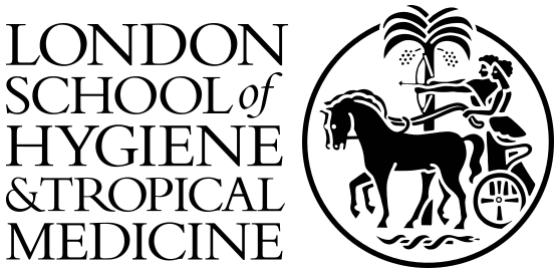

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Hygiene behaviour and hygiene behaviour change during humanitarian crises.

Sian White

Thesis submitted in accordance with the requirements for the degree of a Doctor of Philosophy of the University of London, March 2022

Faculty of Infectious and Tropical Diseases

Department of Disease Control

LONDON SCHOOL OF HYGIENE & TROPICAL MEDICINE

Funded by the USAID's Bureau for Humanitarian Assistance

Declaration

I, Sian White, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Sian White, March 2022

Abstract

More than any other public health intervention, handwashing with soap can reduce the burden of faecal-oral diseases. Over the last decade substantial research and programmatic investment have gone into better understanding the determinants of people's handwashing behaviour. However, this research base is derived almost entirely from work conducted in stable settings. When a humanitarian crisis occurs, whether it be a disease outbreak, a disaster or a conflict, the social and physical environments of the affected population are disrupted. At the same time, disease risk related to faecal-oral pathogens substantially increases. Given that we currently lack an in-depth understanding of the factors that drive behaviour in crises, hygiene programmes in these settings typically rely on a narrow set of 'traditional' interventions such as health education and the distribution of hygiene kits. Although knowledge about handwashing and enabling products are likely to be important, these interventions alone have been shown to be insufficient to lead to meaningful and sustained changes in behaviour. Recent systematic reviews and research agenda setting activities within the humanitarian sector have suggested that research on hand hygiene behaviour and improved hygiene programme design in emergencies should prioritised.

This thesis is grounded in a pragmatic epistemology and uses a mix of methods drawn from the disciples of cultural anthropology and behavioural science. It aims to better understand what influences hygiene behaviour during crises and outbreaks and identify opportunities for effective hygiene behaviour change in these settings. The thesis includes five manuscripts. The first is a literature review which aims to identify and categorise the determinants of handwashing behaviour in stable settings, crises and outbreaks and to appraise the quality of this evidence. The second assesses the strengths and limitations of a survey-based tool which is commonly used in humanitarian crises to understand behavioural determinants. The third and fourth paper are qualitative case studies set in Iraq and the Democratic Republic of the Congo. Both explore how the determinants of handwashing behaviour are shaped by different types of crises. The thesis concludes with a paper about experiences and challenges faced by humanitarians when designing hygiene programmes in emergencies.

Prior research on behavioural determinants was found to be poor quality and limited by methodological challenges and inconsistent definitions of determinants. The literature review was unable to draw conclusions about the determinants of hygiene behaviour in crises or outbreaks due to a lack of evidence. Current approaches to assessing determinants in crises were feasible to conduct but were methodologically limited and unable to fully account for contextual factors and

the impact of the crisis on behaviour. The qualitative case studies indicated that the relative importance of certain determinants is likely to vary during crises and outbreaks. The characteristics that appear to affect the variation of behavioural determinants include the type of crisis; the phase of the crisis or outbreak; the physical and social context; and the broader consequences of the crisis or outbreak on the lives of the affected population. The determinants that seem to be most influential in driving hygiene behaviour during crises and outbreaks included risk perceptions; the prioritisation of time and resources, daily routines; and factors within the behavioural settings where handwashing takes place (such as access to handwashing facilities, water and soap). Interviews with humanitarians indicated that the constraints humanitarians faced when designing hygiene programmes, and the way they made decisions, were remarkably similar across contexts, leading to programming that was also relatively de-contextualised. Hygiene programme design processes were considered sub-optimal, but humanitarians struggled to implement the more ideal principles and processes that they aspired to due to time pressures; financial constraints; limited capacities; the infeasibility of assessment tools; unequal partnerships organisations; and poor sector learning processes. Given these constraints, most programmatic decisions were based on the intuitions and past experiences of managerial staff. The findings presented in this thesis offer opportunities for strengthening the assessment of behavioural determinants and improving hygiene programme design so that it can be done rapidly, while still being contextualised and evidence-based.

In memoriam

I would like to dedicate this thesis to two people who have shaped my life, and this PhD, immeasurably.

Firstly, this PhD is dedicated to Val Curtis. Val was my mentor, my line manager and my supervisor both when I was a master's student as well as during my PhD. Val's passion for changing the lives of others and her revolutionary work on hygiene and behaviour change was inspiring and infectious. When I first heard Val give a lecture about her work, I knew immediately that this was something that fascinated me and that I wanted to be involved in! Despite my initial hesitations, Val saw something in me worth cultivating and persuaded me that academia was a worthwhile pursuit, even though she knew my first love was always programme management. Her mentoring, encouragement, and her trust in me, encouraged me to embark on this PhD. Her multiple rounds of questioning and critique during the first phase of my PhD, were sometimes hard to take but proved essential in refining my scope of work and developing my own critical view of my research. Val's passing in October 2020 still hits me with waves of disbelief. It's hard to comprehend that someone so full of life, and with so many remaining ambitions, is no longer here. I can only hope that this thesis measures up to her high standards and in some small way carries on her impressive legacy.

Secondly this thesis is dedicated to my father, Roger White, who passed away in March 2021. It would be silly to even attempt to summarise the multitude of ways that my dad has shaped my life. What I will say is that he always placed the highest value on education, despite leaving school himself when he was 15. In one salient moment before he passed away, he pulled me closer and said "just finish your PhD, kiddo". So here you go dad - this one is for you.

Acknowledgements

While there may be one name on the front of this PhD, it has been anything but an individual effort, and there are many people who have guided and supported me throughout this tumultuous and longer-than-anticipated journey.

I have had the support of four incredible supervisors over the course of my PhD - Robert Dreibelbis, Val Curtis, Jennifer Palmer and Karl Blanchet. Each provided unique, complementary perspectives which have shaped this thesis and each have been an invaluable support to me along this journey. I have learnt so much from all of you. A particular thanks to Robert, who stepped in as my lead supervisor after Val's passing and subsequently had the difficult task of pushing me across the finish line! Robert, your clear and constructive guidance made this stage so much easier. I would also like to thank my advisory team of Adam Biran and Robert Aunger. Both have tolerated me randomly firing questions at them over the course of this PhD and have always responded with thoughtful recommendations. To Oliver Cumming, who has been my line manager for the last year and half, I thank you for your steadfast support and your guidance on how to juggle competing priorities. Somewhat ironically, I am particularly appreciative that you supported my decision to put this PhD on hold while I undertook COVID-19 response work in 2020/21. This showed a deep appreciation for my motivations. While this decision delayed things substantially, it would have been odd to spend this time writing about handwashing during outbreaks, rather than applying this knowledge to the global pandemic. I would also like to thank my colleagues in the Environmental Health Group who were always there as a sounding board for ideas or a good rant about the difficulties of doing a staff PhD. In particular, I would like to thank those in the group who went through this PhD journey alongside me or graduated in the last few years and provided many useful words of wisdom, so thanks to Lauren D'Mello-Guyett, Katie Greenland, Julie Watson, Ian Ross, Fiona Majorin, Ben Tidwell, Jane Wilbur, and Kavita Chauhan.

Outside of LSHTM I have also had a great deal of support. I would like to particularly thank my 'Wash'Em family' for being willing to take a risk and go on this journey with me. A particular thanks to Tom Heath, Jean Lapegue, Karine Le Roch, Olivier Mills, Lisa Mitchell, Lona Robertson, William Thorsen, Camilla Thorsen, Angie Fleischer, Jonathon Hamrell, Astrid Hasund Thorseth and Jenny Jamb. I am thankful to all of you for your questions, your interest in this topic, the endless hours you have thrown into this project, the countless zoom calls, the many glasses of wine we enjoyed together pre-pandemic, and most of all your support and encouragement.

By relative chance I seemed to have ended up with the most remarkable group of research assistants to work with in Iraq and DRC. Through our long sweaty days of data collection, the bumpy car rides, and the laughs and tears of working in such difficult settings, I felt privileged to get to know you all. I learned so much from you all during this research. I admire the passion you put into this work and am so glad that several years on we remain close friends. So thank you Dilveen Ihsan, Waleed Khlaid Ibrahim, Aso Zangana, Anna Mutula, Modeste Buroko and François Mazimwe. The fieldwork components were made possible due to the hard work of colleagues in ACF in both countries - staff who are too numerous to name here. I knew from the outset that this research would be an addition to your workload and that you didn't all necessarily sign up for it. So I thank you for the constant good humour and the support you gave our team. Particular thanks to Tara Vernon, Waleed Rasheed, Honar Hasan, Asmaa Farooq, Geraldine Delestienne, Léon Ngwasi, and Batian Arthur Benao, who made me feel so welcome, spoke to me frankly about the challenges of the humanitarian sector, and welcomed me into their homes and lives. Most importantly this thesis is dedicated to all the humanitarians and people within the crisis-affected populations who spoke with us for this research. I am not sure I could ever do justice to the richness of the experiences you shared with us, but so many of our conversations will forever be etched into my memory and will continue to remind me of human resilience, kindness in the face of adversity, and my own privileges.

Lastly to my family. For you, 'thank you' doesn't even cut it. So to my partner Tristan, my mother Mary, and my wonderful extended family and in-laws, thanks for always magically knowing when to ask about my PhD and when to distract me from it! Most of all thanks for your constant, unwavering love and support. I am truly lucky to have such fabulous humans in my life.

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List of Acronyms

ACF – Action Contre la Faim

ARI – Acute respiratory infection

BCD – Behaviour Centred Design

DRC – Democratic Republic of the Congo

FGDs - Focus group discussions

IDIs – In-depth interviews

IDPs – Internally displaced persons

IEC – Information, education and communication materials

INGO – International non-government organisation

LMICs - Low-or middle-income countries

LSHTM – London School of Hygiene and Tropical Medicine

NGO – non-government organisation (when referenced in this thesis this refers to a national organisation as opposed to INGO)

UN Agency – An agency or administrative unit of the United Nations

UNICEF - United Nations Children's Fund

WASH – Water, sanitation and hygiene

WHO – World Health Organisation

Chapter 1: Introduction to the thesis

In this introductory chapter I outline the research rationale, aims and objectives, and discuss my positionality in relation to the research topic. I also summarise the ethical and harm minimisation approaches used throughout this research and the funding that supported it. I conclude by providing an outline of the subsequent chapters in this thesis.

1.1 Rationale for this thesis

In humanitarian crises people are often displaced to crowded environments and social systems and infrastructure are disrupted. In short, emergencies create the 'perfect storm' of conditions which are conducive to the spread of faecal-oral diseases [1, 2]. In these settings water, sanitation and hygiene (WASH) interventions are the main way of preventing diarrhoea, acute respiratory infections (ARIs) and outbreak-related diseases [3]. In cases where the state is unable to meet needs, humanitarian organisations often step-in to provide or improve water and sanitation systems. The hygiene component within WASH is often regarded as more complex, requiring both infrastructure provision and local-level interventions to maintain or improve the behaviour of crisis-affected populations [4]. Handwashing with soap, has the potential to substantially reduce disease morbidity and mortality yet programmes to promote it in crisis-affected settings are routinely underfunded, poorly designed and implemented and under researched [3-11]. While these problems are widely acknowledged, the humanitarian system has been slow to address them. This is partly because of a lack of understanding about what actually influences hygiene behaviour in the wake of a crises and partly because behavioural frameworks are typically designed with stable settings in mind [4]. Approaches designed for stable settings are often impossible to use within humanitarian responses where capacity, finances, logistics, time and security are more constrained. Improving the way that hygiene programmes are designed in crises would allow for aid funding to be used more effectively and would help curb disease transmission and mortality in the settings where people are most at risk.

1.2 Thesis aim

This thesis aimed to respond to the humanitarian operational and evidence gaps described above [4, 7, 12]. It aims to better understand what influences hygiene behaviour during crises and outbreaks and identify opportunities for effective hygiene behaviour change in these settings.

1.3 Thesis objectives

This thesis contributes to achieving the aim above by fulfilling four research objectives:

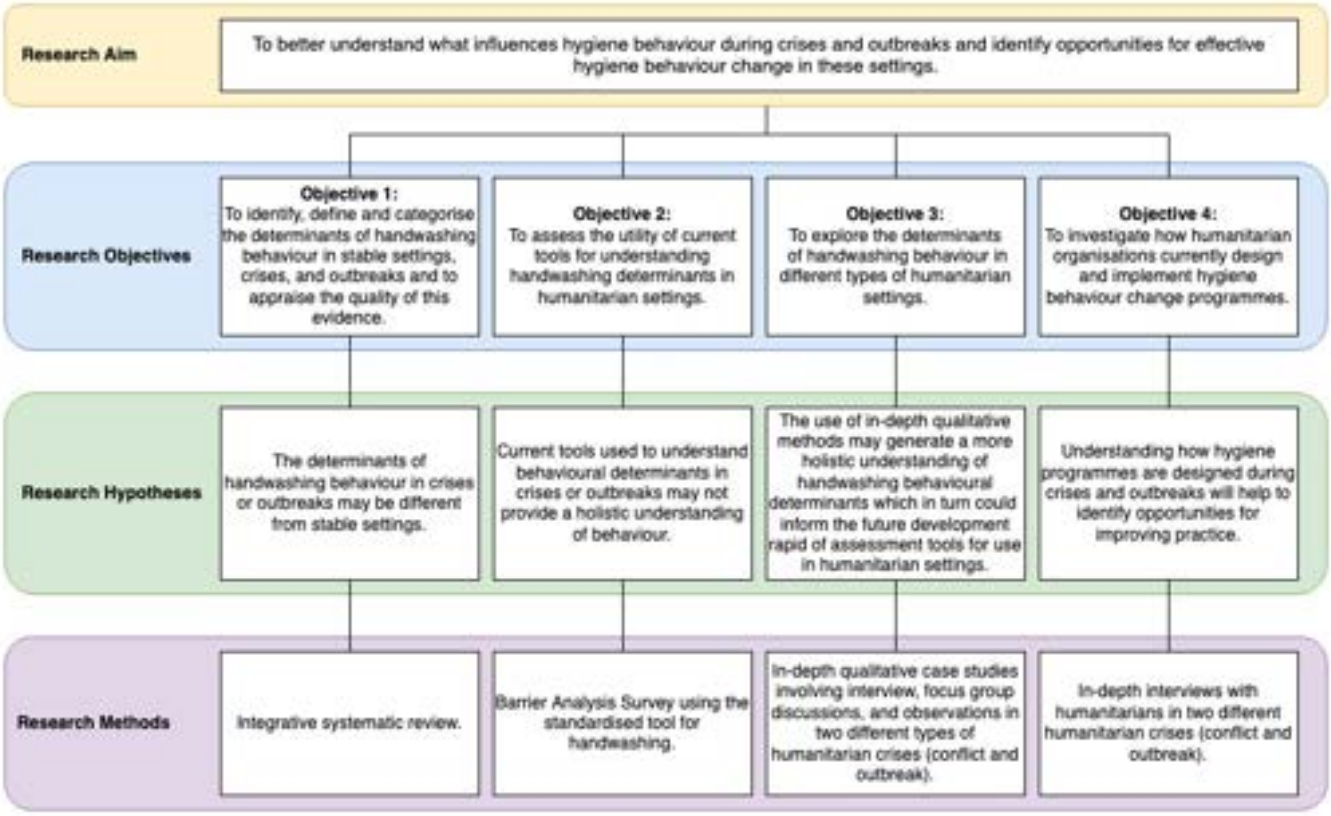
1. To identify, define and categorise the determinants of handwashing behaviour in stable settings, crises and outbreaks and to appraise the quality of this evidence.
2. To assess the utility of current tools for understanding handwashing determinants in humanitarian settings.
3. To explore the determinants of handwashing behaviour in different types of humanitarian settings.
4. To investigate how humanitarian organisations currently design and implement hygiene behaviour change programmes.

1.4 Overall research design and methods

My research was grounded in a pragmatic paradigm and therefore used a range of methods to address these research objectives. The methods used in this thesis are informed by a range of disciplines including anthropology, sociology, behavioural science, psychology and epidemiology. Methods were selected based on their ability to generate useful data to respond to each objective. Method selection also considered the acceptability, feasibility and ethical consequences of each method when applied within crisis-affected settings. Where possible I selected methods that had already undergone some reliability and validity testing in other settings. However, in cases where no appropriate method could be identified, new methods were developed and tested as part of this research.

Figure 1.4 summarises how the aims and objectives relate to the research hypothesises and methods selected and below I outline the rationale for each of the methods selected. Each method is also described in more detail in the subsequent papers and the research tools are included as Annex 6.

Figure 1.4: Overview of the research aims, objectives, hypothesises and methods



1.4.1 Integrative systematic review on the determinants of handwashing behaviour

Linked to objective 1, a central hypothesis of this research is that the determinants of handwashing behaviour in humanitarian crises may be different from the determinants of handwashing behaviour in stable settings. A review of available evidence from stable settings, humanitarian crises and public health emergencies was considered an appropriate way of comparing what is known about the determinants across these settings and appraising the quality of this evidence. An integrative review following the process outlined by Russell [13] and Whittemore and Knafl [14] was selected. This was because it allowed for the inclusion of diverse study types, required an appraisal of the quality of evidence, and is aimed at informing or developing theory and identifying evidence gaps. However, given the nature of the research question some modifications to this standard integrative review method were made, particularly at the point of data analysis. Specifically, the review sought to differentiate between the overall quality of an included study, and the quality with which it defined and assessed determinants. To address this, I developed a composite quality score which combined three quality measures: the overall study quality; how well determinants were defined; and how

valid and reliable the methods were to assess both determinants and behaviour. Data analysis within integrative reviews typically utilise theory [13], and in this case, I used the determinant categories outlined in Behaviour Centred Design [15] as a way of categorising determinants. The review was designed to extract commonalities in determinants across contexts and study types. To do this, directional patterns of association were mapped for all determinants that were reported in three or more studies and classified against seven categories. Lastly, through sub-analysis I was able to compare evidence across the three types of settings analysed to draw some conclusions in relation to the first research objective.

1.4.2 A Barrier Analysis Survey to assess handwashing behavioural determinants using a standardised and common approach

In stable settings, 'formative research', using a mix of methods, is often used to understand the determinants of hygiene behaviour [16-21]. However, formative research typically requires some familiarity with social science methods, it can be time consuming, and data from formative research can be challenging to triangulate and analyse to inform programming. Accordingly, in-depth formative research is rarely applied in acute crises and so research objective 2 aimed to assess structured tools commonly employed in humanitarian crises as an alternative to in-depth formative research methods. The hypothesis related to this objective was that these rapid tools may only gather a partial picture of the determinants of the handwashing in these contexts. This may represent an important gap given that behaviour change interventions are more likely to be successful if they target a range of determinants and barriers [15, 22, 23]. Following a grey literature review of resources used to inform hygiene programming in emergencies (presented in chapter 2), the Barrier Analysis Survey which is part of the Designing for Behaviour Change Framework (BCD) [24] was identified as the only standardised tool that had been applied to crisis-affected settings by multiple organisations and as part of routine programming processes. The Barrier Analysis approach has clear guidance and is informed by behaviour change theory which outlines a clear process for moving from findings to programme design. The standard Barrier Analysis Survey for assessing handwashing behaviour was applied in two camps in the Kurdistan Region of Iraq [25]. To align the Barrier Analysis Survey with standard humanitarian practice, I trained two staff members on the approach and supported them as they translated and piloted to survey, used it within the camps and analysed data according to the standardised approach. The survey was conducted in some of the same research sites as the more in-depth qualitative research (described below) allowing for the comparison of approaches and findings.

1.4.3 Qualitative research among crisis-affected populations to understand the determinants of behaviour in crises and outbreaks

Following on from the previous component of work, objective 3 assumes in-depth qualitative research may be needed to inform the development of holistic and feasible tools to assess handwashing determinants in crises and outbreaks. It also assumes that behavioural determinants and handwashing behaviour are likely to vary by the cultural and geographical context [26-28], the nature of a crisis (e.g. conflict affected region compared to an outbreak affected region) and the phase of the crisis (e.g. acute compared to protracted phase).

To explore this research objective, I used a mix of qualitative methods including observations, in-depth interviews (IDIs) and focus group discussions (FGDs). These were applied in crisis-affected settings where risks of faecal-oral disease outbreaks were high. This included a post-conflict setting with large scale displacement in Iraq and a cholera outbreak amid a complex crisis in the Democratic Republic of the Congo (DRC). Unstructured observation was used as the primary measure of handwashing behaviour in these studies.

The primary way of understanding behaviour in these qualitative case studies was through unstructured extended observation. Observation has its limitations but it is often regarded as the 'gold standard' for understanding routine behaviours like handwashing because it provides the opportunity to understand how behaviour occurs within a naturalistic setting and avoids the over-estimation of socially desirable behaviours (a common limitation of self-reported measures) [29].

To ensure that a diverse range of determinants were explored, the list of behavioural determinants outlined in the BCD Framework [15] was used as a guide. By reviewing the BCD formative research guide [16] and broader literature from a range of disciplines (including social marketing, anthropology, sociology, behavioural science), I identified specific participatory activities that could be used within interviews and focus groups to explore each determinant. Participatory methods are those which go beyond 'talk-based' techniques [30] and instead engage the research participant in activities which use visuals, props, vignettes, and practical exercises such as simulations, games or tasks. Participatory methods were considered appropriate for this research because they are more able to overcome some of the common biases and limitations of self-reported perspectives on behaviour. Instead, participatory activities provide a different means of learning about behaviour that is collaborative and focuses on the ways knowledge is constructed by individuals and communities [31]. The participatory methods I used were oriented towards understanding lived

experiences, behavioural decision-making, and used abstract scenarios to encourage participants to describe patterns of behaviour within their community. These methods were also intended to make participation in the research more enjoyable for participants and to accommodate a broad range of literacy levels among participants [32, 33]. Each of the participatory methods were adapted to be focused on handwashing and to be relevant for use in humanitarian contexts. They were then piloted in Iraq and DRC and modified to facilitate acceptability and understanding.

1.4.4 In-depth interviews with humanitarian WASH actors to understand hygiene programme design

This research hopes to inform the development of improved processes for rapidly assessing the determinants of behaviour and designing evidence-based hygiene behaviour change interventions in crises. The hypothesis underpinning Objective 4 is that by understanding how hygiene behaviour change programs are currently designed, it will be possible to identify potential opportunities for change and to design tools that are conscious of the constraints that humanitarian actors must operate within. To effectively explore this, I conducted in-depth interviews with humanitarians involved in hygiene programming in Iraq and DRC. In-depth interviews were selected as the method to explore this objective because they provide personal narrative accounts of contextualised experience [34, 35]. This allowed the research to explore not just what was done when designing hygiene programmes but also why it was done, how decisions were made, and how participants constructed themselves in relation to the organisations they worked for, the populations they worked with, and the broader humanitarian system. In-depth interview guides were informed by past research [4, 5, 36, 37], behavioural theories [15, 38-40] and the Humanitarian Programme Cycle [41].

1.5 Positionality and motivation for undertaking this research

Increasingly, research recognises that a researcher's socio-demographic characteristics, world view, experiences and beliefs shape the way they approach a topic, research it, and interpret and frame the findings [42-45]. It is therefore necessary to begin by situating myself and my socio-cultural background in relation to the subject, the research context and my research participants.

On the surface I come to this research as an 'outsider', having lived a privileged middle-class life in Australia and England, that has been sheltered from the direct effects of disaster, conflict, and disease outbreaks. Growing up, my family encouraged me to be curious about the world and question inequity and the systems that perpetuate it. Due to my parent's professions, I travelled a

lot from a young age, and this inevitably shaped my liberal worldviews and my sense that my identity as a global citizen was more important than the nationality on my passport. My pale skin and blonde hair meant that my 'foreigner status' would be immediately obvious to all those I interacted with over the course of this research. I had never travelled to Iraq or DRC prior to this research and most of my prior behaviour change experience came from more stable low-and middle-income countries (LMICs). Prior to undertaking this research I read books and followed news alerts about both locations, but these provided me a relatively shallow outsider perspective on national history and current events.

There were two experiences from my career that brought me to research this topic. The first occurred in 2010 when I was living in Papua New Guinea. At the time I was working on the National Tuberculosis Program and our organisation's role focused on changing health seeking behaviour and treatment adherence. One day when I was in a remote region of the Highlands, I got a call from a colleague at the WHO saying that they had just confirmed the first ever cholera case in Papua New Guinea and that they were requesting for our organisation to lead on the hygiene and behavioural strategy for the outbreak's control. To start with, my colleague from WHO explained, they needed a cholera poster which they could disseminate - and they needed it by the following morning. Feeling panicked with the urgency of the situation, I failed to draw on what I knew of behaviour and local norms, traditions and demographics. I developed a poster that was unsuitable for low-literacy populations, and which was designed to educate people on transmission of this new disease. Thousands of these were printed the next day and distributed around the country yet I am almost certain no one's behaviour changed because of it. When I returned to the capital I reflected on the error of my ways and mobilised a small team to try to find out what contextual aspects of behaviour could lead to increased cholera transmission. This generated some interesting findings, but it took several weeks to conduct. When we eventually shared the findings with the recently established Emergency Response Cluster no one, including me, knew what to do with them. How were we to go about designing a program based on this? Ultimately our indecision meant that no preventative interventions were implemented, but fortunately cholera cases naturally declined. My solution to addressing this gap in my understanding (and many others), was to study a master's in public health, after which I transitioned into working in research within the WASH sector.

The second experience happened in 2015 when I was a research assistant at the London School of Hygiene and Tropical Medicine (LSHTM). By this point I had spent a couple of years working on applied behaviour change projects and had a better understanding of how to undertake formative research on behaviour and translate these into targeted intervention ideas. I was asked to provide a

behaviour change training to humanitarian WASH staff at Action Contre la Faim (ACF). It was not the first time I had run such a training, based on Behaviour Centred Design [15], but it was the first time I had delivered this to a humanitarian audience. It quickly became apparent that the thorough, theory-driven approach we were describing, wasn't feasible amid short humanitarian timelines, the stress of crisis response work, and capacity limitations. At lunch time I raised my concerns with the Senior WASH Advisor, and we agreed that new research-informed hygiene behaviour change processes are needed for humanitarian settings. We left the training with a plan to jointly apply for funding to conduct this research. A year later the research started.

I shall return to issues of positionality at the end of this thesis, reflecting on how my positionality changed over the course of the research, how my subjectivities may have biased the conclusions I have drawn, and providing specific examples of moments where my view of research participants, or their views of our research team, may have shaped the results.

1.6 Intellectual ownership, funding, ethics and harm minimisation

1.6.1 Intellectual ownership

While I led all elements of the research in this thesis, I received support and advice from my supervisors and advisory team throughout and logistical support and humanitarian system insights from staff at ACF. The data collection, preliminary analysis and dissemination of findings was made possible because of the hard work and reflections provided by the research assistants I worked with in each country. The research staff I hired were employed as ACF for the duration of the work and had prior experience working for non-government organisations, providing translation, or collecting data to inform humanitarian programming. In many ways the research team were similar to the crisis-affected populations we were working with, however for reasons I detail in chapter 8, it was not possible to work with research assistants from these crisis-affected communities. In both research locations we were able to work with two community members who facilitated our interactions with crisis-affected populations. All of the data collection was done jointly, meaning that a female research assistant, a male research assistant and myself were present for all IDIs, FGDs, and observations. The mix of genders within our team was designed to put participants at ease and the process of joint data collection allowed us to pool our collective perspectives to inform a richer interpretation of findings.

1.6.2 Funding

The literature review and data collection in Iraq and DRC was supported by a grant from the Office of U.S. Disaster Assistance now called USAID's Bureau of Humanitarian Assistance (Award no: AID-OFDA-G-16-00270). However, the contents of the research are my responsibility and that of my co-authors, and do not necessarily reflect the views of USAID or the United States Government. The donor had no involvement in the design of the methods, the data collection and analysis or the way findings have been interpreted. However, the donor does deliver humanitarian WASH programmes in both of the study sites and did go on to fund some of the subsequent applied work stemming from this research (see chapter 8 for more information).

1.6.3 Ethics approvals

Ethics permission for the study was provided by the London School of Hygiene and Tropical Medicine (Protocol 13545), the University of Kinshasa's Public Health School in DRC (Approval no: 038/2017) and Hawler Medical University in the Kurdistan Region of Iraq. Approval letters are included in Annex 9.

1.6.4 Ethical considerations and harm minimisation

The challenges of ethical research conduct in humanitarian crises have been widely documented [46-51]. This literature acknowledges that research in crisis-affected settings is integral to improving humanitarian practice but that the unique characteristics of crises are likely to exacerbate ethical issues and increase risks related to research. Below I describe the ethics risks that were identified and how these were mitigated during the field-based components of this research. In discussing these, I refer to ethical implications on two different research populations: crisis-affected populations and humanitarians.

<u>Participants may feel pressured to participate</u>

Informed written voluntary consent was sought from all participants. To facilitate this, information about the study was translated into Arabic, Kurdish, French, and Congolese Swahili. The information sheet made clear that participation was voluntary and would not have any bearing on their access to humanitarian aid (crisis-affected populations) or their employment (humanitarians). It also explained that their data would be anonymised. In the case of humanitarian staff, it was anonymised at the level of the individual and organisation to avoid deductive disclosure and allow people to openly

reflect on their organisation's work. Information sheets were emailed to all members of the WASH Cluster in Iraq and DRC and were then discussed with potential participants. Information sheets were read to all potential crisis-affected participants to mitigate literacy issues. In cases where a person was unable to sign their name, they marked the consent form with a fingerprint which was witnessed by a literate neighbour. Participants were invited to ask the research team questions about the study. An additional section of the consent form was completed for audio recording and for any video or photos that were taken during some of the methods. For household observations, adults within crisis-affected households were asked to provide consent and then a simplified explanation of the study was given to any young people in the household between the ages of 7-18. These younger participants were asked for their verbal assent. Given the proximity of living in the displacement camps in both countries, neighbours were also informed about the study so that they understood what was taking place. Since we had mix-gendered research team, the female research assistant would lead interactions with women and vice versa for male participants. Consent was verbally confirmed again at the end of each person's participation [52]. Participants were left with a copy of the information sheet and encouraged to contact the research team if they wanted to later retract their participation. Copies of the information and consent forms in English are provided in Annex 8 and copies of the ethics approvals are provided in Appendix 9.

Despite these measures it is still possible that some people felt pressured to participate. This has been acknowledged as a challenge in other humanitarian settings [51] given power relationships between researchers and crisis-affected populations and the fact that the research was associated with an organisation (ACF) who were involved in providing aid in these locations.

Participants may not directly benefit from the research

During the information and consent process humanitarians and crisis-affected populations were informed that they may not receive any direct benefit from participating in this research but that findings would be used to improve hygiene programming in humanitarian settings. Humanitarians participating in the research, and others working within the WASH Cluster or regional governments, were invited to a workshop which shared the preliminary findings from the research so that this could be used to inform their hygiene programming. Crisis-affected participants were given food and drinks if they participated in FGDs and were given bars of soap as a thank you gift if they participated in IDIs or observations. Participants were not informed of these gifts in advance.

Participants may become distressed during the research

While this research focused on handwashing behaviour and hygiene programme design, these things do not exist in isolation and so it was possible that during the discussion of these topics, other difficult memories may surface [53]. This was particularly likely given that almost all the crisis-affected participants will have gone through recent traumatic circumstances [54, 55] and most of the humanitarians will have worked within crisis-affected contexts for multiple years [56, 57].

To reduce the likelihood of this issue it was important that our research team understood what discomfort or distress might look like and accordingly made plans for how to handle such situations. In Iraq, I worked with my local research team to discuss how participants may express distress in this context, in verbal and non-verbal ways. We also discussed how we would act when these signs were identified, including stopping the research process. We worked via the networks of ACF and with other humanitarian actors, to identify services that we could refer people onto if individuals needed further mental health or social support. Lastly, we talked about the potential psychological impacts of the research on the research team, including how the team might handle any distress they experience and what support structures are available to help. Experiences from the fieldwork in Iraq helped to formalise a distress planning tool which structures this process. The distress planning tool was then used in DRC. It is included as Appendix 6.

Additionally, we spent a week in each country piloting the participatory activities that were conducted within IDIs and FGDs. This helped to contextualise the tools and led to some standardisation in the ways that we defined important terms and explained each method. In Iraq one of the methods was dropped at this point (Behavioural Trials) due to constraints of implementing this ethically within some of the camps. At the end of each day of data collection, the research team met to discuss experiences that day, reflexivity, and emergent research themes [58, 59]. Through this process we actively identified ways of strengthening methods and minimising harm. In Iraq this led us to drop one of the participatory activities that was initially conducted during IDIs, prior to us reaching a point of saturation for this method. This was the Social Network Mapping activity, which while working fine with several participants, caused two participants to become upset as they recalled relationships that had been lost due to the conflict. The method was piloted and used without issue in DRC however, similar issues have been identified when using this approach with child refugees in other settings [60].

<u>The research may detract from the provision of humanitarian aid</u>

The research took place at the height of two humanitarian crises and therefore we were conscious that the logistics support required from ACF should not jeopardise their ongoing provision of humanitarian aid. To mitigate this, programmatic staff were not directly involved in this research and instead we hired independent research assistants. We had intended for some or all these research assistants to be students or staff at local academic institutions in both countries. We had intended that this would contribute to local capacity strengthening around qualitative and behavioural research and build links between humanitarian organisations and these institutions. Our partnership with Hawler Medical University made this possible in Iraq, where the research assistant who supported with the Barrier Analysis Survey was also a PhD student at the university. However our academic partner in DRC was not located close to the research site (which was selected after this partnership was formed) and so we were unable to involve staff or students in a similar way. For the interviews with humanitarians, we adopted a flexible approach to scheduling the interviews so that participation did not detract from their usual work.

The research staff may face security risks

A range of measures were adopted to identify and mitigate security risks in both countries. This included:

- All staff underwent security training.
- A risk management plan was developed for the research.
- All research staff team members carried radios and these were used to inform the ACF base on our movements on an hourly basis.
- The research team had security briefings with ACF security managers each morning of the field-based data collection.
- All research happened during daylight hours.
- The research team travelled in an ACF marked vehicle and wore ACF marked vests. This was deemed necessary as ACF had a positive relationship with communities in both regions.
- In all sites we built rapport with local government and non-government stakeholders and kept them updated about our work.

Given that our research did not involve 'life-saving work' we avoided security threats where possible. For example, on occasions where security threats were identified, these were discussed between the research team and security managers and were typically mitigated by not travelling to

the research sites on those days. In total, security threats interrupted this research on one occasion in Iraq and on three occasions in DRC.

1.7 Thesis structure

The thesis is broken into eight chapters. Following this introduction, chapter two locates this research within the broader literature. It provides an introduction to the humanitarian sector, disease control within crisis-affected settings and the history of handwashing promotion. It then delves deeper into behavioural theory and explains how this research is positioned in relation to specific frameworks and broader research paradigms. It summarises what is known about what works to change hygiene behaviour in stable settings, outlines why this may differ in crisis-affected settings, and provides a grey literature summary of the resources and processes currently used to inform programme design in crises. The final section of this chapter reviews literature from the disciplines of behavioural science and cultural anthropology and discusses how this literature provides an understanding of behavioural determinants in humanitarian crises.

Chapter three presents the first of five papers within this thesis – a literature review of the determinants of handwashing behaviour in stable settings, crises and outbreaks. Chapter four presents a paper which utilises a quantitative survey to assess the determinants of handwashing behaviour in Iraq. This approach was undertaken because it is a widely used approach currently and will serve as a point of comparison for the research presented in the subsequent two chapters. Chapter five presents an in-depth qualitative case study exploring how the determinants of handwashing are affected by conflict and displacement among populations in Iraq. Chapter six applies the same methodology to assess how the determinants of handwashing behaviour are affected by a cholera outbreak in the DRC. Chapter seven presents the last of the five papers, which centres on the experiences and opinions of humanitarian staff involved in hygiene programme design in crises.

In the final chapter, I bring each part of this thesis together to discuss the main findings, the methodological and theoretical implications of this research, and recommendations for researchers and humanitarian practitioners. Included in this section is a description of the way that findings from this thesis have already informed research and humanitarian practice. This chapter also includes a discussion on the limitations of this research, the likely validity and transferability of findings, and reflections on the ethical issues that arose and the effect of researcher positionality on the data collection process and interpretation of findings.

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Chapter 2: Situating this research within the broader literature

This chapter sets the scene for the thesis by locating the research within the broader literature. It is divided into three parts. The first part focuses on infectious disease epidemiology in crises. It provides key definitions and contextual information about WASH-related preventative measures for faecal-oral diseases, with a specific focus on the relative importance of handwashing with soap. Common definitions and typologies of 'humanitarian crises' are also introduced along with an explanation of how these settings give rise to increased rates of morbidity and mortality from faecal-oral diseases.

The second part of the chapter is grounded in behavioural science. It starts with a historical overview, documenting key shifts in the ways that handwashing has been promoted in recent decades. It describes the progress that has been made on behaviour change in stable settings, while contrasting this with typical hygiene programming in crises. I then zoom out to explore why behaviour change may have gained popularity within public health in recent years and summarise key theories and frameworks for understanding behaviour, eventually providing a rationale for the behavioural theory used in this thesis.

In the third part of this chapter, I provide two literature summaries which will inform the subsequent research. The first is a summary of literature from cultural anthropology and behavioural science around several pertinent themes. The second is a grey literature review of guidance that humanitarians use to inform their hygiene programming.

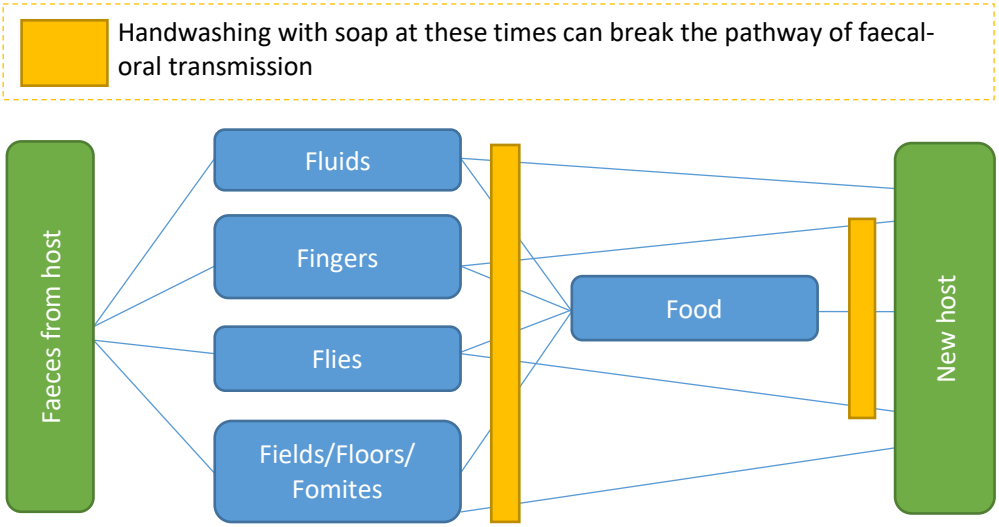
2.1 Prevention of diarrhoea, respiratory infections and other outbreak-related pathogens

2.1.1 How does handwashing with soap affect public health outcomes?

Diarrhoeal diseases and Acute Respiratory Infections (ARIs) are two of the leading causes of preventable deaths among children under the age of five, globally [61, 62]. Water, sanitation and hygiene (WASH) interventions are among the key preventative strategies for diarrhoeal disease [63] and improved handwashing with soap also has the potential to reduce ARIs [64, 65]. The ability of handwashing with soap to interrupt disease transmission is explained through the F-diagram (Figure

2.1) which depicts the pathways of transmission for faecal-oral pathogens and shows that handwashing with soap has the potential to interrupt all pathways.

Figure 2.1: The F-diagram of Faecal Oral Transmission shows the potential for handwashing with soap to reduce transmission



2.1.2 Handwashing – how, when and with what?

At a community level, it is generally agreed that there are four critical times for handwashing with soap in order to interrupt enteric pathogen transmission. These are after defecation; after cleaning a child's bottom or clearing up child stools; before food preparation; and before eating (including before feeding a child) [66].

The WHO describes 11 steps for effective handwashing. However, there is little evidence to support each of these individual steps [67]. In fact, interventions that have tried to improve handwashing technique at a community level have not been able to establish that these improved techniques had any impact on hand contamination [68]. Having said this, some of the steps seem to be more important than others, for example cleaning under nails [69-71] and rings [72, 73] can make a difference to overall handwashing efficacy, as these are locations which typically harbour pathogens. Hand drying is also important as it can remove any residual pathogens [74] and prevent hand recontamination [75]. Thorough handwashing, involving rubbing both hands together to create friction is also likely to be important.

The Centres for Disease Control (CDC) recommends handwashing for at least 20 seconds, while the WHO recommends handwashing for 40-60 seconds. However, within a domestic or community environment, handwashing is typically only practiced for approximately 5-10 seconds [76]. Even under study settings, when people knew their handwashing was being observed, they washed their hands much more quickly than recommended [77]. Therefore, while longer durations of handwashing are more likely to be effective [78], there may be trade-offs in terms of the feasibility of such recommendations within daily routines.

For handwashing within domestic environments, handwashing with soap is normally recommended. Soap is a widely available commodity globally [79-84], is relatively affordable, easy to use and is gentle on skin. It is also highly effective at removing pathogens from hands, and can typically reduce transient bacteria by 0.5 to 3 $\log^{10}$ (this can be interpreted as reductions of up to 99.9%)[77]. In terms of pathogen removal, there is little difference between different brands of soap or between different types of soap (e.g. bar soap, liquid soap, or soapy water) [85]. This is because at a microscopic level, soap works because one end of the soap molecule is hydrophobic and the other is hydrophilic. When a soap lather is developed on hands, the hydrophobic end of the molecule connects with the dirt or oil particles on our hands. When water is added the other end of the molecule, the part that is hydrophilic, connects with the water, allowing the dirt and oil to be lifted off the surface of the skin and washed away. In community settings antimicrobial soaps are not thought to be more effective than un-treated soap [86-88] and are often discouraged due to potential risks of contributing to antimicrobial resistance [89]. Alcohol-based hand rub (ABHR) is generally understood to be as efficacious as soap [90, 91], but is less efficacious against certain pathogens [92]. ABHR is not typically recommended for routine use at a community level because in many countries it is not widely available; it is poor at cleaning hands when they are visibly dirty (i.e. hands covered in mud or hands covered in food after eating); and regular use can cause skin irritation [93]. Handwashing with ash rather than soap is promoted by some government and non-government organisations in parts of Africa and Asia. Sometimes soil and mud are also recommended. The WHO has recommended that such approaches can be used as a last resort option, but there is currently little evidence to support the effectiveness of ash [94], mud [95] or other handwashing alternatives [96]. In certain outbreak settings, handwashing with chlorinated water is recommended [97]. This is effective against a range of pathogens such as Ebola and cholera however, similar to ABHR, handwashing with chlorinated water may be less acceptable to populations due to the odour and feel and can lead to skin irritations [98].

In this thesis I primarily focus on handwashing within the domestic environment or at a community level. The primary focus on is on handwashing with soap in these settings. However, in the literature review presented in chapter 3, the type of handwashing was not always defined in the included studies. In the qualitative case study in DRC handwashing with ash is also discussed because this emerged as a commonly reported practice in the region.

2.1.3 A summary of the evidence of the effect of handwashing with soap on health outcomes

Systematic reviews have suggested that frequent handwashing with soap can result in diarrhoeal disease reductions between 23% to 48% [99-105] and reductions of respiratory infections of between 21% and 23% [64, 65]. Improved hand hygiene is also associated with reductions in neglected tropical diseases such as yaws, impetigo, taeniasis, cysticercosis, trachoma and helminth infections [88, 106-109]. There is some evidence handwashing with soap may reduce acute malnutrition and environmental enteric enteropathy andprevent children from becoming stunted or underweight [110-113]. There is also some evidence that handwashing may improve child motor skills development[114]. Handwashing is also thought to be critical for the prevention of hospital-acquired infections [115] and for reducing the development of drug resistant organisms [116, 117].

Handwashing behaviour change is the most commonly recommended intervention for the prevention of cholera and is part of the standard guidelines for the control of other outbreak-related pathogens [118-124]. The evidence base behind such recommendations is recognised to be limited [123]. A recent meta-analysis of case control studies conducted during cholera outbreaks found that self-reported good hygiene practices and the availability of handwashing materials had the highest protective effect of any of the water, sanitation and hygiene (WASH) factors assessed [125]. Another broader review of cholera risk factors also found that handwashing had smaller but still protective effect against symptomatic cholera [126]. The authors acknowledged that the included studies used inconsistent measures of self-reported behaviour, likely to result in overestimates of actual handwashing behaviour [29]. Handwashing with soap, ABHR or chlorinated water is also recommended during other types of outbreaks. For example, studies have also indicated that handwashing may be protective during outbreaks of shigellosis [127], hepatitis E [128, 129], and coronaviruses such as COVID-19 and SARS [130-132].

2.1.4 Limitations of the literature associating handwashing to health outcomes

While the protective effects of handwashing have been consistently demonstrated in multiple reviews, the quality of studies included in each of these reviews remains biased and of relatively poor quality. For example, handwashing behaviour and its associated disease outcome measures

have predominantly been measured through self-report which is prone to social desirability bias and recall bias. The interventional studies included in some systematic reviews are also likely to be atypical examples of hygiene promotion. For example, an analysis of the 2015 Cochrane review on handwashing [102] found that all the studies which demonstrated substantial diarrhoeal reductions also adopted intensive delivery mechanisms (e.g. with hygiene promotors having daily to fortnightly contact with community members for a sustained period) [133]. Suggesting that interventions with more sporadic engagement, which is more common, are unlikely to be able to achieve the same affect. Furthermore, when these high-intensity studies concluded, handwashing behaviour often declined rapidly [88, 134], indicating that that beneficial health outcomes are likely to be difficult to sustain.

Recent evidence from the WASH Benefits and Sanitation, Hygiene, Infant Nutrition Efficacy (SHINE) trials have also raised broader questions about the effectiveness of WASH interventions. These were high-quality randomised controlled trials conducted in Bangladesh, Kenya and Zimbabwe respectively [135-137]. Each assessed the independent and combined effects of improved infant and young child feeding (IYCF) and improved household WASH on children's linear growth and diarrhoea. To the surprise of many within the WASH sector, the WASH interventions (water chlorination at point of use, increased access to 'improved' pit latrines, safe disposal of child faeces, increased access to handwashing stations and soap, and hygiene promotion) had no effect on linear growth and, with the exception of Bangladesh, the WASH interventions also did not have an impact on reducing diarrhoea [138]. The results indicated that to achieve meaningful reductions in diarrhoea and other enteric infections, WASH interventions need to be high quality and adequately address all routes of faecal-oral transmission [133, 138]. Therefore, while handwashing will be the focus of this thesis, it is understood that in practice handwashing behaviour change should always be implemented alongside other WASH interventions.

2.1.5 Handwashing prevalence

Despite the health benefits of handwashing with soap, it is estimated that only 26% of the world's population wash their hands with soap after contact with excreta [139]. Handwashing rates are estimated to be even lower at other critical occasions. Given that handwashing rates are sub-optimal in high-incomes settings where piped water and soap are found in almost every bathroom and kitchen [76, 140, 141] it is no surprise that in low-income countries, where handwashing is much less convenient and where handwashing facilities are lacking, handwashing rates are even lower [139, 142].

2.2 What constitutes a humanitarian crisis?

The Humanitarian Coalition define a humanitarian crisis as 'an event that causes a critical threat to the health, safety, security or wellbeing of a large group of people' [143]. Humanitarian crises and needs are on the rise. As of 2021 there are up to 273.1 million people globally in need of humanitarian assistance [144, 145]. The last two years have been exceptional because of the impact of the COVID-19 pandemic which has had the effect of compounding several pre-existing trends in recent years.

Humanitarian crises fall into three broad categories: disasters, armed conflicts and disease outbreaks. Disasters are defined as 'a serious event that causes an ecological breakdown in the relation between humans and their environment on a scale that requires extraordinary efforts to allow the stricken community to cope, often with outside help or international aid' [146]. Disasters include events such as earthquakes, typhoons, volcanic eruptions, wildfires, droughts or floods. Disasters have been increasing in scale and severity in the last 20 years [147]. 2020 was one of the hottest years on record and 389 disasters were also recorded that year. These events killed more than 15,000 people, affected 98.4 million and displaced 7 million people [148, 149]. While disasters can affect all countries, citizens in low-income countries experience 68% of all mortality despite constituting only 9% of the global population [150]. Despite disasters increasing in frequency as a consequence of climate change, mortality rates, when adjusted for population growth, are reducing as a result of preparatory measures in many countries [151].

Armed conflicts are the greatest cause of humanitarian needs globally [152]. Armed conflicts include different forms of organised violence such as state-based armed conflict (when one of the warring parties is the government of a state), non-state conflicts (where fighting is between rebel groups or militias) and one-sided violence (such as the targeted killing of unarmed civilians by states) [153]. Armed conflict can also occur within a state, between multiple states or be internationalised (occurring within one state but involving other states) [154]. As of 2019 there were 54 active state-based conflicts, 67 non-state conflicts and 31 actors who were 'targeting civilians through one-sided violence' [155, 156]. These conflicts caused the displacement of 9.8 million people and approximately 50,000 battle related deaths [149, 155]. Conflicts are associated with increases in all-cause mortality. For example, between 1990 and 2017 it is estimated that 30 million civilian deaths were indirectly attributable to armed conflict, with the greatest increases in mortality among children under the age of five [157]. Current data suggests a decrease over time in large-scale interstate wars and mortality due to conflict. However there appears to be an increase in

internationalised conflicts and the number of countries experiencing conflict [158, 159]. Due to definitional inconsistencies, disagreements remain about whether armed conflict is on an upwards or downwards trend [158, 160, 161].

The World Health Organisation defines disease outbreaks as 'the occurrence of disease cases in excess of normal expectancy' with more precise definitions for each disease causing agent [162]. The outbreaks of interest to this research are those that are transmitted through poor water, sanitation and hygiene. These include Ebola, Cholera, coronaviruses (such as COVID-19, SARS, and MERS) Hepatitis E and others. Outbreaks appear to be increasing in number and diversity [163]. In recent years we have seen a rise in large-scale outbreaks such as the cholera outbreaks in Yemen and Haiti and Ebola in West Africa and the Democratic Republic of Congo (DRC). Of course, the COVID-19 pandemic has heightened global awareness of the threat posed by the emergence of novel pathogens and the challenges of large-scale disease control.

The three categories described above are often overlapping and indistinct. For example, disease outbreaks frequently occur in areas affected by armed conflict or disaster [164]. Conversely, the socio-economic toll of epidemics can give rise to social conflict, [165] and future resource scarcities created by climate change may also increase conflicts [166]. In many parts of the world we now see protracted crises spanning many years, the development of chronically fragile states (where governments and economies are weakened) and an increase in complex emergencies. Definitions of complex emergencies vary. The Inter-Agency Standing Committee suggest that complex emergencies are characterised by a combination of man-made crises and disasters necessitating an international response [167], while ALNAP emphasise that it is a crisis with 'complex social, political and economic origins' which may lead to 'the breakdown of state structures, the disputed legitimacy of host authorities, the abuse of human rights and possibly armed conflict,'[168]. Salama et al use a public health framing to define complex crises as occurring when the 'mortality among the civilian population substantially increases above the population baseline mortality, either as a result of the direct effects of war, or indirectly through the increased prevalence of malnutrition and/or transmission of communicable diseases, especially if the latter result from deliberate political and military policies and strategies' [169].

This thesis presents case studies from Iraq and the DRC. At the time of the research Iraq was facing an armed conflict involving state, non-state and international actors. DRC, at the time if this research, was considered to be experiencing a complex emergency characterised by regular armed

conflict between non-state actors, cholera outbreaks, a fragile state and economic situation, and widespread poverty and hunger.

2.3 Faecal-oral disease prevention in humanitarian emergencies

In the wake of all of the aforementioned types of crises, mortality often occurs indirectly due to disease. Robust data on morbidity and mortality due to diarrhoeal diseases and ARIs is often scarce in humanitarian crises. However, a literature review conducted in 2004 concluded that ARIs and diarrhoeal diseases are often the leading contributors to excess mortality and morbidity in the wake of a crisis [170]. During the acute stages of an emergency, diarrhoeal disease is estimated to cause 40% of all deaths and up to 80% of deaths among children [170]. In a conflict, children under the age of five are 20 times more likely to die from diarrhoea than from violence itself [171]. A second systematic literature review found that during humanitarian emergencies there may be a 20-35% increase in the proportional mortality associated with ARIs [172]. ARIs and diarrhoeal diseases are notoriously difficult to measure accurately, with most measures tending to underestimate the true disease burden [173]. However, the estimates above are supported by more recent country specific data from the Central African Republic and Somalia and a narrative review of community-based surveillance systems [174-176].

A confluence of factors are responsible for these increases in illness and death [1, 2]. For example, crises commonly lead to the displacement of populations to overcrowded camp-like environments. This can put people at risk of exposure to new pathogens and facilitate the easy transmission of disease from one person to the next. Existing water and sanitation systems may be damaged during the crisis causing reductions to water quality and quantity and potentially increasing exposure to human excreta. Markets may collapse, hampering the ability of crisis-affected populations to access necessities. This may cause reductions in the availability of hygiene products (e.g. soap) and insufficient access to food. Higher rates of malnutrition, combined with exhaustion and trauma, may cause people to deprioritise hygiene behaviour and may speed up the progression of diarrhoeal diseases and ARIs, resulting in more severe symptomatic cases. In a crisis, health systems often become overburdened due to the high level of need, or semi-dysfunctional due to the limited availability of medical supplies and medical capacity. This can result in higher than usual fatalities from faecal-oral diseases.

2.4 Promoting handwashing behaviour

2.4.1 Handwashing promotion - a core part of WASH programming

For many years people working in low-or middle-income countries (LMIC) or humanitarian settings used the term WatSan (an abbreviation of water and sanitation) to describe the WASH sector. One explanation for this is that at this time the 'WASH sector' was largely driven by engineers or biologists, who understood their mandate to be the infrastructural improvement of water and sanitation systems [177, 178]. The inclusion of hygiene in the WASH acronym only occurred in the early 2000s. This terminology shift reflects the historical position of hygiene promotion – always the 'little sister' to water and sanitation. For example, it took until 2017 for the Joint Monitoring Programme, led by UNICEF and the WHO, to establish a standardised global handwashing indicator [29, 179, 180]. In contrast, standardised indicators for water and sanitation have been in place since 1990. Similarly, hygiene remains under funded globally and underrepresented in national policies and plans [181, 182].

Despite the later inclusion of hygiene into the WASH sector there has since been an increase of programming, research and theorising about handwashing with soap [63, 183]. Programming increasingly recognises that for disease interruption to occur, interventions must tackle each of the three WASH pillars. Coinciding with the greater interest in hygiene there has been shifts in the staffing of the WASH sector [184] with social scientists, anthropologists, health psychologists and economists increasingly contributing to programme design and evidence building.

2.4.2 The journey to handwashing behaviour change

Early handwashing promotion typically involved teaching populations about disease transmission under the assumption that if people were better informed they would take protective action based on their increased knowledge. Such approaches had minimal success [185-189]. Behaviour change theorists have suggested that this is because knowledge about hygiene and disease transmission is already high in almost all contexts [80, 190] and because awareness of bio-medical facts appear to be weak determinants for routine behaviours such as handwashing with soap [185-188].

Limitations of the 'hygiene education' model prompted the sector to complement this with other approaches, including a drive to promote low-cost, locally made handwashing facilities. This made logical sense – if populations have a dedicated place to wash their hands and if this facility has soap and water available and is in a location near the toilet or kitchen, then handwashing would be easy to remember and practice regularly [139, 142]. This gave rise to innovations like the Tippy Tap [191,

192] the Oxfam Bucket [193], the Sanitap [194] and others [195]. There are not many studies exploring the effectiveness of such technologies. There are indications that such devices may improve handwashing behaviour initially, [192] but then when financial support for infrastructural programmes end, communities often develop a 'graveyard' of dysfunctional handwashing facilities [196, 197]. Some in the sector suggest that this may be because we are relying on types of handwashing facilities that are too basic or undesirable to inspire infrastructural maintenance or sustainable behaviour change [198, 199]

WASH researchers and practitioners in the development sector began to engage the skills of social marketing agencies and health psychologists. This shifted the focus away from what WASH sector actors *thought* would change behaviour, to a focus on the 'target audience' and their opinions, priorities and needs. Increasingly programmes incorporated a learning phase prior to programme design (often described as 'formative research') [17-19, 80, 84, 200] where WASH staff tried to understand the barriers and enablers of behaviour within a specific context. This has led to handwashing programme designs which are both more complex and more expensive [201, 202]. Such programmes aim to address a range of behavioural determinants, through multiple interactions with communities and a range of delivery channels in order to achieve a 'dose' sufficient enough to have a behavioural impact.

2.4.3 Handwashing Promotion in Crises

Hygiene promotion in humanitarian crises has not evolved at the same rate as programming in stable settings. In emergencies there is a recognised overreliance on hygiene education, the installation of handwashing facilities, and the distribution of soap or hygiene kits [4, 203]. Despite substantial donor investment in hygiene promotion in crises, programmes are generally short-term, generic (rather than context-adapted), and often fail to have the desired behavioural impact [4, 9, 11, 204, 205].

In recent years, novel hygiene innovations have been piloted in humanitarian crises and greater evidence has been developed around 'standard' or frequently used hygiene approaches [206-208]. Outbreaks of Ebola in North-West Africa and DRC, as well as the global COVID-19 pandemic, highlighted the importance of anthropological perspectives and social science research in crises. In recent years there has been an increase in this kind of research in crises and mechanisms to support this [209-215]. However, the use of social science in crises and outbreaks remains 'novel' and is not yet widespread. Understanding these historical shortcomings, and leveraging recent research, will be an important part of improving handwashing programming and will be central to this thesis.

2.5 The rise of behaviour change within public health

Behaviour change is now at the core of hygiene promotion and increasingly is a mainstay of all public health programming. Rising interest in behaviour change is evidenced in research too. For example, a search of PubMed databases indicates that in 2020 there were three and a half times more annual publications on behaviour change than there were in the year 2000 and almost 10 times more publications than there were in 1980. Furthermore, almost all of the behaviour change theories commonly used in WASH and public health were published within the last 40 years [216].

There are two schools of thought about this peak in behaviour change interest within public health. Some would argue that this shift was long overdue and that behaviour change is an essential pre-requisite to holistically addressing WASH or any other health problem [217-219]. Others adopt a more critical view arguing that behaviour change is also a politically convenient option [220]. Both schools of thought acknowledge that population-level behaviour is only a partial contributor to illness and disease. However, the second, more critical, standpoint argues that behaviour change receives greater funding because it shifts the focus towards the behaviour of individuals and away from structural factors or social inequalities which are more difficult and expensive to address in the short-term [220, 221]. Behaviour change programmes that are delivered in LMICs, or in crisis-affected settings, but which are funded or guided by expertise from 'Western' powers, often frame their interventions as natural and apolitical responses to disease threats [222]. However, interventions of this nature can have a vast range of unintended consequences on targeted populations. Indirectly, they may support the continuation of structural inequalities by positioning public health problems as something poor or vulnerable populations should be able to address independent of government systems [222]. Equally, interventions which have a top-down design process are often critiqued for maintaining colonial power structures and prioritising 'Western' interests rather than what populations actually need and want [223, 224].

2.6 Behaviour change theories and frameworks

More than 100 behaviour change theories and frameworks have been identified in the literature and applied to public health challenges [216, 225, 226]. Before thinking about this diversity, it is useful to first arrive at a definition for what a theory or a framework actually is. According to Nilsen, theories are defined as a 'set of analytical principles or statements designed to structure our observation, understanding and explanation of the world' [227]. Typically, theories explain the relationship between a set of variables and an outcome, often detailing the necessary steps for how and why

these events are likely to take place. In contrast frameworks normally provide a list-like set of descriptive categories or variables that are presumed to account for a phenomenon [227].

There are four types of theories and frameworks used within the world of behaviour change. With regards to frameworks there are those which classify types of behaviour and then then are frameworks which classify and define behavioural determinants. There are also two types of theories – explanatory theories and change theories. Each of these typologies is described below.

The least common of these typologies are frameworks which provide a taxonomy for classifying different types of behaviour. Examples of frameworks like this include the Attribute-Centred Approach for Understanding Health Behaviour [228, 229] or Fogg's Behaviour Grid [230]. These frameworks suggest that there is usefulness in identifying the characteristics of a behaviour before attempting to change it. For example, they argue that changing a behaviour that occurs on a daily basis (like tooth brushing) is different from changing a behaviour that may occur at a specific time in one's life (like exclusive breastfeeding). Similarly, they argue that a different approach may be needed to encourage people to start practicing a new behaviour (like taking up a new sport) compared to the approach needed for behavioural cessation (like stopping smoking). Table 2.6 below shows a categorisation of handwashing with soap according to a combination of the two frameworks mentioned above.

Table 2.6: Characterisation of handwashing with soap according to the Attribute-Centred Approach for Understanding Health Behaviour [228] and Fogg's Behaviour Grid[230]

	Characteristics of handwashing with soap
Schedule	**Behaviour that occurs on a predictable schedule** - ideally the 5 critical occasions
	Behaviour that follows a cue - such as the flush of a toilet or the presence of dirt on hands.
Type of behaviour change required	**Perform existing familiar behaviour** - most people have tried it before or seen others practice it
	Increase the behaviour - in most cases people do not wash their hands frequently or thoroughly enough
Visibility	**Private behaviour** – although handwashing is known to increase in the presence of others
Costs and Benefits	**Collective and individual benefit** – The potential to reduce individual risk of faecal-oral diseases and reduce the risk facing those you come in contact with.
	Delayed benefit – The absence or reduction of disease is hard to gauge
	Immediate benefit – feeling that hands are softer, cleaner and nicer smelling.
	Low cost – the materials needed for handwashing (soap and water) are common and low cost
	Value – the materials needed for handwashing are considered valuable and prioritised for other tasks.

Addictiveness	**Non-addictive** – in most cases handwashing with soap is not an addictive behaviour. Exceptions included people with Obsessive Compulsive Disorder.

The second group of frameworks are those that propose and define sets of behavioural determinants. Generic frameworks of behavioural determinants include those outlined by the WHO [231] and the Theoretical Domains Framework [232]. The latter framework was developed through a collaboration between behavioural scientists and implementation researchers and aims to present a comprehensive map of behavioural determinants by drawing on 33 theories of behaviour to develop 12 domains of determinants and 128 more specific 'explanatory constructs'. Recent reviews have suggested that certain behaviours are likely to have 'unique' determinants or determinants which are of much greater importance than others [233]. Accordingly, there are also some frameworks that have a narrower, behaviour-specific focus. A good example of this within the WASH sector is the IBM-WASH framework [234] which was specifically developed with WASH-related behaviours in mind.

While determinant frameworks do exist on their own they are more often linked to the third category of theories - 'explanatory theories' [235]. These map the links between these determinants and behaviour. Explanatory theories are by far the most numerous type of theories used in public health and have emerged out of a range of disciplines including different branches of psychology, economics, social marketing, sociology and anthropology [216, 226, 235]. These different disciplinary origins also mean that the epistemological and ontological assumptions behind each theory do vary substantially. As such it is common for leading theorists to disagree about even the most fundamental aspects of behaviour [226, 236].

There have been several reviews of explanatory theories [235, 237]. These reviews identified that the most commonly utilised theories in the peer-reviewed literature were: The Theory of Reasoned Action, The Health Belief Model, the Social Cognitive Model (previously known as Social Learning Theory), the Self-efficacy Construct, the Theory of Planned Behaviour, the IBM Model (Information, Motivation and Behavioural Skills Model), the Health Action Process Approach, Social Support/Social Network Theory, The Social-Ecological Model, and the Diffusion of Innovations Theory. The majority of these theories suggest that health behaviour can be best explained through individual-level psychological determinants of behaviour. Theories such as the Social-Ecological Model came as a challenge to this traditional way of thinking [221, 238]. This theory hypothesised that behaviour is influenced not just by individual factors, but also by an individual's relationship with their

environment and different levels of society (such as the social networks they are part of, organisations they are connected to, their community, and public policy) [221]. In recent decades an increasing number of explanatory theories have moved to acknowledge contextual, social, environmental and structural effects on individual behaviour, yet these factors are still insufficiently discussed in the literature [216, 221, 239, 240].

Just as there are determinant frameworks adapted for use within the WASH sector, so too there are explanatory theories which have been developed with WASH behaviours in mind. One widely used theory is RANAS [23] which is grounded in health psychology and focuses on domains of cognitive reasoning such as risk, attitudes, norms, abilities and self-regulation. FOAM [241] and SaniFOAM [242] are two other theories which focus on handwashing and sanitation respectively. These theories have their roots in social cognition theory. FOAM postulates three categories of determinants: opportunity (covering determinants like social norms and access to products), ability (covering determinants like knowledge and social support) and motivation (covering determinants such as beliefs, intentions and emotional drivers). Additionally WASH practitioners and academics have commonly used a set of more generic behavioural frameworks including Designing for Behaviour Change [24], COM-B [243], Theory of Planned Behaviour [244], the Health Belief Model [245], and Behaviour Centred Design [15].

The last group of theories are those that explain how change ought to occur. Some change theories explain the processes that individuals go through when changing behaviour, one such example is the Transtheoretical Model [246]. However, the majority of 'change theories' are used by public health professionals to design behaviour change programmes [235]. Examples of change theories designed to be used in this way include the P-Process [247], Design Thinking [248], and the Intervention Mapping Approach [249]. While each of these uses slightly different terminology and methods, there is a higher degree of similarity between these theories than among the explanatory theories. Each change theory basically proposes a five-stage, theory-driven programme design process. The first stage typically involves programme designers gathering knowledge from existing literature about their target behaviour, audience, and context. This helps to identify knowledge gaps which are then explored during the next stage of 'formative research' which assesses behavioural determinants within a given context. The third stage involves iteratively designing and pre-testing the intervention package. Programme implementation and evaluation are stages four and five [5]. Some approaches combine an explanatory theory with a change theory. Examples of this include the RANAS [23] approach and Behaviour Centred Design [15].

2.7 The behaviour change approach used within this thesis

The summary provided above highlights that there are few theories that manage to bring together all these components and give a full view of behaviour and processes for behavioural change. The research presented in this thesis will predominantly be informed by Behaviour Centred Design (BCD) [15, 250]. BCD defines a clear list of behavioural determinants, provides a theory to explain how these determinants relate to each other and outlines a step-by-step process for designing a behaviour change intervention. BCD falls short of establishing a matrix for classifying different types of behaviour but does outline a clear process for refining the behaviour that will be targeted.

BCD was developed to bring together useful constructs from diverse disciplines. As such, components of BCD are influenced by evolutionary and cognitive psychology, social ecology, anthropology and social marketing practice. BCD assumes that behaviour is the consequence of individual physiological and psychological responses to the settings an individual finds themselves in, and to their broader social and physical environment [15]. This is reflected in the BCD determinant framework which provides a more comprehensive list of determinants than other comparable approaches, and defines each of these determinants clearly [251]. Categories of determinants include factors in the brain (including knowledge, risk, motives, reactions, and psychological trade-offs), factors in the body (characteristic traits and sensations), factors related to the settings where the behaviour takes place (infrastructure, props, roles, routine and norms) and factors in the broader environment (the biological, physical and social environment and the wider context). BCD's change theory is expressed through an easy to remember five-step mnemonic: A for assessing the literature, B for building on this through formative research, C for creating the intervention, D for delivering the intervention, and E for evaluation. For the reasons outlined above, BCD has been widely used for understanding and changing WASH-related behaviours, particularly handwashing with soap [201, 202, 252-257].

2.8 Working on behaviour change despite having imperfect knowledge

The proposed research seeks to better integrate behavioural theory and evidence about hygiene programming into humanitarian practice. However, this research is set within an imperfect space. There are major gaps in our theoretical and scientific understanding of the factors that influence our behaviour in general. Even those who specialise in behaviour commonly disagree on its definition [236]. Great strides have been made in neuroscience and experimental psychology towards building an understanding of how our brain works. Neuroimaging, for example, has allowed us to 'see' brain function in action and has already begun to be used by consumer researchers [258]. However, such

advances have not enabled a comprehensive understanding of the mechanisms which influence behaviour nor those that could be levered to change behaviour [259].

Within the WASH sector we are working with poor measures of handwashing behaviour, behavioural determinants and health outcomes [29, 260, 261]. These limitations are not unique to this field. Literature reviews on the determinants of hospital-based hygiene [262] and obesity-related behaviours [263] have found similar shortfalls. If we believe in the public health pursuit of improving handwashing behaviour for the sake of reducing faecal-oral disease, our question becomes how can we do so given the current state of evidence and the unlikely reality of this improving significantly in the near future?

There is no one route for overcoming this challenge, nor a single discipline which is likely to hold the answer. I argue that our craving for certainty in behavioural science is also not an essential prerequisite for taking constructive action to improve public health. Behaviour science, like all science, is a cumulative enterprise and accordingly, a greater understanding of what influences behaviour can only be achieved through continued attempts to observe and document behaviour [264]. In order to address this 'theory-evidence-practice' gap within the hygiene sector, I adopt a pragmatic approach to this research. Pragmatism has three core tenets: abduction, intersubjectivity and transferability [265]. Each of these tenets will inform the design of this research and the way that meaning is created and shared.

Abductive reasoning encourages the researcher to acknowledge that they are starting from a point of incomplete knowledge. As explained by Morgan, this approach allows the researcher to "move back and forth between induction and deduction – first converting observations into theories and then assessing those theories through action" [265]. In this research, my 'initial observations' about how behaviour may respond to crises were informed by reviewing anthropological and behaviour science literature (section 2.9 of this chapter) and developing initial theories about how this might relate to hygiene behaviour in crises. These preliminary theories were tested by conducting a systematic literature review on the determinants of hygiene behaviour in domestic settings (chapter 3). This process allowed for the collation of insights about handwashing behaviour from across the globe and from a range of theoretical disciplines. Gaps in our understanding of hygiene behavioural determinants were then explored through the in-depth qualitative studies in crisis-affected settings (Chapters 5 and 6). 'Initial observations' and theories about hygiene programme design in crises were developed through a review of grey-literature documentation used by humanitarians to guide their programming (section 2.10 of this chapter). Common approaches for assessing behavioural

determinants, that emerged from this review were tested to understand their strengths and limitations (Chapter 4). Finally, opportunities and barriers associated with hygiene programme design were explored through in-depth interviews with humanitarians working in crisis-affected settings (Chapter 7). This process of abductive reasoning is also used in the last chapter to outline how this research could contribute to practice-oriented outputs for emergency responders and future research [266].

Pragmatism also opposes the adoption of a dualistic approach to subjectivism and objectivism, suggesting that both detract from constructive meaning-making. Pragmatism is interested in 'provisional' truths. It acknowledges that although these truths may change over time, they offer, at the current time, the best possible explanation of the phenomenon under study and lead towards workable action [265-268]. Ways of knowing within the hygiene sector have oftentimes been incongruous. Cognitive theorists, for example, may rarely talk to evolutionary psychologists or behavioural economists, to seek common understandings. Nor do academics always collaborate with practitioners and hence the 'theory-evidence-practice' gap persists [216]. This research is intentionally multidisciplinary and will employ a mixed-method research design in order to best answer the research hypotheses.

Transferability was initially described by Lincoln and Guba as one way of assessing the quality of qualitative research [269]. For research to be transferable it must establish, through clear reasoning, that its findings are not so unique and context-bound that they have no implications whatsoever for other actors in other settings, nor are findings so generalizable that they are applicable to every historical and cultural setting [265]. Shenton describes two main strategies for improving the transferability of research findings [270]. Firstly, he suggests that replicating research methods in more than one context enables transferability. In this research, I have intentionally chosen to conduct two in-depth qualitative case studies in humanitarian contexts. The two regions were selected because they are experiencing very different types of emergencies and humanitarian responses. Secondly Shenton suggests that an essential quality of transferable research is for the investigator to provide sufficient contextual information about the case study sites, the population and methods, to enable the reader to infer whether the findings are transferable to their own context. Table 2.8 provides an outline of some of the ways that the study sites are both similar and different. A more detailed narrative description is available in chapters 4 and 5.

Table 2.8: Characteristics of the two case-study sites

Type of humanitarian emergency	Disease outbreak	Natural disaster	Armed conflict
Northern Iraq			✓
Eastern Democratic Republic of Congo	✓		

Duration of the current humanitarian emergency	More than 10 years	5 years to 10 years	1 year to 5 years	6 months to a year	Within the last 6 months	Within the last month
Northern Iraq			✓ (since Da'ish took Mosul)			
Eastern Democratic Republic of Congo						✓ (cholera outbreak)

State of the region prior to the current humanitarian crisis	Regular exposure to disease outbreaks	Regular exposure to natural disasters	Regular pockets of violence	Political unrest	Stable
Northern Iraq			✓	✓	
Eastern Democratic Republic of Congo	✓		✓	✓	

Displacement	People who have experienced multiple displacement	People displaced to formal camps	People displaced to other host communities	People residing in their place of origin
Northern Iraq		✓	✓	
Eastern Democratic Republic of Congo	✓		✓	✓

Literacy	High	Moderate	Low
Northern Iraq	✓		
Eastern Democratic Republic of Congo			✓

Provision of water, sanitation and hygiene infrastructure and products	Predominantly acquired/built/maintained by the household	Predominantly acquired/built/maintained humanitarian organisations
Northern Iraq		✓
Eastern Democratic Republic of Congo	✓	

Quality of water, sanitation and hygiene services	Does not meet the Sphere Standards [271]	Meets the Sphere Standards [271]
Northern Iraq		✓
Eastern Democratic Republic of Congo	✓	

Socio-economic status of country	High income	Upper middle income	Lower Middle income	Low income
Northern Iraq		✓		

Eastern Democratic Republic of Congo				✓

Within the two regional areas I also selected the sub-sites to represent different types of characteristics. In Northern Iraq this included a long-term displacement camp, a short-term displacement camp, and villages where people were returning to post the conflict. In DRC this included those living in informal camps and host community members. While each of these sub-sites is described in detail in chapters 4 and 5 the images below show how physically different these settings were.

Figure 2.8.1: Images of the short-term displacement camp in Iraq

Figure 2.8.2: Images of the long-term displacement camp in Iraq

Figure 2.8.3: Images of the villages people were returning home to in Iraq.

Figure 2.8.4: Informal camps in DRC

Figure 2.8.5: Host communities in DRC

2.9 How might behaviour respond to crises and outbreaks? Perspectives from behaviour science and cultural anthropology.

2.9.1 Why combine behaviour science and cultural anthropology?

Historically, cultural anthropology and behavioural science have been epistemologically at odds [272, 273]. While both disciplines are interested in the variations and commonalities in the way humans behave, they come to this topic from different perspectives. Below I describe the common characteristics of both disciplines and why combining their strengths and different perspectives is likely to support the development of 'provisional truths' about hygiene behaviour within the broader pragmatic framing of this thesis.

Behaviour science developed from broader social science disciplines and has grown exponentially in recent years [274]. It remains an interdisciplinary field which is predominantly informed by various branches of psychology, but also draws on sociology, anthropology, neuroscience and economics [275]. The discipline uses theories to help explain the determinants of decision-making processes and the way these affect people's responses to stimuli in our social and physical environment [274, 275]. Behaviour science tests theories through a range of methodologies [276, 277] but most commonly it involves empirical research that may take place through experimental studies conducted within the controlled environment of a laboratory, or through applied interventions within real-world contexts [278, 279]. Behaviour science typically focuses on either one specific behavioural outcome or the effect of one specific behavioural determinant on behaviour. Behaviour science can be used to understand mechanistic cognitive aspects of behaviour (i.e. how what happens in our brain influences what we do) and contextual aspects of behaviour (i.e. how what happens in our social and physical environment influences what we do) [275]. Historically, there have been relatively few applied behavioural studies in humanitarian crises and outbreaks in low- and middle-income countries. However, researchers working within experimental psychology have designed laboratory-based studies to understand how people respond to scarcity, risk, fear, and changes to their physical and social environments – all things likely to occur in crises. Some patterns emerging from laboratory studies have been shown to be consistent with moments of actual crisis in high-income settings such as in response to disasters, terrorist attacks or the COVID-19 pandemic [280-282]. Handwashing has been the subject of many theoretical, experimental and interventional behavioural science studies [80, 257, 283-285].

There are several common characteristics that unite the diverse field of cultural anthropology. Firstly, cultural anthropology is interested in developing a holistic understanding of humankind and

therefore emphasizes the need to look at the full range of human variety and to study people in all parts of the world, and through all human activity [286, 287]. Secondly, 'culture' is the primary analytical lens through which cultural anthropologists view and make sense of human beliefs and action. This is not just because culture shapes behaviour, but also because cultures are shared systems of constructing and understanding the world. These culturally informed explanations of reality determine how behaviour and beliefs are permitted within a society and how individuals navigate and respond to the world around them [286, 288]. Thirdly, the discipline is guided by cultural relativism which is the idea that a person's beliefs, behaviours and world view should be understood from their perspective rather than through the imposition of an ethnocentric lens [289, 290]. This gives rise to the core methodology of cultural anthropology which is to listen to and observe the full complexity of people's social and cultural lives in order to develop a 'thick description' [291] which acknowledges the contextual complexity in which they are situated. For many decades anthropology has been used to construct and de-construct humanitarian action and the system that this action operates within [292-295]. It has also been used to document the experiences of crisis-affected populations during conflict, disaster, displacement and disease outbreaks [296-306]. Anthropology has also contributed to documenting cultural constructs of purity and cleanliness [307-309], which may in turn inform understandings of handwashing behaviour.

Table 2.9.1 summarises the characteristics of both disciplines and their relevance to this research. Behavioural science has been criticized for using overly simplistic theories and experiments to understand complex behavioural phenomena, but in contrast the 'thick descriptions' developed by anthropologists, and their grounding in specific contexts, can make transferability challenging [272]. This summary of cultural anthropology and behaviour science literature addresses the fact that both disciplines provide incomplete understandings of hygiene behaviour in crises. Therefore, by combining insights from both disciplines we may develop a fuller understanding of relevant concepts.

The summary of literature below is not comprehensive, rather I review anthropological and behaviour science literature in relation to five key concepts that are likely to be relevant to understanding the impact of crises and outbreaks on hygiene behaviour. Three of these key concepts have been selected because they are common experiences or consequences of a crises or outbreak (risks, fears and responses to threats; scarcity; and trauma, stress and mental health). The other key concepts have been selected because they are known to have a substantial influence on handwashing behaviour in stable settings and are likely to change substantially when outbreaks or

crises occur (habits, routines and rituals; and physical settings). Thus it is hypothesised that all five of these key concepts may shape handwashing behaviour in humanitarian settings.

Table 2.9.1: The characteristics of cultural anthropology and behaviour science and their relevance to this thesis.

		Cultural Anthropology	Behaviour science
General characteristics	Understanding of behaviour	Behaviour occurs within, and is a product of, cultural systems. To understand behaviour within a culture you need to develop a holistic understanding of the context from perspectives of that society.	Behaviour occurs in response to stimuli in the external environment and via cognition mechanisms in the brain. To understand behaviour hypotheses should be developed and tested by drawing on a mix of disciplines. Individual behaviours and their determinants can be explored independently.
	Methods	Ethnographic research which foregrounds observing and listening to populations in context.	Experimental studies which allow for the control of some variables. Mixed-method research to understand behavioural determinants.
Relevance to this research	Applicability to humanitarian crises and outbreaks	Research on the nature of humanitarian action. Research on the experiences of crisis-affected populations.	Experimental studies which simulate aspects of being exposed to a crisis Observational studies of behavioural determinants in outbreaks
	Applicability to handwashing behaviour	Limited handwashing specific research. Research on cultural constructions of purity and cleanliness.	Limited application of behaviour science in crises and outbreaks.

2.9.2 Key concept 1: Risk, fear and responses to threats

Definitions of fear are contested [310, 311] however there is some agreement among behaviour scientists that fear is a neural-behavioural system that emerged to protect animals, including humans, from threats in their environment. Being exposed to external cues that are mentally associated with danger results in a state of arousal that has an arresting effect on our cognition and directs our behaviour towards defensive behavioural responses (e.g. avoidance, escape or confrontation) [310, 312]. A meta-analysis of the use of fear within public health campaigns found that fear can be useful for changing behaviour if people feel capable of taking preventative action (perceived self-efficacy) and believe that this action will be effective (perceived response efficacy) [313]. However, if fear is used without increasing self-efficacy and response efficacy, then it can lead to defensive responses (e.g. denial or rejection of public health measures) [280, 313, 314].

Fear has proved equally hard to define in anthropology. Anthropologists tend to view all emotions as part of a 'language of the self' which provides a code to others about an individual's intentions, actions and feelings. Emotions, like fear, serve to shape social interactions, create cultural meaning and maintain the moral order [315]. Anthropological studies have tended to focus on the negative consequences of fear such as its use by governments, institutions and social groups to convey authority, silence alternative voices and control systems of order [316, 317].

Fear is intrinsically linked to perceptions of risk. Behavioural scientists typically divide risk perception into two parts: susceptibility (the likelihood of the threat occurring to you) and severity (the likely harm that may be caused by the threat) [313]. Higher levels of perceived risk typically result in greater adoption of preventive public health behaviours [318]. Risk perception can be shaped through 'analytic processes' (e.g. calculating risk probability, using logic, risk assessments etc.) or by emotion and the 'experiential system'. The latter relies on prior associations and intuitions about whether something is good or bad. In practice both systems often combine to affect our perception of risk [319]. However, this can result in biases or errors in our judgment. For example, in relation to most public health threats people typically experience 'optimism bias' whereby people use past experiences to predict likely future outcomes. This typically results in people feeling that they are less susceptible to disease than their peers [320, 321]. Risk perception is also likely to be mediated by direct (e.g. geographical closeness) and indirect proximity (e.g. frequent threat-based communications) to the threat [282].

Historically, risk has not been a dominant theme in anthropology, however this has been changing in recent years. Anthropologists who have written on the topic tend to view risk as a culturally constructed concept, defined differently by each society and generating a diversity of responses to threats [322, 323]. Culturally specific coping strategies may include the use of magic, religion and scientific evidence to mitigate or make sense of threats [322]. The particular risks prioritised by a culture are likely to be dependent on power dynamics, values, beliefs about social relationships, and the obligations of individuals to their cultural group [323, 324]. In Douglas' seminal work *Purity and Danger* she emphasises the role of boundaries in relation to the body, kin-groups and the broader cultural group and explains that these are defined and protected through norms, rituals and taboos [307, 322]. She also suggests that threats occur when these cultural boundaries are transgressed [307, 323].

Crises and outbreaks are both likely to elicit fear and heightened risk perceptions [280, 314, 325]. While there is a popular narrative that fear leads to panic and self-interested behaviours,

behavioural and anthropological studies have indicated that this doesn't tend to bear out in reality [326-328]. Rather, in response to crises, most people demonstrate cooperative, pro-social, and altruistic behaviours [326, 327, 329]. This literature on risks, fear and responses to threats has implications for how humanitarians could go about designing public health communications during crises and outbreaks. From a behaviour science perspective this may include an increased focus on increasing self-efficacy, countering optimism bias (e.g. by drawing attention to the fact that disease threats can affect everyone), and motivating behaviour through pro-social messaging. The anthropological literature indicates that hygiene programmes could be strengthened by incorporating local emic perspectives on disease threats and other risks that crisis-affected populations may face in the wake of crises.

2.9.3 Key concept 2: Resource scarcity

In their book about scarcity [330] behavioural scientists Mullainathan and Shafir summarise work across a range of experimental studies and find that scarcity of any key resource (e.g. sleep, security, time, food, money) causes a 'tunnelling' of vision to focus on immediate priorities. However, intensely focusing on the immediate issue at hand taxes the 'bandwidth' of our brain, inhibiting other cognitive capacities. Specifically, decisions made while tunnelling may result in longer term goals or values being compromised as decisions get made based on factors that optimise short-term realities, discount negative future consequences, and overlook other possible options. During experiences of scarcity, people are more likely to struggle to solve problems, become impatient or distracted, and forget things. Ultimately, in such states people are more likely to make decisions that have negative consequences for our longer-term health and wellbeing. Throughout, Mullainathan and Shafir emphasise that the scarcity mindset is the outcome of environmental conditions and not the failing of individuals. However, those experiencing scarcity are more likely to have to make important decisions about their survival and future and are less likely to be able to cope with any mistakes or errors in judgement. Combined, these factors create a 'scarcity trap' which perpetuates experiences of scarcity and poverty.

To understand anthropological views on scarcity it is necessary to first recognise that this body of literature has arisen in critique of traditional economic theories emphasising the human desire to consume goods for individual gain. Anthropological studies suggest that in hunter-gatherer societies, where the availability of resourses fluctuated, the exchange of goods was not driven by individual consumption but served to solidify relationships, facilitate solidarity and create a more egalitarian society [331-333]. More recent anthropological studies, including those specifically focused on water scarcity [334-338], have identified a range of household-level coping strategies in response to

scarcity. These include intensifying and diversifying economic activities, modifying consumption, migration, and reprioritisation of needs [336].

Humanitarian crises are characterised by a scarcity of resources. They typically cause loss of income and livelihood, scarcity in the availability of products, food or water, and a reduction in access to basic services such as healthcare or social welfare. The behaviour change literature indicates that it is plausible that affected populations will not be thinking about their long-term health and may deprioritise handwashing because they either forget to practice it at key moments or prioritise soap and water for other tasks. Humanitarian interventions may need to be more sensitive to the competing priorities of crisis-affected populations. Integrated programming may help expand 'bandwidth' to facilitate a re-prioritisation of hygiene. The anthropological research on scarcity may help to identify opportunities to build upon and strengthen local coping mechanisms, support systems and sharing strategies [328].

2.9.4 Key Concept 3: Trauma, stress and mental health

For behavioural scientists, mental health conditions and associated risky health behaviours arise through 'maladaptive developmental processes'. These occur because of complex interactions between genetic and learned cognitive factors and our interactions with the social and physical world [339]. Chronic stress, or exposure to stress at certain points in a person's life span, can affect key aspects of brain functioning including memory and risk-related decision-making, and increase the likelihood of depression or anxiety [340]. People with mental health challenges have also been found to experience challenges with regular handwashing and the factors driving their handwashing behaviour appear to be different from people without mental health conditions [341-343].

Anthropologists view trauma as an individual or group response to disruptions in a society's social or moral world and the subsequent unmaking of their history, identity, values and roles [344-346]. Individuals and social groups may express distress or trauma through a range of physiological symptoms (that may sometimes be at odds with bio-medical conceptualisations of mental health) and may articulate their experiences through culture-bound idioms [347, 348]. Anthropologists suggest that navigating experiences of trauma can be supported by understanding local narratives of distress and resilience, fostering re-connection to cultural identities, re-establishing social relationships and identifying material resources that facilitate trust, hope and meaning [345, 346, 349, 350].

Recent estimates have suggested that the prevalence of mental health conditions may double in conflict-affected settings [351]. Mental health issues are also likely to increase during economic crises, displacement and outbreaks, although the measurement of mental health remains poor across many of these studies [351-355]. Mental health also seems to shape common behavioural responses to crises and outbreaks [314, 356] and is likely to have a substantial effect on behaviours like handwashing. Despite this access to mental health services in crisis-affected settings is limited and often underutilised [357-359]. Taken together the behavioural and anthropological literature indicate that it may be beneficial to integrate hygiene programming with psychosocial support mechanisms. Given that hygiene programming is typically done through interpersonal communication, there may be opportunities for hygiene promotion activities to be designed in such a way that they contribute to improving wellbeing and re-establishing social support mechanisms.

2.9.5 Key Concept 4: Habits, routines and rituals

From a behaviour science perspective habits are learned automatic behavioural responses to specific familiar situations [360]. Habitual action is thought to govern the majority of our daily behaviours [361, 362]. One explanation for why habits dominate our behaviour is that they allow us to by-pass the need to constantly process information about the world when making everyday decisions or performing routine tasks. As such, habits help to reduce overall cognitive demand [363, 364]. For a behaviour to happen routinely and automatically a person needs to be exposed to a familiar cue or stimulus which elicits a behavioural response toward a desired outcome [365]. Habits are more likely to form when we find ourselves in similar physical settings day-in, day-out [366] and when the repeated action achieves a specific goal or generates a reward – the latter is often called reinforcement learning [367]. The more rewarding a behaviour, or the more it aligns with a person's goals and motivations, the more likely it is to be repeated. Rewards cause the brain to release dopamine which has the effect of binding together the stimulus and response into a memory, enabling it to be recalled and repeated in the future [368]. Given that habits require us to operate within familiar contexts, and be repeatedly exposed to response-triggering stimuli, moving to a new place or experiencing substantial changes to routines has the potential to disrupt habits [369]. Consequently, this forces us to more actively make decisions about our behaviours and potentially try out different behaviours to gauge their outcomes [370].

Humanitarian crises are likely to disrupt prior routines and often displace people to new and unfamiliar environments. In so doing it is likely that previously established good handwashing habits may be affected. However, these dramatic shifts could also create 'windows of opportunity' to allow for new hygiene habits to form as people adapt to their new circumstances [371]. This is even more

likely to occur when there is a 'shared discontinuity' [369] of habits due to large groups of people experiencing similar changes to circumstances at the same time – exactly what occurs at the onset of a crisis.

Cultural anthropology has placed greater focus on understanding routine and rituals rather than habits. Rituals are purposive, socially standardised activity sequences which often involve symbolic acts, language or objects [372]. Anthropology views ritualised action as having a communicative function because of its role in preserving collective identities [372, 373]. The performance of rituals within daily routines and as part of larger group events, rewards group identification, creates order, and promotes certain values or behaviours, while sanctioning others [373]. In this sense, routines which encompass 'everyday rituals' provide predictability and stability to a society and the individuals that are part of it. Rituals are also likely to be destabilised at the onset of a crisis, given that populations may be separated from social groups, symbolic objects and places. However, Das and others [374, 375] suggest that at times when populations are robbed of agency due to violence and struggles, they negotiate this loss by trying to recover everyday routines and so re-establish themselves in the new normalcy.

This literature on habits, routines and rituals may have implications for the design of displacement camps. For example, behavioural scientists have shown that modifying physical spaces to add cues and nudges may support the establishment of new handwashing habits [376]. As people experiment with new behaviours in an unfamiliar displacement setting, positive handwashing habits may also may be facilitated by drawing attention to emerging norms and coping mechanisms that affected populations are adopting to adapt to their situation [377]. Pre-existing values and motivations can also influence behaviour [369]. Given that handwashing is heavily embedded within daily routines and rituals it may be part of the restorative everyday behaviours that can contribute to overcoming trauma and rebuilding agency among displaced populations [378].

2.9.6 Key Concept 5: Physical settings

While a great deal of the literature within behavioural science tends to foreground the role of cognition on behaviour, socioecological theories which focus on an individual's behavioural responses to their environment have grown in popularity in recent years [379-381]. While much could be said about the influence of the physical environment on behaviour from the perspective of behaviour science, I have chosen to focus this discussion on one particular theory – behavioural settings as this is also a core concept within BCD. The concept of behaviour settings was initially developed by Barker following an in situ behavioural study in the American Midwest and then

developed and applied to a range of other disciplines [30, 382-386]. By documenting the behaviour of a whole town over the period of a year, Barker arrived at the conclusion that behaviour wasn't predominantly being driven by individual characteristics, preferences and goals, but rather that there were standing patterns of human behaviour which occurred within behavioural settings. Barker described that, upon entering a defined physical milieu, the infrastructure and objects within it, cue certain types of behaviours and prevent others. As such people entering the space tend to adopt particular roles and adhere to the common norms governing the space. Behaviour settings, in essence, are small-scale social systems that are optimised for goal-oriented outcomes. Manipulating choice architecture within behaviour settings and using synomorphic objects or nudges has the potential to change or re-create standing patterns of behaviour [387-391].

Anthropologists have always had a strong interest in how place is constructed and experienced and how this affects contextualised behaviours and beliefs about the world. Historically anthropologists thought of place as a relatively static backdrop to cultural action [392]. However, as a result of the increased amount of work on the anthropology of displacement, there has been a shift in people's conception of place. It is now often viewed as a constituted entity which is made and re-made as people move between cultural worlds [392, 393]. While there is also much that could be said about place and dis-placement within the field of anthropology I shall focus my discussion on the domestic setting, given that this is where hygiene behaviours take place. Initially when populations are displaced, they are often re-located to basic and impersonal camp-like contexts. Together with the processes and classifications imposed by the humanitarian system, these settings often serve to heighten experiences of impermanence and make people feel like they are living in a 'state of exception' [394]. Initially populations may resist customising or trying to feel comfortable within these environments due to a strong desire to return to their place of origin [395]. However, over time the process of 'homemaking', orderliness and customisation of the domestic space, can help crisis-affected populations regain a sense of control and agency within these otherwise uncertain spaces [396, 397]. Customisation of the domestic environment through decoration, the use of symbolic objects and the re-categorisation or repurposing of spaces, may serve to reproduce and establish continuity with a happier past, re-establish cultural identities and a sense of home, and help crisis-affected populations to rise above their current predicament [398-400].

Behaviour settings may be a useful lens through which to consider the way that physical spaces are designed following a humanitarian crisis or outbreak and whether these spaces may facilitate or discourage certain types of action. For example, during the COVID-19 pandemic, handwashing facilities were scaled up in public locations [401] which led behaviour to be cued at new critical

moments for interrupting disease transmission [402]. Similarly, humanitarian actors are normally responsible for designing camp environments in response to displacement [271]. If camps could be created with hygiene behavioural outcomes in mind, then they may be more likely to facilitate practice. Drawing on the anthropological literature, camp managers and hygiene promotion teams could actively encourage the customisation of hygiene facilities within the home so that they are attractive features that contribute to homemaking and agency.

2.9.7 Summary

This selective review of literature from behavioural science and cultural anthropology provides some initial indications of the factors that may influence hygiene behaviour in crises and describes potential opportunities for strengthening interventions. By drawing on literature from both disciplines I was able to see how key concepts were defined and constructed from these different disciplinary perspectives and identify likely behavioural responses. However, none of the literature above explored this topic specifically and therefore the transferability of these theories, experiments, and ethnographic monographs to hygiene in humanitarian crises may be limited.

2.10 A grey literature review of documents to inform hygiene programme design during crises

2.10.1 Overview

The promotion of handwashing with soap is prioritised during humanitarian responses to crises because of its potential to reduce diarrhoeal diseases and reduce acute respiratory infections. The Sphere Standards [271] provide a set of minimum standards for WASH programming in emergencies. These are particularly useful for designing and maintaining infrastructure or identifying the kinds of goods to be distributed to crisis-affected populations. In contrast, the section of these guidelines related to promoting hygiene behaviour change is broader – providing key principles but not directives for how these principles should be actioned. Humanitarians have explained that this often results in programs which prioritise the provision of infrastructure and hygiene products, but are rather weak on behaviour change programming [4]. Reportedly this is because humanitarians feel like they lack capacity and expertise on how to design and deliver hygiene behaviour change programs [4, 5]. Given this apparent gap, this review aimed to understand what other grey literature resources are used by the humanitarian sector to design and deliver hygiene programs. By assessing these documents, and how they are used by practitioners, this review aimed to identify which resources are most useful to practitioners and the limitations of these resources.

2.10.2 Methods for the grey literature review

This review aimed to identify behaviour change resources that were in use by the WASH sector, not just resources which were available. As such, no online search strategy was used. Instead, I contacted the Global WASH Cluster and requested contact details for all member organisations. In January 2017, I sent individual emails to each of the 32 organisation contacts. No donor organisations or academic organisations (associate members of the Global WASH Cluster) were approached because they do not directly implement programmes. In these emails I explained the rationale for review and asked them to share documents that met the following description: 'the primary documents that your organisation uses to guide or inform your hygiene and behaviour change programming in humanitarian emergencies'. Participants were asked to respond via email and no cap was applied to the amount of documents that could be shared. Two follow up emails were sent to encourage participation but if no response was received after the second email, it was assumed that the individual or organisation had declined to participate.

Documents shared by participants were reviewed in full and descriptively analysed according to document length; type of document; whether the document was designed specifically for humanitarian actors; and whether there was content specifically about program design.

2.10.3 Descriptive summary of grey literature resources

A total of 16 organisations replied with documents and responses. Those who responded included UN agencies and international non-government organisations (INGOs) that work on WASH in humanitarian emergencies. There were no local organisations included in the sample as these are not represented in the Global WASH Cluster. A total of 90 separate documents were identified from the 118 documents that were generated through this process. Thirteen were excluded because even though they were used by organisational staff, they were considered internal and were not publicly accessible documents. One resource was excluded because it provided a shorter summary of a document already included. A further three resources were excluded because they only described the specific approach to hygiene programming used by an organisation in a particular crisis-affected setting and were therefore not considered guidance documents.

Table 2.11.7 describes the characteristics of the diverse set of grey literature materials that were shared. Many organisations shared documents developed by other organisations and 28 documents were referred to by more than one participant. The most commonly mentioned document was the Sphere Standards [403]. Just over half of the included documents were designed with humanitarians

in mind (55%). Some of the documents that were designed with humanitarians as the target audience did not discuss how hygiene promotion during humanitarian crises or outbreaks may be different to hygiene promotion in stable settings. Rather, most of the content in humanitarian-oriented documents was based on standard recommendations coming from stable settings. Only 36% of the grey literature resources focused specifically on hygiene, with the others having a broader focus (e.g. all aspects of WASH or humanitarian response or behaviour change more generally). In documents with this broader focus, hygiene-related content was normally quite brief. The majority of documents were long (60% over 50 pages) but did typically include clear sections or lists of contents to aid navigation. Most documents also included photos and images to illustrate the content. Shorter documents included standardised information, education and communication (IEC materials) and briefing documents which aimed to provide guidance in a short form. Of the included documents, seven did not have a publication date on them and 53% were published more than five years prior to the search being conducted.

Table 2.10.7: Characteristics of the grey literature documents informing hygiene behaviour change programmes in humanitarian crises

Total number of documents	73
Number of organisations involved in the production of the documents	25
Publication date range	1994-2017
Published after 2012	27 (37%)
Published between 2001 and 2011	30 (41%)
Published in 2000 or before	9 (12%)
No publication date	7 (10%)
Length of document	
Range	1- 458
Documents less than 10 pages	21 (29%)
Documents 11-50 pages	8 (11%)
Documents 51-100 pages	28 (38%)
Documents over 101 pages	16 (22%)
Type of document*	
Guidelines - including documents outlining minimum standards, summarising theory or evidence or outlining general principles which should inform practice	52 (71%)
Toolkit – practical tools for assessments, programme implementation or monitoring	23 (31%)
Training manual – documents designed for training staff or documents which summarise the key messages of a training	5 (7%)
IEC materials – Standardised information, communication and education products	5 (7%)
Reflection on practice – summary of lessons learned across an organisation or type of context	2 (3%)
Documents designed with humanitarians in mind	41 (56%)
Documents focused on hygiene	26 (36%)

Percentage of documents describing how to assess behaviour and its determinants	22 (30%)
Documents describing how to design and deliver hygiene behaviour change programs	38 (52%)
Documents discussing the provision of hygiene-related infrastructure and products	21 (29%)
Documents describing how to assess behaviour and determinants, design and deliver programmes and hygiene infrastructure and products	2 (3%)

** Documents could be classified in more than one of these categories*

Guideline documents were the most common type of document in this review (71%). These documents provided summaries of evidence and theory and used this to develop general principles to guide practice. Thirteen of the documents classified as guidelines also included specific tools to aid assessment, implementation and monitoring. Some guideline documents also included case studies. Additionally, there were 23 stand-alone toolkits which described one or more specific approaches and how to implement them through standardised tools and processes. Such documents often included method descriptions, questionnaires, worksheets and tips for their use. A small number of hygiene promotion or WASH training manuals were shared (5). These provided an overview of the content to be taught and were usually presented as lesson plans. Five sets of standardised IEC materials were shared. These typically focussed on the key moments for handwashing and diagrams to illustrate disease transmission. The IEC materials had no accompanying guidance for their use. Lastly there were two documents that summarised lessons learned across organisations or within a particular type of setting and then made recommendations for future practice.

Nineteen of the included documents did not discuss key aspects of hygiene behaviour change such as how to assess behaviour and its determinants, hygiene infrastructure and products, or hygiene behaviour change design and delivery. These documents typically focused on how hygiene relates to transmission of disease and described hygiene behaviours and messages. Only two documents discussed all three of these aspects of hygiene programming and only one of these was focused on emergency settings. The rest of the documents tended to focus on either ‘hardware’ or ‘software’. Given that hygiene kit distributions and the construction of handwashing facilities are relatively standard interventions, this was only discussed in 29% of documents and limited information was provided to guide the selection of items, consultations with communities around the acceptability and use of items, or operation and maintenance.

Most of the documents that outlined processes for designing and delivering hygiene programmes were not focused on humanitarian settings. These broader documents often started by summarising how behaviour change theory could be used to guide programme design. A sub-set included information on the potential determinants of behaviour. These included environmental factors (including WASH infrastructure), social networks, norms, political and historical context, motives (e.g. disgust, nurture, affiliation and status) religious practices, self-efficacy, knowledge, beliefs, and habit. The majority of these broader documents recommend doing an assessment of behaviour and its determinants before designing programmes. Common tools for doing this were Knowledge, Attitude and Practice Surveys, observation, and other qualitative and participatory methods conducted through interviews and FGDs. Several documents provided practical formative research guides with constructive tips for how to implement them. However, there was little information about which tools to use under what circumstances and how they might be adapted to different behaviours.

Among the documents that were oriented towards work in crises or outbreaks, most of the content on programme design and delivery focused on the selection of target audiences, the prioritisation of behaviours, the selection of delivery channels, the training of hygiene promotors and the feasibility of certain types of hygiene promotion actions during different stages of the emergency. In general, these documents were more likely to emphasise that hygiene education and the sharing of information about disease transmission was a key part of hygiene promotion. None of these humanitarian focused documents mentioned the use of behavioural theory.

One noticeable gap across the broader and humanitarian-specific literature was descriptions of how to move from formative research to actually designing an intervention which reflects these findings. Most documents skimmed over this stage in the process entirely. Many documents also mentioned the importance of engaging vulnerable groups and considering gender within hygiene programming. Monitoring was mentioned in many of the documents, with a focus on participatory approaches and accountability to populations. Some documents provided a list of indicators for hygiene monitoring. Very few documents provided concrete information on how to collect, analyse or use monitoring data.

2.10.4 Discussion of findings from grey literature

Most WASH or behaviour change related reviews which utilise grey literature focus on extracting information about intervention effectiveness [189, 404-406]. In contrast this review is the first to specifically focus on grey-literature documents which are used to inform programme design. The

review identified there were few resources which were designed specifically for humanitarians, and which provided a holistic overview of how to assess hygiene behaviour and its determinants and use this to design and deliver programmes. Consequently, humanitarian organisations relied quite heavily on broader behaviour change resources that were designed for people implementing programmes in stable settings. However, these documents were unlikely to be easy to navigate and apply during a crisis given that they were often long and text heavy. There was also a noticeable contrast between the documents that were specifically designed with humanitarian settings in mind and the broader grey literature on behaviour change programme design. The humanitarian-focused literature was oriented towards practical aspects of programme design such as the actions to take in each phase of the crisis, the process of training staff and the delivery channels that could be used during programme delivery. The humanitarian literature focused predominantly on hygiene education which is unlikely to result in sustained behaviour change [185-189], and omitted information about behaviour change theory. The literature positioned hygiene 'hardware' such as handwashing facilities and hygiene kits as distinct and separate types of interventions from hygiene 'software' which focused on changing behaviours. This downplays the critical role hardware is likely to have in enabling hygiene behaviour [139]. Finally, the date range of the documents shared suggests that there may be barriers to effectively disseminating more recent documents so that they get into the hands of the staff who could use them for hygiene programme design. As such the documents that are being used to inform programming may not reflect the latest evidence.

A recent study, published during the COVID-19 pandemic, examined how guidance about COVID-19 was developed and used in humanitarian settings [407]. Their findings were aligned with patterns identified in this review. Specifically, they found that while guidance documents were produced rapidly during the pandemic, they were often not shared between organisations, were rarely updated, and were often too general to guide programming in humanitarian settings or reflect ground-level realities.

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Chapter 3: The determinants of handwashing behaviour in domestic settings: An integrative systematic review

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Thesis Title	Hygiene behaviour and hygiene behaviour change during humanitarian crises		
Primary Supervisor	Dr. Robert Dreibelbis		

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Where was the work published?	International Journal of Hygiene and Environmental Health		
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For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I conceptualised the study, designed the methodology, led the data extraction and formal analysis and wrote the manuscript. I also secured the funding that supported this research. Astrid Hasund Thorseth acted as a second coder during the analysis process and contributed to reviewing and editing the manuscript. Robert Dreibelbis provided supervision for this study and input onto the methodology. He also revised and edited the manuscript. Val Curtis provided supervision for this study, guidance on the application of the behavioural theory, support with initial coding and revised and edited the manuscript.

SECTION E

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The determinants of handwashing behaviour in domestic settings: An integrative systematic review

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ABSTRACT

Background: Hygiene promotion interventions are likely to be more effective if they target the determinants of handwashing behaviour. Synthesis of the evidence on the determinants of handwashing behaviour is needed to enable practitioners to use evidence in hygiene promotion programming.

Purpose: To identify, define and categorise the determinants of handwashing behaviour in domestic settings and to appraise the quality of this evidence.

Methods: We conducted an integrative review, searching three databases for terms related to handwashing and behaviour change determinants. Studies were summarised and their quality assessed against a pre-defined set of criteria for qualitative, quantitative and mixed-method studies. Data on determinants were extracted and classified according to a predefined theoretical taxonomy. The effect of each association between a determinant and handwashing behaviour was summarised and weighted based on the quality of evidence provided. Determinants that were reported more than three times were combined into a meta-association and included in the main analysis. Sub-analyses were done for studies conducted during outbreaks or humanitarian crises.

Results: Seventy-eight studies met the criteria. Of these, 18% were graded as 'good quality' and 497 associations between determinants and handwashing behaviour were extracted. We found that 21% of these associations did not clearly define the determinant and 70% did not use a valid or reliable method for assessing determinants and/or behaviour. Fifty meta-associations were included in the main analysis. The determinants of handwashing that were most commonly reported were knowledge, risk, psychological trade-offs or discounts, characteristic traits (like gender, wealth and education), and infrastructure. There was insufficient data to draw conclusions about the determinants of behaviour in outbreaks or crises.

Conclusions: This review demonstrates that our understanding of behavioural determinants remains sub-optimal. We found that there are limitations in the way behavioural determinants are conceptualised and measured and that research is biased towards exploring a narrow range of behavioural determinants. Hygiene promotion programmes are likely to be most successful if they use multi-modal approaches, combining infrastructural improvement with 'soft' hygiene promotion which addresses a range of determinants rather than just education about disease transmission.

1. Introduction

Handwashing with soap (HWWS) is an effective means of preventing infectious disease. Meta-analyses suggest that HWWS can reduce the risk of diarrhoeal disease by 23%–48% (Cairncross et al., 2010; Freeman et al., 2014; Wolf et al., 2018) and reduce risk of respiratory infections by 21%–23% (Rabie and Curtis, 2006; Aiello et al., 2008). However, we still do not know how best to go about promoting handwashing in the communities that could most benefit. Systematic reviews of the effectiveness of hygiene promotion interventions to change handwashing behaviour have reported mixed results and identified many challenges (Naikoba and Hayward, 2001; Wilson et al., 2011; Luangasanatip, Hongsuwan et al. 2014, 2015; De Buck, Van Remoortel et al., 2017; Mbakaya et al., 2017; Watson et al., 2017; Martin et al., 2018), including the need to identify factors which can be modified to prompt changes in handwashing behaviour. We refer to these potential factors as 'behavioural determinants'. For a behaviour change intervention to be effective, behaviour change theorists argue that it must address some of the determinants that influence a behavioural outcome (Coombes and Devine, 2010; Mosler, 2012; Aunger

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Table 1
Handwashing determinant definitions adapted from on the BCD checklist of determinants (Aunger and Curtis, 2019).

Behavioural determinants defined by the BCD framework		Definitions of each determinant adapted to handwashing
Brain	Executive Brain	The extent to which knowledge of handwashing behaviour and its benefits affects handwashing intentions and plans, and eventually performance of the behaviour.
	Motivated Brain	The goal-related drivers of behaviour. Motives for handwashing can include (but is not limited to) disgust (the desire to avoid cues to sources of infection), affiliation (the desire to fit in with others) and nurture (the desire to care for your child).
	Reactive Brain	The extent to which handwashing can be automatically triggered based on past experience and repetition.
	Discounts	The perceived time, effort and costs of washing hands with soap as compared to other courses of action.
Body	Characteristics	Socio-demographic characteristics that may affect handwashing, including gender, wealth, age, education and employment.
	Senses	The sensory perceptions that may cue handwashing behaviour or be experienced during or after handwashing.
	Capabilities	Whether an individual has the skills required to wash their hands with soap. Whether an individual perceives themselves to be able and willing to actually wash their hands at the times required.
Behaviour settings	Stage	The design and set up of the specific physical spaces where handwashing behaviour takes place.
	Infrastructure	Durable infrastructure associated with handwashing such as water supply systems, sanitation, kitchen facilities and handwashing facilities.
	Props	The value, characteristics, usability, ownership and accessibility of soap and other objects used for handwashing.
	Roles	The ways in which an individual's role, identity or responsibilities influence their handwashing practices.
	Routine	The sequence of behaviours regularly performed in association with handwashing.
	Norms	The extent to which an individual's handwashing practice is influenced by their perception of normative setting-specific rules. This includes an individual's perception of whether handwashing is commonly practiced in their community (descriptive norm); whether handwashing is part of their role and their normal behaviour (personal norm); whether handwashing is socially approved of (injunctive norm); and whether handwashing is practiced by their 'valued others' (subjective norm).
Environment	Physical environment	Factors in the physical or built environment including climate and geography.
	Biological Environment	Factors associated with an individual's interaction within their biological environment.
	Social Environment	The structure of an individual's social environment, including how they interact with it and perceive themselves within it.
External context	Political and historical context	The historical and cultural events that have shaped current perceptions and practices of handwashing. The extent to which handwashing-related policies or local and national leadership on handwashing issues, shape handwashing perceptions and practices at the individual level.

and Curtis, 2016; Dreibelbis et al., 2016).

Within the WASH sector there are multiple behavioural frameworks, each with different ways of defining and categorising the determinants of behaviour. IBM-WASH (the Integrated Behaviour Model for WASH) (Dreibelbis et al., 2013) is an example of an ecological framework and stratifies determinants according to their level of behavioural influence (e.g. those which influence people at individual, local, community and social/cultural levels). RANAS (Mosler, 2012) is another widely applied method which is grounded in health psychology and focuses on domains of cognitive reasoning such as risk, attitudes, norms, abilities and self-regulation. FOAM (Coombes and Devine, 2010) is an approach specifically focused on handwashing behaviour which has roots in social cognition theory. FOAM postulates three categories of determinants: opportunity (covering determinants like social norms and access to products), ability (covering determinants like knowledge and social support) and motivation (covering determinants such as beliefs, intentions and emotional drivers). Additionally WASH practitioners and academics have commonly used a set of more generic behavioural frameworks including Designing for Behaviour Change (CORE Group and Behavioural Change Working Group, 2008), COM-B (Michie et al., 2011), Theory of Planned Behaviour (Ajzen, 1991), the Health Belief Model (Becker MH. 1974) and Behaviour Centred Design (Aunger and Curtis, 2016). Across these behavioural frameworks there is a high level of overlap in the determinants mentioned. Yet each model conceptualises determinants and their relationship to one another differently.

Whilst research on handwashing in communities has expanded in recent decades (Global Handwashing Partnership 2017, 2019) there have, as yet, been no systematic reviews focusing on its determinants.

This current review has two objectives: 1) to identify, define and categorise the determinants of handwashing behaviour in domestic settings globally and, 2) to appraise the quality of this evidence, with the broader aim of assisting practitioners to better focus their handwashing promotion efforts.

2. Methods

We completed an integrative systematic review. This style of review allows for the inclusion of diverse methodologies and are particularly useful for informing and developing theory, appraising the quality of evidence provided by different types of studies in relation to a topic, and identifying gaps in current research (Russell, 2005; Whittemore and Knafl, 2005). We followed the five step process outlined by Whittemore and Knafl, (2005) and Russell, (2005). Step 1 is formulation of the problem, step 2 is defining the search criteria, step 3 is the evaluation of the data, step 4 is the analysis of data and step 5 is the presentation of data. Each of these steps are described below.

2.1. Step 1: problem formulation

Integrative reviews require a well-defined philosophical or theoretical framework for analysis (Kirkevold, 1997). We therefore sought a practical and flexible framework for systematically classifying the determinants of behaviour. We further specified a definition of our outcome, 'handwashing behaviour', and selected appropriate populations of interest and study types for the review.

2.1.1. Definition of determinants

In identifying a framework of determinants for this review we sought to use an approach that had been widely used in water, sanitation and hygiene (WASH) research; which had a clearly defined set of determinants; and which reflected the diverse ways determinants are conceptualised across academic disciplines. The approach of Behaviour Centred Design (BCD) (Aunger and Curtis, 2019) was selected because its theory is generic, and draws from a range of disciplines such as evolutionary and cognitive psychology, social ecology, and social marketing practice. BCD presents a more comprehensive set of behavioural determinants than any of the other models we considered and defines each of these clearly(Aunger and Curtis, 2019). Types of determinant include factors in the brain (including knowledge, risk,

motives, reactions, and psychological trade-offs), factors in the body (characteristic traits and sensations) factors related to the settings where the behaviour takes place (infrastructure, props, roles, routine and norms) and factors in the broader environment (the biological, physical and social environment and the wider context). BCD proved broad enough to classify all of the determinants described in other frameworks. It has also been widely used for handwashing and other behaviour change studies (Biran et al., 2014; Greenland et al., 2016; White et al., 2016; Gautam et al., 2017; Tidwell et al., 2019). Table 1 provides definitions of each BCD determinant adapted for handwashing behaviour.

2.1.2. Behaviour of interest

We then specified the outcome, handwashing with soap, by defining and categorising measures of behaviour. Handwashing with chlorine mixtures, ash or alcohol gel were not included because they are less widely used and their determinants may be different. In cases where authors used more ambiguous terminology (e.g. 'hand hygiene practices' or 'handwashing'), we emailed authors to clarify whether handwashing was carried out with soap. HWWS in the 'domestic environment' was defined as handwashing after contact with faeces or prior to cooking and eating food at home. Handwashing behaviour is known to be difficult to measure. All study methods, such as self-report and structured observation suffer from limitations, especially measurement bias (Ram, 2010; Loughnan et al., 2015). We followed the general consensus on behavioural measurement within the hygiene sector (World Health Organization, 2009; WHO and UNICEF, 2015). We classified evidence gathered through direct observation or monitors (devices inserted into soap bars or soap dispensers) as 'good', evidence from proxy measures (such as the presence of water and soap near a toilet), handwashing 'sticker diaries' (Schmidt et al., 2019) or demonstrations of handwashing behaviour as 'moderate', and self-reported behaviour as 'weak' evidence.

2.1.3. Population of interest

We excluded studies conducted in schools, universities, day-care centres, aged-care homes, prisons, health facilities or workplaces. Studies in any country were eligible for inclusion. A sub-analysis was performed on studies conducted during disease outbreaks and during humanitarian crises (this included studies conducted during disasters, conflict or displacements of populations). This was because the determinants of handwashing behaviour may differ when there are major disruptions to social, physical and biological environments.

2.1.4. Study types

We included all types of qualitative and quantitative peer-reviewed publications concerning interventional or observational studies. Commentaries, editorials, review articles or theoretical articles that did not present new data or provide an analysis of secondary data were excluded.

2.2. Step 2: search criteria

We conducted our searches via the Embase, Medline, and psycINFO databases on the June 22, 2018. Searches combined handwashing and hygiene mesh terms with either broad terms relating to behaviour change and behaviour determinants, or to specific terms describing each determinant in the BCD checklist (see ESM 1). We only included studies published in English. Studies published before the year 2000 were excluded. This cut-off date was decided based on adoption of the Millennium Development Goals. After this point there appears to have been a recognition that handwashing and hygiene were as important as water and sanitation (Curtis and Cairncross, 2003) followed by a corresponding increase in WASH-related research.

2.2.1. Data management and screening

We imported citations into Endnote and duplicates were removed. We screened citations for eligibility first on titles and abstracts and then on a full text review. Eligibility was determined based on whether the manuscript reported any relationship between a behavioural determinant and handwashing behaviour in the results section of the paper (hereafter we describe this as 'an association'). Associations could be qualitatively or quantitatively described. No weighting was given based on the type of data or reported size of effect. We excluded papers that only speculated or expressed opinions on potential determinants of handwashing behaviour without actual data. We screened the references of all included papers so to identify further relevant texts, however, no additional studies were identified.

2.3. Step 3: evaluation of data

Studies were tabulated according to: publication date; country of focus (disaggregated according to World Bank classifications (World Bank, 2018)); population sampled (whether the study population was rural or urban, and whether the population were in a stable setting or were experiencing an outbreak or were crisis-affected); the study design and study methodology (classed as observational or interventional, and as qualitative, quantitative or mixed methods); the methods used for assessing behavioural determinants; the means of measuring the behavioural outcome; and whether the study referenced or used a behavioural theory.

2.4. Step 4: data analysis

Each reported determinant was categorised against the definitions in the BCD checklist. This process was double coded by authors SW and VC. For each association we also categorised whether the determinant was reported to have a positive effect on HWWS, no effect, or a negative effect. We also assessed each association in terms of whether the determinant was well defined and whether a valid and reliable method was used to assess the determinant and the resulting HWWS behaviour. The first author (SW) summarised the effect and assessed the definition and measurement of determinants. The second author (AHT) cross-checked a random 25% of all the classifications to validate the process. Inter-rater agreement between the two authors was assessed using Fleiss' Kappa (Fleiss and Cohen, 1973). Almost perfect agreement was found (Kappa score = 0.88) (Landis and Koch, 1977) so no further double-coding was undertaken. Where initial disagreement was identified, the authors discussed the rationale for their coding decision and were able to resolve all difference of opinion.

We calculated a composite quality score (range: 0 to 4) for each association. This was comprised of the sum of three specific quality measures: overall study quality (0–2 points), if determinant was well defined (0 or 1 point), and if valid and reliable methods were used to measure both handwashing behaviour and determinant (0 or 1 point). This composite means of assessing quality was necessary because study quality alone was an insufficient measure of the quality of determinant reporting and measurement within the study. Table 2 provides a detailed description of how the quality measures were defined and calculated.

If more than three studies described the same association between a determinant and HWWS (irrespective of how HWWS was measured), then the associations were summarised and included in the main analysis. For each of these 'meta-associations' we enumerated the number of individual associations in each effect category (positive effect on HWWS, no effect on HWWS, or negative effect on HWWS). The quality scores from each individual association were summed across each of the meta-association categories. This process allowed us to appraise both the number of studies reporting a certain type of effect and the quality of the evidence associated with each effect.

All authors were then invited to review this data and independently

Table 2
Description of the methods used to calculate the composite quality score for each association between a behavioural determinant and HWWS behaviour.

Quality Score Components	Possible Scores	Definition
Overall Study Quality	• 0 points for poor quality • 1 point for moderate quality • 2 points for good quality	We assessed the quality of each study using the methods adapted from Hill et al. (Hill, D'Mello-Guyett et al., 2014) We graded quantitative studies against 10 criteria, qualitative studies against 8 criteria and mixed method studies against 10 criteria. Studies were considered to be of good quality if they scored nine or ten on the quantitative or mixed method criteria and seven or eight on the qualitative criteria. Studies were considered to be of moderate quality if they scored between six and eight on the qualitative and mixed methods criteria and between four and six on the qualitative criteria. Studies scoring less than this were considered to be of poor quality. A full summary of the quality grading of all papers is provided in the supplementary materials (ESM2).
Determinant definition	• 0 points for a poor definition • 1 point for a clear definition	A 'clear definition' required that the determinant and the means of measuring it be explained in the text.
Valid and reliable measurement of the determinant and of HWWS behviour	• 0 points if the modes of measurement were not valid and reliable • 1 point if the modes of measurement were valid and reliable	A 'valid and reliable' measurement required two things: • That the method of measuring the determinant had either been tried elsewhere, or, if being tried for the first time, the validity and reliability of the method had to have been discussed. • That the method for measuring HWWS behaviour did not rely only on self-report.

draw their own conclusions about the overall effect of each meta-association and the quality of evidence in each meta-association category. Authors were asked to grade the meta-association effect as: a) a positive effect, b) inconsistent results indicating a positive effect, c) no effect, d) inconsistent results indicating no effect, e) negative effect, f) inconsistent results indicating a negative effect or g) inconsistent findings. Authors also graded the quality of evidence in each meta-association category as weak, moderate or good. Inter-rater agreement between the four authors was assessed using Fleiss' Kappa (Fleiss and Cohen, 1973). According to Landis and Koch's definitions (Landis and Koch, 1977) we reached almost perfect agreement in relation to the effect direction (Kappa score = 0.93) and substantial agreement on the quality of evidence (Kappa Score = 0.8). Where disagreement was identified the opinion of the majority of authors was reported.

We conducted a sub-group analysis of studies conducted during outbreaks and humanitarian crises by summarising the types of determinants reported in these settings and comparing them with the overall dataset.

Our review adheres to the PRISMA reporting guidelines (Moher et al., 2009).

3. Results

3.1. Characteristics of the studies included in this review

Fig. 1 presents a flow diagram of the search process used in this review and Fig. 2 presents a flow diagram of the analysis process. We identified 78 studies that met inclusion criteria. These studies took place in 44 countries, the majority of which were middle income (60%). Studies were equally divided between urban and rural contexts and 69% took place in stable settings. Sixteen took place during disease outbreaks while nine took place in humanitarian crises. Together the studies included over a million participants, although not all studies stated their sample size clearly. Only seven behaviour change theories were mentioned across all the studies and 45 studies did not cite any behaviour change theory. The theories mentioned were: IBM-WASH (Dreibelbis et al., 2013), Behaviour Centred Design (previously known as Evo-Eco) (Aunger and Curtis 2013, 2016), Theory of Planned Behaviour (Ajzen, 1991), RANAS (Mosler, 2012), the Health Belief Model (Becker MH. 1974), FOAM (Devine, 2009; Coombes and Devine, 2010), and Protection Motivation Theory (Rogers, 1983). Among the included studies the most common study design was cross-sectional quantitative studies that used self-reported measures of handwashing behaviour. However, the second most common measure of HWWS behaviour was direct observation, which was used in 30 studies. Table 3 summarises the characteristics of the studies in greater detail.

3.2. Quality of the studies included in this review

Table 4 summarises the quality of the studies. Only 13 studies were graded as high quality, with mixed-methods studies proportionally more likely to be graded as high quality when compared with qualitative or quantitative studies. A quarter of the papers did not provide a description of the context where the research was undertaken. Many papers (22%) provided ambiguous descriptions of their methods for assessing determinants and the majority provided no rationale for how methods were selected. Furthermore, 70% of papers did not discuss the limitations or biases of their methods.

3.3. Quality of assessment of associations between determinants and behaviour

We identified a total of 496 associations between a reported behavioural determinant and the HWWS outcome in the 78 included studies. Of the 496 associations identified, the determinant was not clearly described in 108 (22%) cases. Even in cases where determinants were well defined, there was little consistency in definitions across the literature. For example, nine manuscripts (Sakisaka et al., 2002; Scott et al., 2007; Lohiniva et al., 2008; Biran et al., 2009; Luby et al., 2009; Schmidt et al., 2009; Hulland et al., 2013; Oswald et al., 2014; Friedrich et al., 2017) discussed the importance of having either piped water or a water source close to the household, yet there was no agreement on what 'close' meant. Similarly, six papers reported that living in certain geographic regions made participants more likely to wash their hands (Schmidt et al., 2009; Miao and Huang, 2012; Al-Khatib et al., 2015; Hirai et al., 2016; To et al., 2016; Kumar et al., 2017) but did not describe the characteristics of these locations.

A further 344 of the reported associations did not use a valid and/or reliable method to measure either the determinant or the HWWS outcome, most often because the outcome measure was self-reported.

3.4. Reported associations between determinants and handwashing behaviour

Fig. 2 shows the total number of associations in each of the determinant categories of the BCD checklist. The association between socio-demographic characteristics and HWWS was the most widely reported determinant (n = 122, 25%). Several determinants were under-represented (mentioned fewer than 10 times across the literature), such as the biological environment, contextual factors, routines,

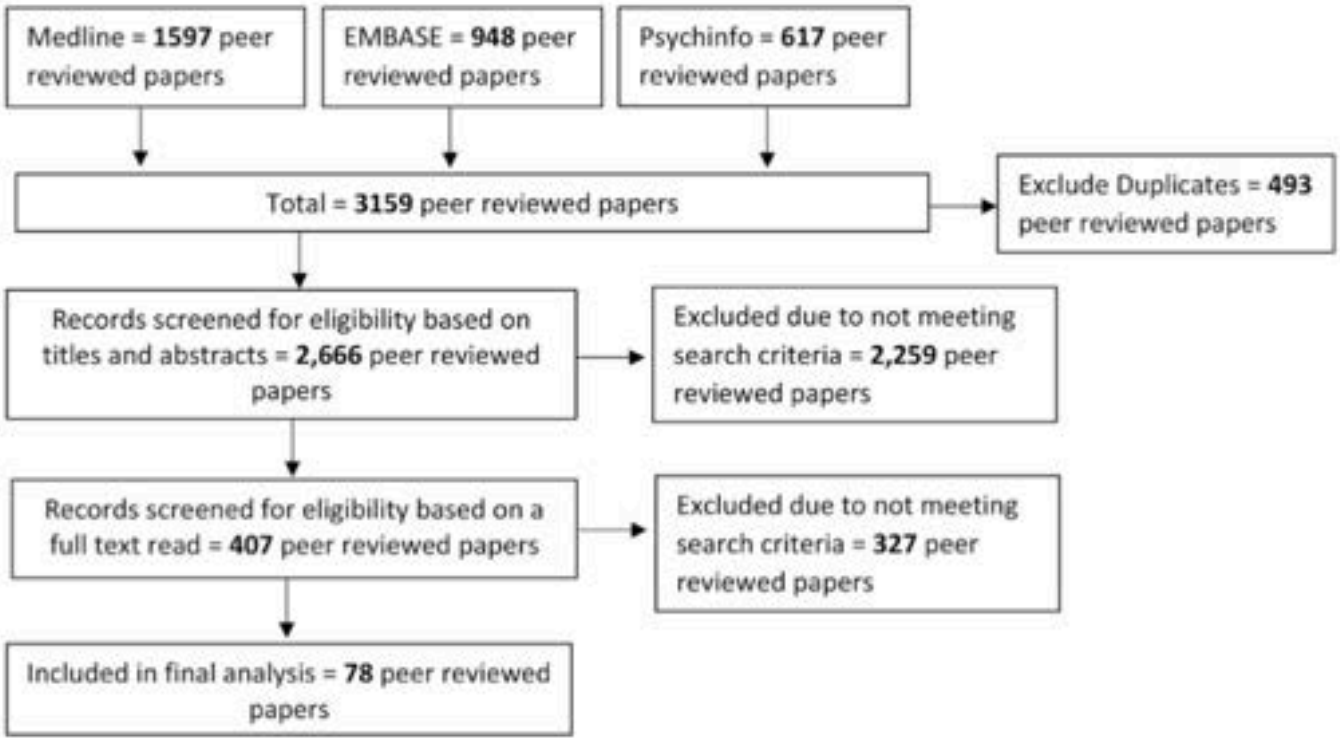

Fig. 1. Flow chart of the literature search process.

roles, capabilities, intention and motivations other than disgust, comfort, fear and nurture.

Fifty 'meta-associations' – i.e. determinants that were mentioned three or more times – were identified and included in the main analysis. The meta-associations are summarised in Table 5 and a full description of the analysis is provided in the supplementary material (ESM3). These meta-associations were drawn from 338 individual determinant references. The remaining 111 associations were mentioned only once or twice and are included in a table as part of the supplementary material (ESM4). Among the 338 associations included in the main analysis, a third were graded as 'good quality' (85 graded at 3 points and 26 graded at 4 points). We identified greater consensus (more meta-associations identified) about handwashing determinants in the categories of executive brain (particularly risk and discounts), characteristics, motivations, and behavioural settings (particularly infrastructure). There were lower levels of consensus around capabilities, roles, certain

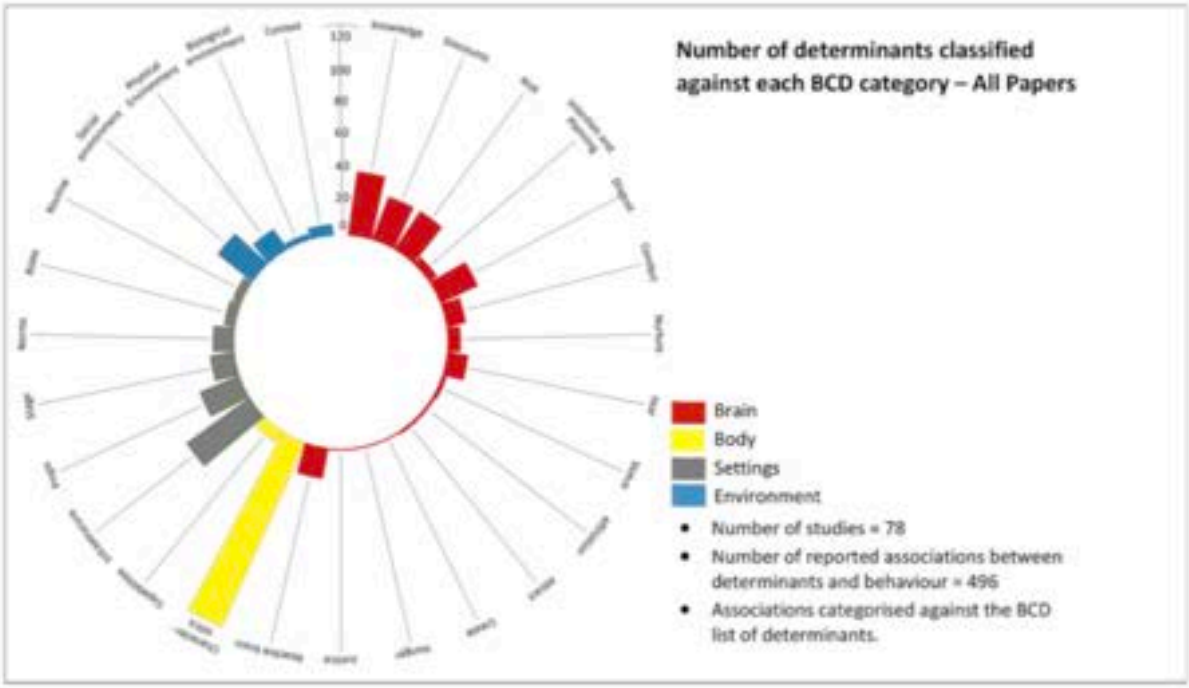

Fig. 2. Reported determinants of handwashing behaviour according to the Behaviour Centred Design determinant categories – All papers.

Table 3
Characteristics of the included studies.

Descriptive characteristics of studies	N (78)	%
Number of countries represented by the review	44[a]	
High income	17	22%
Upper-middle income	8	10%
Lower-middle income	38	50%
Low income	11	14%
Multi-country	4	5%
Total number of research participants	1,014,293	
Number of studies in rural areas	30	38%
Number of studies in urban areas	30	38%
Number of mixed location studies	18	23%
Number of studies in stable settings	54	69%
Number of studies in outbreaks settings[b]	16[c]	21%
Number of studies in crisis settings (conflict, displacement, earthquake, drought, famine)[b]	9[c]	12%
Types of studies		
Interventional	28	36%
Observational	50	64%
Qualitative	11	14%
Quantitative	51	65%
Mixed-methods	16	20%
Methods used for assessing behavioural determinants		
Questionnaire	52	67%
Observation	30	38%
In-depth interview	20	26%
Focus Group Discussion	18	23%
Behaviour Trails or Trials of Improved Behaviour[c]	2	3%
Ranking or voting	2	3%
Transect walk	1	1%
Methods for assessing handwashing behaviour		
Observation (good quality)	27	35%
Monitors (good quality)	2	3%
Proxy measures (moderate quality)	10	13%
Sticker diaries (moderate quality)	0	0%
Handwashing demonstrations (moderate quality)	2	3%
Self-report (poor quality)	51	65%
Number of studies that made any reference to theory	33	42%

[a] Taiwan, Hong Kong and the Palestinian territories are treated as countries in the World Bank income classification and in this study.

[b] Studies had to explicitly make reference to a crisis or outbreak to meet this classification.

[c] Behaviour Trials (also known as Trials of Improved Behaviour) involve asking the target population to follow the ideal behaviour for a certain period of time or sometimes populations are asked to use a new product or handwashing facility to wash their hands for a certain period of time. (Aunger et al., 2017).

Table 4
Summary of the quality of studies in this review.

	Good quality	Moderate quality	Poor quality
Qualitative (n = 11)	0	9	2
Quantitative (n = 52)	8	29	14
Mixed methods (N = 16)	5	7	4
Total	13 (17%)	45 (58%)	20 (26%)

motives (e.g. hunger and affiliation), the biological environment and the political, cultural and historical context.

3.5. Effect of determinants on handwashing behaviour

The authors unanimously agreed on the effect direction and quality of evidence for 35 of the 50 meta-associations. Twenty-five of the meta-associations were found to have a positive effect on HWWS and a further 13 were found to have inconsistent results but indicating that there may be a positive effect. Of these 38 positive-leaning meta-association categories, nine were deemed to be supported by good evidence. These included six meta-associations related to handwashing infrastructure, stage and props (specifically having a handwashing facility with soap and water present, having a handwashing facility located close to the kitchen and/or toilet, having handwashing facilities that are desirable and user friendly and having piped water close to the household, using soapy water and the presence of an improved latrine). Other positive-leaning meta-association categories, which were considered to have good evidence, were feeling that your handwashing was being observed due to the presence of others in the bathroom, living in certain geographic environments and having a young child in the family.

Four meta-association categories were classed as having a positive effect but having weak evidence to support them. These related to risk (specifically believing that handwashing with soap is efficacious in reducing outbreaks and disease transmission), motives such as disgust (specifically a desire to avoid germs and contamination) and nurture (specifically parents who have a strong desire to care for their children and are attentive to their needs) and habit formation in the reactive brain (specifically being taught handwashing behaviour from a young age). Many of the meta-associations in the characteristics category were found to have a positive effect on HWWS. For example, women and girls were found to be more likely than men to wash their hands with soap. Wealthier and more highly educated people were also more likely to HWWS. Despite many studies reporting these associations, the quality of evidence for these characteristic-related determinants was graded as weak or moderate because the majority of the studies reporting them relied on self-reported measures of HWWS.

Nine of the meta-associations were classified as having a negative effect on HWWS. While four of these were classified as having moderate evidence to support this effect, none of these negative meta-associations were classed as having good evidence. Five of these negative meta-associations related to discounts including being too busy, distracted, tired or lazy to focus on handwashing, perceiving soap to be expensive, believing that handwashing uses lots of water, or thinking that handwashing was not an important activity.

We classified three meta-associations as having inconsistent evidence which indicated that there may be no effect. There was moderate evidence to support two of these categories, while the other was classified as weak. These included biomedical knowledge of disease transmission, the real or perceived availability of water, and the likelihood of practicing handwashing if your friends and family practice handwashing.

Only one meta-association was found to have such inconsistent findings that no effect direction could be concluded. This related to the effect of believing that other people in your community wash their hands and therefore practice handwashing to adhere to this norm.

3.6. Determinants of handwashing behaviour during disease outbreaks

There were 17 studies that were undertaken during a disease outbreak. The majority of these were H1N1 influenza outbreaks (n = 9) but the sub-analysis also included H5N1 (n = 2), cholera (n = 2), typhoid (n = 2) and salmonella (n = 1). Of these, 12 were in high income or upper middle income countries. In comparison to the overall dataset these studies were more likely to use cross-sectional surveys as their only data collection method (71% compared to 30% overall). In total 103 associations were extracted from the 17 studies. None of these were mentioned frequently enough across the papers to be included in the main analysis. Part 1 of Fig. 3 shows the number of associations categorised against each BCD determinant for the outbreak sub-analysis. It highlights that there are gaps in the evidence related to some motivations, aspects of behavioural settings and the physical environment. It also reveals that studies undertaken during outbreaks predominantly focus on determinants like fear, risk perception and demographic characteristics.

3.7. Determinants of handwashing behaviour during other types of humanitarian crises

There were nine studies where authors described the context as

Table 5
Descriptive and weighted analysis of handwashing determinants reported by three or more studies (summarised version).

BCD categories		Hypothesised relationship between determinants and HWWS	Number of associations reported	Assessment of overall Association	Assessment of quality of evidence
Executive Brain	Knowledge	Biomedical knowledge about health and disease	10	Mixed results indicating no association*	Moderate
		Knowledge about the critical times to wash hands	10	Mixed evidence indicating a positive association	Moderate
	Risk	Believing that HWWS is efficacious in reducing outbreaks and disease transmission.	11	Positive association	Weak
		Believing that there are no preventative or curative treatments for an outbreak related disease.	3	Positive association	Moderate
		Perceiving yourself to be vulnerable to disease	9	Mixed evidence indicating a positive association	Moderate*
		Perceiving the consequences of getting diarrhoea or an outbreak related disease to be serious.	8	Mixed evidence indicating a Positive association	Moderate
	Intention and planning	Intending to wash hands with soap.	5	Mixed evidence indicating a positive association	Moderate
	Discounts	Being busy or getting distracted by other tasks	9	Negative association	Moderate*
		Perceiving soap to be expensive	6	Negative association	Weak
		Thinking that HWWS is not an important activity.	4	Negative association	Moderate
		Believing that HWWS requires a lot of water.	4	Negative association	Weak
		Feeling tired or lazy	3	Negative association	Moderate
Motivated Brain	Disgust	Perceiving unwashed hands to be disgusting	6	Positive association	Moderate*
		Hands being contaminated with something that is dirty, foul or smelly.	16	Positive association	Moderate
		A strong desire to avoid germs and contamination.	3	Positive association	Weak
	Comfort	Believing that HWWS will leave hands smelling nice.	5	Positive association	Moderate
		Believing that HWWS will make hands feel nice and help them to feel refreshed, confident and comfortable.	5	Mixed results indicating a positive association	Moderate

(continued on next page)

Table 5 (*continued*)

BCD categories		Hypothesised relationship between determinants and HWWS	Number of associations reported	Assessment of overall Association	Assessment of quality of evidence
	Nurture	Parents who have a strong desire to care for their children and are attentive to their needs.	9	Positive association	Weak
	Fear	Experiencing worry or anxiety in relation to a disease or outbreak.	9	Mixed results indicating a positive association	Moderate
	Status	Believing that HWWS is linked to being respected in society.	3	Positive association	Moderate*
Reactive Brain		Being cued to wash hands by the presence of a handwashing facility.	6	Positive association	Moderate
		Believing that your HWWS behaviour is habitual.	3	Positive association	Moderate
		Visual reminders (e.g. posters about handwashing or images of eyes to make people feel like they are being watched).	4	Mixed results indicating a positive association*	Moderate*
		Being taught HWWS behaviour from a young age.	3	Positive association	Weak
Characteristics		Having higher levels of education	25	Mixed results indicating a positive association	Moderate
		Being female	14	Mixed results indicating a positive association	Moderate
		Being wealthy	22	Positive association	Moderate
		Having a young child in the family	3	Mixed results indicating a positive association*	Good*
		Belonging to certain ethnic groups	4	Mixed results indicating a positive association*	Moderate
		Having a professional or office-based job.	3	Positive association	Moderate
		Being older.	10	Inconsistent results*	Weak*
Stage		Having an improved latrine.	3	Mixed results indicating a positive association	Good*
		Having access to a private toilet.	3	Positive association	Moderate*
		Working away from home	3	Negative association	Moderate
Infrastructure		Having a handwashing facility with soap and water present.	9	Positive association	Good
		Having handwashing facilities that are conveniently located close to the kitchen and toilet.	3	Positive association	Good
		Having handwashing facilities that are desirable and user friendly (a mirror, a soap holder, a basin, nicely coloured).	5	Positive association	Good
		Having piped water or a water source close to the household.	9	Positive association	Good
		Having water available at the handwashing facility.	9	Positive association	Moderate*

(*continued on next page*)

Table 5 (continued)

BCD categories	Hypothesised relationship between determinants and HWWS	Number of associations reported	Assessment of overall Association	Assessment of quality of evidence
	A real or perceived lack of water.	4	Mixed results indicating no association	Moderate*
Props	Having soapy water.	3	Positive association	Good
	An actual or perceived limited availability of soap	5	Negative association	Weak
	Soap being conveniently located and near to the place where hands are washed.	8	Positive association	Moderate
Routine	Doing other household tasks involving water within a close time proximity to a critical handwashing occasion.	5	Negative association	Weak
Norms	Believing that other people in your community wash their hands you are more likely to wash your hands.	5	Inconsistent results	Moderate
	Believing that HWWS is practiced by your friends, family, and others who are important to you.	4	Mixed evidence indicating no association*	Weak*
Physical Environment	Living in an urban area	9	Positive association	Moderate
	Living in certain geographic regions.	6	Positive association	Good
Social Environment	Having role models or people with some authority (e.g. teachers, health workers, parents) encourage and support HWWS.	6	Positive association	Weak
	More than one person present in a public bathroom.	3	Positive association	Good

Colour coding for direction of the association: Grey indicates inconsistent results or no association. Red indicates a negative association. Blue indicates a positive association.
Colour coding for quality of evidence: The dark blue indicates good evidence, the medium blue indicates moderate evidence and the pale blue indicates weak evidence.
*unanimous agreement was not found between all authors.

being a humanitarian crisis. This included studies done in conflict settings (n = 2), in refugee or displacement camps (n = 3), and during climatic events (droughts n = 2) and disasters (earthquakes n = 2). None of the papers described research done in the acute phase of an emergency. In two of these studies there were concurrent disease outbreaks. These papers were included in both of the sub-analyses. In total 39 associations were extracted from the nine studies. None of these were mentioned frequently enough across the papers to be included in the main analysis. Part 2 of Fig. 3 shows the number of associations categorised against each BCD determinant for humanitarian crisis sub-analysis. This highlights the overall paucity of evidence in this area as well as key gaps in the determinants literature in relation to some motives, some aspects of behavioural settings, the biological environment and contextual factors.

4. Discussion

Despite there being a growing body of work on handwashing, there are major gaps in the literature on the determinants of HWWS. Our review indicates that the overall quality of the evidence on this topic remains poor and that the literature is skewed towards reporting certain types of determinants (e.g. characteristic traits, infrastructure and executive brain functions such as knowledge, risk and discounts) at the expense of a more complete understanding of what drives HWWS. More evidence is needed about how HWWS is influenced by routines, norms, context, the physical and biological environments, and motives. Further, there are no standard ways of defining or measuring determinants across this literature, which impedes the accretion of scientific evidence. Even with these limitations, we were able to identify some consensus within the literature as to the effect of certain determinants of HWWS behaviour.

4.1. Implications for designing programmes to change handwashing behaviour

This review identified 50 associations that were reported more than three times in the literature, indicating some level of agreement about the determinants influencing HWWS behaviour. While the evidence around many of these remains sub-optimal, there are some implications for those seeking to promote HWWS.

Historically practitioners have primarily tried to improve HWWS by educating populations about disease transmission. This review found that knowledge about disease and disease transmission may have limited or no impact on HWWS. Many studies in our review documented already high levels of knowledge about disease transmission (Curtis et al., 2009; Aunger et al., 2010; Hirai et al., 2016) yet handwashing remained rare. Knowledge may not be necessary or sufficient to influence handwashing behaviour in the face of competing priorities or unconducive behavioural settings (Biran et al., 2005; Curtis et al., 2009; Rheinlander et al., 2015). In contrast this review indicates that the

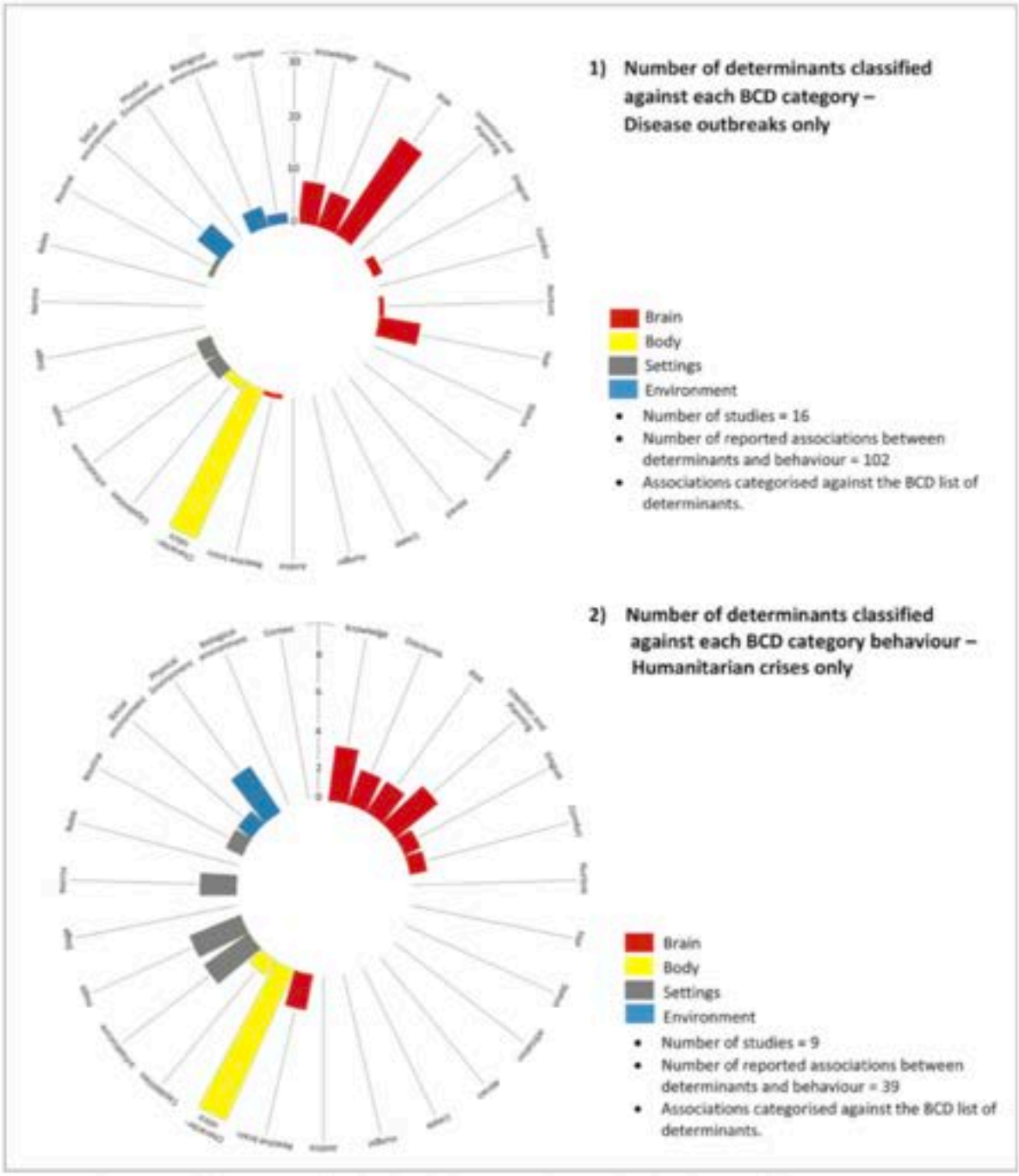

Fig. 3. Reported determinants of handwashing behaviour 1) in disease outbreaks and 2) in other humanitarian crises.

greatest opportunity to improve HWWS may be to ensure access to a desirable and conveniently-located handwashing facility, with soap and water present. This body of literature indicates that this is likely to be effective because handwashing infrastructure acts a cue or reminder for HWWS and works to overcome some of the psychological trade-offs that may prevent handwashing (such as perceived effort, and feeling busy or tired). Positioning facilities in 'observable' settings, where people can easily notice whether or not hands are being washed is also likely to have an increase behaviour by enhancing positive social pressure.

Socio-economic factors such as wealth and education do seem to be associated with a higher likelihood of HWWS. It is hard to specify what the causal route is here, given the likely interactions and confounds with other determinants. We do know that WASH access and quality typically improves with the economic growth of nations (Cha et al., 2017) but that even high income settings where HWWS is easier it is not ubiquitous (Garbutt et al., 2007; Judah et al., 2010; Freeman et al., 2014). It is not the role of hygiene programmes to address broader wealth or educational challenges within a nation, but without broader societal and economic change it is possible that handwashing promotion programmes may only achieve moderate impacts.

4.2. *Differences in handwashing determinants during outbreaks and humanitarian crises*

We were unable to draw conclusions about whether the determinants of HWWS differ between stable settings, outbreaks and

humanitarian crises. In the literature relating to outbreaks this was because of the poor quality of studies and the tendency for researchers to focus only on a narrow subset of determinants like knowledge, fear and risk. No conclusions could be drawn in relation to the determinants of behaviour in humanitarian crises because of lack of evidence. Other reviews have also highlighted the lack of hygiene behaviour change research in these settings (Ramesh et al., 2015; De Buck, Van Remoortel et al., 2017). Despite this, it remains plausible that a major disruption to a person's social life, psychological state, physical or biological environment, such as that experienced during crises or outbreaks could lead to changes in the determinants of HWWS. Future research in this area could consider a broad range of behavioural determinants in contexts that reflect the diversity of both outbreaks and humanitarian crises (the literature we reviewed was biased towards outbreaks in middle and high-income settings and protracted crises).

4.3. Refining what is meant by 'handwashing determinants'

Our ability to identify the determinants of handwashing behaviour was hampered by the lack of scientific consensus on how behaviour operates in general. We neither have commonly agreed definitions of what constitutes behaviour (Levitis et al., 2009), nor do we have commonly agreed categories of factors that determine behaviour (Morgenstern et al., 2013). Whilst humans are inclined to rationalise why they do, or do not, practice a behaviour like HWWS, individuals cannot objectively identify the determinants of their own behaviour. Though the BCD checklist of behavioural determinants moves us forwards, complete, valid, and agreed upon methods for objectively measuring the determinants of behaviour are still beyond our grasp.

The determinants that are reported in the literature are thus likely to reflect a bias towards factors that are easy to measure. For example, it is easier to assess knowledge, characteristic traits, and the influence of infrastructure, because there are simple ways of reporting these, or they are observable. It is much harder to assess determinants which operate at a partially or fully sub-conscious level such as motives, roles, social influence, and factors in the physical and biological environments. Many studies rely on methods which require participants to report their perceptions regarding their own behaviour. Study findings may also be subject to confirmation bias, with researchers typically only generating findings related to a choice of determinants generated ad hoc at the beginning of the research. Lists of determinants have become more comprehensive over time, and are no longer so biased towards knowledge and cognition. However, there are some indications that confirmation bias may be replicated across research studies. For example, the earliest reference to motives such as disgust in this literature was 2005 (Biran et al., 2005). Other motives began to be reported on in 2009 (Curtis et al., 2009; Judah et al., 2009) and since then 21 manuscripts have reported on motives. To mitigate this tendency, we recommend that future studies aiming to explore behavioural determinants should, as a minimum, utilise a comprehensive determinant checklist (such as that offered by BCD) but ideally incorporate a range of methods that allow them to identify determinants *a posteriori* such that the existing determinant categories can be extended or modified.

4.4. Designing 'fit for purpose' studies on determinants of handwashing behaviour

There were three main types of studies included in this review: exploratory or formative research (typically using qualitative or mixed method approaches); cross-sectional (primarily using surveys); and intervention (including experimental studies of simple interventions, trials of complex interventions, and process evaluations). The exploratory and formative research studies allowed a range of determinants to be explored, including those not identified *a priori*. However, their findings were less generalizable; they were less likely to report on determinants which had no impact on behaviour; and these studies typically did not identify which determinants had the strongest influence on behaviour. Cross-sectional studies, on the other hand, are better positioned to explore the relative importance of different determinants. However, these studies had multiple limitations. Measurement bias was an issue in these studies because of the absence of standardised, thoroughly tested survey tools and many used self-reported measures of HWWS, which made them subject to social desirability and recall bias. As with all cross-sectional studies, we cannot be sure of the direction of causation, for example, does hand washing routine determine handwashing behaviour or handwashing behaviour determine the routine? Finally, the cross-sectional studies included in this review were only able to generate data on the determinants that they identified *a priori*. This may be one reason why socio-demographic determinants are the most commonly reported. Intervention studies ought to be well positioned to provide high quality evidence on determinants. However, many HWWS interventions comprised multiple components which targeted different determinants. This made it challenging for authors to attribute change to one particular determinant. Other reviews of WASH-related behaviour change (Martin et al., 2018), hospital-based hygiene (Huis et al., 2012), protective behaviour during pandemics (Bish and Michie, 2010) and obesity-related behaviour (Buchan et al., 2012) have documented similar challenges in measuring both determinants and behavioural outcomes.

Many frequently cited handwashing intervention studies were excluded from this review because they only hypothesised about determinants in their discussion, but did not measure determinants directly (Huda et al., 2012; Biran et al., 2014, Greenland et al., 2016, Gautam et al., 2017; Ram et al., 2017). Furthermore, many of the studies which were included had multiple objectives, and exploring the determinants of HWWS was just one of these. This may be a factor limiting detailed descriptions of the methods used to understand behavioural determinants.

This review highlights a number of ways in which the quality of research on handwashing determinants could be improved. Firstly, as we suggested above, studies investigating behavioural determinants should employ a comprehensive set of theoretically derived potential determinants and utilised a mixed method or iterative research design approach. Secondly, there are opportunities to improve the way we assess HWWS outcomes with relatively little cost. For example, only ten studies in this review used proxy measures like the global handwashing indicator ('the availability of a handwashing facility within the [household] premises with soap and water'(WHO and UNICEF, 2015)). While this measure is imperfect, it is more reliable than self-reporting and is feasible to conduct at scale. Thirdly, research on determinants of HWWS must adequately describe the characteristics of the context in which it is set. This would allow evidence-users to understand the relevance and transferability of the findings to their own contexts. As a minimum Polit and Beck suggest that "readers should know when data were collected, what type of community was involved, and who the participants were, in terms of their age, gender, race or ethnicity, and any clinical or social characteristics" (Polit and Beck, 2010). Fourthly, research in this area needs to provide greater detail about how methods were developed, the rationale for using them, and the biases and limitations of these methods. Lastly, the studies that provided the highest quality of evidence in this review were experimental studies that tested one potential determinant at a time and showed the impact of this on observed behaviour (Johnson et al., 2003; Judah et al., 2009; Contzen et al., 2015; Pfattheicher et al., 2018). Further research of this nature should be encouraged, particularly since small-scale pilots can be done relatively quickly and cost-effectively.

4.5. Methodological limitations

This review aimed to identify direct associations between single determinants and HWWS. It was not designed to explore the interactions between determinants. Quality limitations within the dataset also

prevented us from doing deeper analyses of the size of the effect of any particular determinant. These are areas that could be addressed as the state of evidence progresses.

This review screened peer-reviewed publications only. However, in the process of reviewing the references of the included texts it was clear that many authors drew on grey literature, particularly unpublished formative research studies. Researchers should be encouraged to publish formative research and other studies on behavioural determinants.

The findings of this review are not disaggregated by handwashing occasion (e.g. HWWS prior to eating compared with HWWS post-defecation). This was because this differentiation was not consistently applied in the literature. However, HWWS practices and determinants may vary by occasion (Biran et al., 2005; Biran et al., 2009; Schmidt et al., 2009; Aunger et al., 2010; Halder et al., 2010; Schmidt et al., 2012; Greenland et al., 2013; Contzen et al., 2015).

This review did not perform a sub-analysis on whether handwashing determinants differ according country-level income categories. This decision was made because of the quality limitations of the data at this stage.

This review used the BCD framework to analyse and structure the findings. The determinant definitions that this framework provided were generally able to account for the diversity of determinants reported in this body of literature. Through the process of classifying determinants against the BCD determinant list we realised that some of the determinant categories are broad and could benefit from further sub-categorisation, while others are narrow and overlapping. For example, 'executive brain' is a broad category covering knowledge, beliefs, planning/intention, perceptions of risk and discounts. Consequently, these were displayed as sub-categories in our main analysis. In contrast, our original classification included 'senses' as a determinant category. However, it was not possible to differentiate between the motive of disgust and the category of senses. Papers did not specify whether it was just the sensation of feeling dirty that caused people to wash their hands or whether it was the combination of feeling dirty and perceiving that dirt to be disgusting that led to people wash their hands. As such the category of senses was dropped from the analysis.

We did not register the protocol for this study in the standard repository as PROSPERO currently does not include integrative reviews.

5. Conclusion

This is the first review to attempt to identify, define and categorise the determinants of HWWS in domestic settings and appraise the quality this evidence. We found some consensus across this diverse body of literature and these insights provide opportunities for practitioners to improve the design of handwashing behaviour change programmes. Specifically, this review highlights the need for hygiene programme designers to use multi-modal approaches, combining infrastructural improvement with 'soft' hygiene promotion which addresses a range of determinants rather than just education about disease transmission.

This review also demonstrated that our understanding of behavioural determinants remains sub-optimal. Much more can be done to strengthen the methods we use to measure both the determinants and the practice of HWWS.

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Appendix A. Supplementary data

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Chapter 4: A Barrier Analysis of the determinants of handwashing behaviour in Iraq

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RESEARCH ARTICLE

The determinants of handwashing behaviour among internally displaced women in two camps in the Kurdistan Region of Iraq

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Data Availability Statement: The Barrier Analysis Questionnaire used during this study is attached as a supplementary material. All data analysis files are

Abstract

Background

Diarrhoea is one of the most common causes of mortality and morbidity among populations displaced due to conflict. Handwashing with soap has the potential to halve the burden of diarrhoeal diseases in crisis contexts. This study aimed to identify which determinants drive handwashing behaviour in post-conflict, displacement camps.

Methods

This study was conducted in two camps for internally displaced people in the Kurdistan Region of Iraq. A Barrier Analysis questionnaire was used for assessing the determinants of hand washing behaviour. Participants were screened and classified as either 'doers' (those who wash their hands with soap at critical times) or 'non-doers' (those who do not wash their hands with soap at critical times). Forty-five doers and non-doers were randomly selected from each camp and asked about behavioural determinants. The Barrier Analysis standard tabulation sheet was used for the analysis.

Results

No differences were observed between doers and non-doers in relation to self-efficacy, action efficacy, the difficulties and benefits of handwashing, and levels of access to soap and water. In the first of the two camps, non-doers found it harder to remember to wash their hands ($P = 0.045$), had lower perceived vulnerability to diarrhoea ($P = 0.037$), lower perceived severity of diarrhoea ($P = 0.020$) and were aware of 'policies' which supported handwashing with soap ($P = 0.037$). In the second camp non-doers had lower perceived vulnerability to diarrhoea ($P = 0.017$).

Conclusions

In these camp settings handwashing behaviour, and the factors that determine it, was relatively homogenous because of the homogeneity of the settings and the socio-demographics

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of population. Handwashing programmes should seek to improve the convenience and quality of handwashing facilities, create cues to trigger handwashing behaviour and increase perceived risk. We identify several ways to improve the validity of the Barrier Analysis method such as using it in combination with other more holistic qualitative tools and revising the statistical analysis.

Background

During conflicts, children under the age of five are twenty times more likely to die from diarrhoeal diseases rather than as a direct consequence of violence [1]. Handwashing with soap is considered to be one of the most cost-effective public health interventions [2] and has the potential to reduce diarrhoea by 23% to 48% [3–7]. However, the prevalence of handwashing with soap after contact with excreta is estimated to be 19% globally, and prevalence is even lower at other critical times (e.g. before food preparation, before eating, before feeding a child or after cleaning a child's bottom) [8]. Despite the increased risk of diarrheal disease morbidity and mortality among displaced populations [9], handwashing rates remain sub-optimal in the aftermath of crises [10,11].

These low prevalence rates are unlikely to just be due to a lack of knowledge about the health benefits of handwashing. Studies have shown that even in areas of low literacy, populations are well able to explain the link between handwashing and disease avoidance [10,12]. Researchers working in non-emergency settings have identified a range of behavioural determinants likely to affect handwashing with soap. These determinants include the availability of handwashing facilities, soap and water; social norms and support mechanisms; motivations like disgust, nurture (the desire to do what is best for your child) and affiliation (the desire to fit in with a social group); risk perception; self-efficacy; and broader contextual factors [13–17]. In the wake of a humanitarian crisis substantial programmatic attention is given to the promotion of handwashing with soap but often such programmes have been unable to achieve substantial behaviour change [11]. One reason for this may be that there is limited evidence about whether the determinants identified in stable settings are likely to be the same in crises situations.

In stable settings, we are increasingly seeing that hygiene programme designers incorporate a learning phase prior to programme design (often described as 'formative research') [8,12,18–21]. This normally involves programme staff trying to understand the barriers and enablers of behaviour within a specific context. A mix of qualitative and quantitative methods are normally employed. Formative research can span from several weeks to many months and is a relatively resource heavy and high-capacity task. These time and resource demands mean that formative research is often compromised or omitted in humanitarian crises [22,23].

This study aims to contribute to improving our understanding of the determinants of behaviour in humanitarian crises. It does so by exploring barriers to handwashing with soap among women living in two displacement camps in the Kurdistan Region of Iraq (KRI). Through this research we also aim to determine whether existing, rapid methods assessing behavioural determinants are feasible to conduct in crisis settings. As such we have employed the Barrier Analysis approach in this study setting and seek to appraise the strengths and limitations of this tool.

Methods

Study site

This study was conducted in Duhok Province during June and July 2017. At this time 3.3 million Iraqis were displaced due to conflict [24]. Two camps for internally displaced persons (IDPs) were purposively selected to reflect different cultures, living conditions, durations of displacement, and different modalities of accessing hygiene infrastructure and products. The first, Nargazliya Camp (henceforth referred to as C1) housed 9,905 people at the time of this research. The population was predominantly Arab from the city of Mosul and its surrounding villages. C1 had been open for about six months at the time of this research and displaced people were still arriving on a daily basis, while others were beginning to return home to their villages. Sheikhan Camp (henceforth referred to as C2) was the other site selected for this research. Its population was more constant. At the time of this research C2 housed 5,371 Yazidi (*Êzidî*) people who had fled from the town of Sinjar and its surrounding villages in the summer of 2014.

Residents of both camps fled from areas which had been taken over by the Islamic State of Iraq and the Levant (ISIS). The nature of this crisis meant that all our research participants had been exposed to extreme violence in the past three years. Through consultations with camp residents and staff we learned that many people within the camps were still experiencing trauma at the time the research was conducted. Camp conditions generally met the SPHERE standards [25] but remained sub-optimal in many other ways. For example, at the time of this research the average temperature in these camps ranged between 45–50˚C. Plastic tents and infrequent access to electricity meant that for most of the day there was no means of keeping cool. C1 was a 'closed camp' meaning that at the time of the research the population were unable to leave without formal permission. All communication equipment (e.g. phones or computers) was taken from C1 residents upon entry to the camp—a measure reportedly taken because of 'security concerns'. Many of the residents had come from urban or peri-urban areas and were used to a relatively high standard of living prior to the conflict. For example, the displaced population would have previously been accustomed to pour-flush toilets and piped water.

In both camps water, sanitation and hygiene (WASH) infrastructure were provided to residents by non-government organisations (NGOs). In C1 WASH facilities were shared between six shelters (about 30 people), while in C2 each family had its own shower, toilet and kitchen. In both camps, water was stored in large tanks and accessible through taps inside the WASH facilities. There were no limitations on the amount of water the IDPs could consume in either camp. At the time of this research hygiene kit distribution (including soap) and hygiene promotion was ongoing in C1. Hygiene promotion was ongoing in C2, however, hygiene kit distribution had ceased and camp residents were responsible for buying their own soap. In both camps hygiene promotion was done by international and local NGOs in conjunction with hygiene promoters from the camp population. In both settings hygiene promotion was done through house-to-house visits. Hygiene promoters taught people a step-by-step process for how hands should be washed and used an image of the F-Diagram to explain faecal-oral disease transmission.

The barrier analysis method

Barrier Analysis is a standardised rapid assessment tool which is part of the Designing for Behaviour Change Framework [26]. The Barrier Analysis approach is intended to be used in advance of designing a behaviour change programme. It allows programme designers to

identify key barriers and motivators of desirable behaviours (such as handwashing with soap) which can then be used to develop strategies for behaviour change. The Barrier Analysis approach can be considered to be part of a family of approaches which compare the perspectives of people who practice a behaviour ('doers') with those who do not practice the same behaviour ('non-doers'). The RANAS framework, which is widely used in the WASH sector, also uses a doer/non-doer method for understanding behaviour [27]. These approaches are typically grounded in cognitive psychology and are designed with programme implementers in mind. The analysis process resembles that of a case-control study, allowing users to clearly pinpoint the factors that are most likely to enable or inhibit behaviour.

This study used the standardized Barrier Analysis questionnaire [28] for assessing the determinants of handwashing behaviour (S1 File). The Barrier Analysis approach was chosen for this research as it is widely used by the development and humanitarian sectors to inform behaviour change strategy. To date it has reportedly been used by more than 20 NGOs in 50 countries [29]. Despite the common usage of the Barrier Analysis approach, results and reflections on this method are rarely published in peer reviewed journals. Our research team was interested in identifying the strengths and limitations of the Barrier Analysis method and comparing findings with other observational and ethnographical data collection tools (these were implemented subsequently and will be reported elsewhere).

We started by defining the behaviour, the details of when and how this behaviour was to be practiced and priority groups whose behaviour we were interested in (see Table 1). This helped to inform our sampling and survey process. The Barrier Analysis questionnaire consists of two

Table 1. Table of definitions based on the barrier analysis approach and adapted for this study.

Key term	Definition
Target Behaviour	Handwashing with soap
Priority groups	Mothers of children under the age of five
Details of behaviour	Handwashing with water and soap at critical times.
	Critical times defined as 1) before preparing food, 2) before eating, 3) before feeding a child, 4) after using the toilet and 5) after cleaning a child's bottom.
Perceived self-efficacy	An individual's belief that he/she can wash their hands with soap given his/her current knowledge and skills.
Perceived social norms	The perception that people important to an individual think that he/she should wash their hands with soap.
Perceived positive consequences	The positive things a person thinks will happen as a result of handwashing with soap.
Perceived negative consequences	The negative things a person thinks will happen as a result of handwashing with soap.
Access	The availability of the needed products or services (e.g. soap, water, handwashing facilities) required for handwashing with soap. This includes barriers related to the cost, distance, and cultural acceptability of these products and services.
Cues to action / reminders	The presence of reminders that help a person remember to wash their hands with soap.
Perceived susceptibility	A person's perception of how vulnerable or at risk they are to getting diarrhoea.
Perceived vulnerability	The extent to which a person believes that the diarrhoea is a serious illness.
Perceived action efficacy	The extent to which a person believes that by practicing handwashing with soap they will be able to avoid getting diarrhoea.
Perceived divine will	The extent to which a person believes that it is God's will (or the gods' wills) for him/her to get diarrhoea and/or to overcome it.
Policy	The presence of laws and regulations that may affect whether people wash their hands with soap or which affect their access to relevant products and services.
Culture	The extent to which local history, customs, lifestyles, values, and practices may affect whether people wash their hands with soap.

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main parts. The first part is designed to classify the participant as either a 'doer' (a person who practices handwashing with soap) or a 'non-doer' (a person who does not practice handwashing with soap). The screening process used a combination of self-reported handwashing behaviour and proxy measures of handwashing behaviour (such as the observed presence of used soap at the handwashing facility). The second part of the questionnaire consisted of closed and open-ended questions exploring the 12 determinants of behaviour change. Specifically, the Barrier Analysis approach explores the following determinants: perceived self-efficacy, perceived social norms, perceived positive consequences, perceived negative consequences, access to products and services, cues to action, perceived susceptibility, and perceived vulnerability, perceived action efficacy, divine will, policy and culture. Table 1 provides a definition of each of these determinants drawn from the Barrier Analysis guidelines [28].

Enumerator training and questionnaire adaption

The data collection team underwent a three-day training conducted by the last author (SW). This included an overview of behaviour change and the Barrier Analysis questionnaire. The training involved opportunities to role-play using the BA questionnaire in the classroom, prior to piloting in the field sites. The data collection team translated the Barrier Analysis questionnaire into Arabic and Kurdish (Kurmanji). In order to arrive at the most accurate translated terms we used a process of brainstorming synonyms, back-translation and consultations with members of the local population through a focus-group discussion. Prior to the survey we pilot-tested the translated tool with a small number of households in the camps and made some small adjustments to enhance clarity.

Sampling

The study team administered the questionnaires to women who had a child under the age of five. These women were chosen as the target population because in this region they are the primary caregivers of children and responsible for most household tasks. Participants were selected through random sampling. Maps of both camps were obtained and each block was numbered. Blocks were selected using a random number generator on an Android device. A second random number was generated to select the shelter within the block. When we found a shelter that did not fulfil the criteria, or did not consent to participate, it was excluded, and we selected a neighbouring household by moving in a clockwise direction.

We aimed to select an equal number of doers and non-doers in each camp. The Barrier Analysis approach recommends a sample size of 45 doers and 45 non-doers. This relatively small sample size is argued to be sufficient because the Barrier Analysis method is designed to identify significant differences in behavioural determinants (defined as results with statistical significance of $P<0.05$) [30]. For this study, 45 doers and 45 non-doers were selected from each camp resulting in a total sample of 180 people. Participants continued to be screened and sampled until these figures were met.

Data collection and management

Data was collected by a team consisting of two persons, the lead author (AK—male) and a research assistant (female). Both individuals were present in all households to increase the acceptability of the questionnaire process. One person asked the questions while the other acted as a scribe, documenting by hand the key elements of the participant's answer. Both team members spoke Arabic and Kurdish, with the questionnaire being administered in whichever language the participants felt most comfortable in. All responses were entered into an excel spreadsheet on the same day as it was collected to maintain quality and identify any

missing data. If missing data was identified or responses were unclear, this process allowed us to return to the household the next day for clarification.

Data analysis

The data collection team and the last author classified the qualitative responses thematically, through a collective discussion. At the end of this process we tallied the number of responses in each category, and by their doer or non-doer classifications. These figures where then entered into the standardised Barrier Analysis tabulation sheet to draw conclusions from the data. This allows for closed-answer, quantitative data to be easily summarized and compared using the standard Barrier Analysis approach involving Chi-square tests and the generation of an odds ratio. The Barrier Analysis tabulation sheet highlights differences between doers and non-doers based on P values of ≤ 0.05.

Ethics

Informed written consent was obtained from each participant. The research was approved by the Ethics committees at the London School of Hygiene and Tropical Medicine and Hawler Medical University. Permission to work in both camps was provided by the Board of Relief and Humanitarian Affairs in Kurdistan and all non-government organisations in the camp were informed of our work.

Results

Classification of doers and non-doers

To be classified as a doer, participants had to mention at least three of the five critical handwashing times when asked 'yesterday, what were all the moments that you washed your hands?'. They also had to report that they used soap when handwashing and had to have a used bar of soap present at the handwashing facility (based on a spot-check by the data collection team).

The most commonly reported 'moment' for handwashing with soap was before preparing food (number reporting this = 154/180). Doers in both camps were observed to have a used bar of soap near WASH facilities (in the kitchen or near the latrine). Only six non-doer households were found to not have soap. The majority of non-doers were found to keep their soap elsewhere in the house.

Perceived self-efficacy

Across both camps, all the doers felt that they were able to wash their hands with soap at the five critical times given their current knowledge, skills and their available resources. Most non-doers also reported feeling able to wash their hands at critical times (C1 = 96%, C2 = 98%).

When asked about factors that made handwashing easier, there was a high level of consistency between doers and non-doers and across the two camps. All the factors mentioned by participants were related to the availability and close proximity of resources such as piped water, soap and handwashing facilities (see Table 2). Participants in C2 were less likely than participants in C1 to mention that handwashing stations and soap increased their ease of handwashing ($p = 0.002$).

In both camps, there were a variety of difficulties which prevented mothers from sometimes washing their hands (Table 3). However, there were no substantial differences in the difficulties reported by doers and non-doers.

Table 2. Comparison of the doers and non-doers in the two camps regarding factors that make it easier to wash hands with soap.

	Camp 1					Camp 2				
Participant Responses	Doers	Non-Doers	Difference	Odds ratio	P value	Doers	Non-Doers	Difference	Odds ratio	P value
What makes it easier for you to wash your hands with soap at the five critical times each day?										
Availability of piped water	44 (98%)	43 (96%)	2%	2.05	0.500	45 (100%)	43 (96%)	4%		0.247
Handwashing facilities are available	20 (44%)	18 (40%)	4%	1.20	0.416	10 (22%)	9 (20%)	2%	1.14	0.500
Close proximity of handwashing facilities	6 (13%)	3 (7%)	7%	2.15	0.242	3 (7%)	3 (7%)	0%	1.00	0.662
Soap is available	41 (91%)	38 (84%)	7%	1.89	0.261	11 (24%)	9 (20%)	4%	1.29	0.400

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There were no significant differences in the difficulties mentioned by doers and non-doers in relation to handwashing. Participants in C2 typically listed a greater number of difficulties than participants in C1. In both camps participants reported difficulties related to the hot weather, the cleanliness of the broader environment, a lack of privacy and mental health challenges. Some difficulties were more pronounced in C1. For example, participants reported that the water for handwashing was hot, the handwashing facilities were shared and too far away, and that the living environment was overcrowded. In contrast, the issues predominately reported in C2 included the quantity and quality of water, a lack of space in bathrooms and kitchens, and broken or damaged handwashing facilities.

Perceived positive consequences

Participants cited many positive consequences of handwashing (see Table 4). The majority of women in both sites said that the main positive consequence of handwashing with soap was the removal of dirt and the prevention of disease. In C1 both of these beliefs were actually more common among non-doers. For example, non-doers were 18% more likely than doers to

Table 3. Difficulties which hinders the mothers from washing their hands for both doers and non-doers in the two camps.

	Camp 1					Camp 2				
Participant Responses	Doers	Non-Doers	Difference	Odds ratio	P value	Doers	Non-Doers	Difference	Odds ratio	P value
What makes it difficult for you to wash your hands with soap at the five critical times each day?										
The environment is dirty and uncomfortable	13 (29%)	7 (16%)	13%	2.21	0.102	9 (20%)	16 (36%)	-16%	0.45	0.079
Hot weather and lack of electricity cause people to be sweaty	9 (20%)	11 (24%)	-4%	0.77	0.400	26 (58%)	25 (56%)	2%	1.09	0.500
Soap is unavailable or affordable	8 (8%)	10 (22%)	-4%	0.76	0.396	21 (47%)	25 (56%)	-9%	0.70	0.264
Quality of water is poor	0 (0%)	1 (2%)	-2%	0.00	0.500	25 (56%)	21 (47%)	9%	1.43	0.264
There is not enough water	1 (2%)	0 (0%)	2%		0.500	5 (11%)	6 (13%)	-2%	0.81	0.500
Not enough space in the bathroom and the kitchen	1 (2%)	0 (0%)	2%		0.500	4 (9%)	6 (13%)	-4%	0.63	0.370
Poor design of the handwashing facilities	2 (4%)	6 (13%)	-9%	0.30	0.133	2 (4%)	1 (2%)	2%	2.05	0.500
Our handwashing facilities are shared	1 (2%)	4 (9%)	-7%	0.23	0.180	0 (0%)	0 (0%)	0%	-	1.000
The water is hot	4 (9%)	5 (11%)	-2%	0.78	0.500	0 (0%)	0 (0%)	0%		1.000
There is no privacy	3 (7%)	2 (4%)	2%	1.54	0.500	4 (9%)	2 (4%)	4%	2.10	0.338
The living environments are overcrowded	1 (2%)	4 (9%)	-7%	0.23	0.180	0 (0%)	0 (0%)	0%		1.000
The handwashing facilities are far away	2 (4%)	2 (4%)	0%	1.00	0.692	0 (0%)	1 (2%)	-2%	0.00	0.500
Hand washing facilities are damaged or broken.	0 (0%)	0 (0%)	0%	1.54	0.500	0 (0%)	4 (9%)	-9%	0.00	0.058
Mental health challenges	1 (2%)	1 (2%)	0%	1.00	0.753	0 (0%)	2 (4%)	-4%	0.00	0.247

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Table 4. Comparison of the responses of doers and non-doers in each camp regarding the positive consequences of handwashing.

Participant Responses	Camp 1					Camp 2				
	Doers	Non-Doers	Difference	Odds ratio	P value	Doers	Non-Doers	Difference	Odds ratio	P value
What are the advantages of washing your hands with soap at the five critical times each day?										
To get rid of dirtiness	30 (67%)	38 (84%)	-18%	0.37	0.042*	42 (93%)	42 (93%)	0%	1.00	0.662
To get rid of germs and disease	39 (87%)	37 (82%)	4%	1.41	0.386	40 (89%)	38 (84%)	4%	1.47	0.379
To feel more relaxed psychologically	11 (24%)	10 (22%)	2%	1.13	0.500	7 (16%)	5 (11%)	4%	1.47	0.379
To prevent food from being contaminated	2 (4%)	5 (11%)	-7%	0.37	0.217	1 (2%)	0 (0%)	2%	0.00	0.500
To look and smell good or improve my personal image	1 (2%)	2 (4%)	-2%	0.49	0.500	0 (0%)	3 (7%)	-7%	0.00	0.121
To improve my child's health	2 (4%)	4 (9%)	-4%	0.48	0.338	0 (0%)	1 (2%)	-2%	0.00	0.500
To prevent insects, lice and flies	1 (2%)	0 (0%)	2%	2.05	0.500	2 (4%)	1 (2%)	2%	2.05	0.500

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report that getting rid of dirt was a key advantage of handwashing (p = 0.042). The third most commonly mentioned benefit was that handwashing could contribute to feeling more psychologically relaxed. Women also said that handwashing allows them to keep their children healthy and protected from disease and that it helps them feel more attractive.

Perceived negative consequences. The majority of women in both camps did not think that there were any negative consequences of handwashing with soap. In C2, non-doers were 18% more likely than doers to report that they did not face any negative consequences from handwashing with soap (doers = 80%, non-doers = 98%, p = 0.008) while in C1 the reverse was true with doers 9% more likely to perceive there to be no negative consequences of handwashing (doers = 91%, non-doers = 82%, p = 0.176). The negative consequences related to dermatological consequences, with a total of 15 people across both sites reporting cracked or irritated hands and one other person feeling that handwashing caused their skin to become lighter in colour.

Social norms. In general, mothers in both sites reported that the people around them approved of them washing their hands with water and soap at the five critical times. However, a total of 18 people (20%) across both sites were not sure what other people thought about handwashing and 25 others (28%) thought people disapproved of regular handwashing with soap. In C1, 17 participants(38%) felt that their neighbours sometimes disapproved of them regularly washing their hands, while only one person (2%) shared this belief in C2. Doers in C1 appeared to receive substantial support from their mothers, with doers being 16% more likely to report this than non-doers (p-value = 0.015). In both camps, most of the mothers said that they relied on their own motivation to wash their hands, rather than the social approval of others. Table 5 describes the participants' responses on social norms.

Perceived access

In both camps, the majority of participants said that accessing sufficient soap and water for handwashing was somewhat difficult or very difficult (Table 6), with residents of C2 (65 people in C2 compared to 39 in C1) and non-doers (p-value C1 = 0.76, p-value C2 = 0.90) being more likely to report difficulty.

Cues to action

In both camps, non-doers were more likely than doers to report that it was sometimes difficult to remember to wash their hands with water and soap at the five critical times (p-value

Table 5. Comparison of the doers and non-doers in each camp regarding perceived social norms.

	Camp 1					Camp 2				
Participant Responses	**Doers**	**Non-Doers**	**Difference**	**Odds ratio**	**P value**	**Doers**	**Non-Doers**	**Difference**	**Odds ratio**	**P value**
Who are the people that would approve of you washing your hands with soap at the five critical times each day?										
I do it for myself	39 (87%)	41 (91%)	-4%	0.63	0.370	42 (93%)	42 (93%)	0%	1.00	0.662
My mother	8 (18%)	1 (2%)	16%	9.51	0.015*	1 (2%)	1 (2%)	0%	1.00	0.753
My husband	6 (13%)	9 (20%)	-7%	0.62	0.286	5 (11%)	1 (2%)	9%	5.50	0.101
Religious leaders	0 (0%)	2 (4%)	-4%	0.00	0.247	0 (0%)	0 (0%)	0%		1.000
Who are the people that would disapprove of you washing your hands with soap at the five critical times each day?										
No one	35 (78%)	33 (73%)	4%	1.27	0.403	44 (98%)	45 (100%)	-2%	0.00	0.500
Neighbours	7 (16%)	10 (22%)	-7%	0.64	0.296	1 (2%)	0 (0%)	2%	0.00	0.500

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C1 = 0.045, p-value C2 = 0.204). However, most of the mothers experienced no difficulty with remembering to wash their hands as shown in Table 7.

Perceived risk

Table 8 describes participant perceptions of perceived vulnerability to diarrhoea, perceived severity of diarrhoea and the action efficacy of handwashing. Participants in C1 perceived themselves to be at much greater risk of diarrhoea than participants in C2, with 36 women in C1 reporting that they felt that their child was likely to get diarrhoea in the next three months, compared to just 12 in C2. Doers in both camps were also more likely to perceive their children as being susceptible to diarrhoea. For example, doers in C1 were 2.94 times more likely than non-doers to say that it was 'somewhat likely' that their children would get diarrhoea in the coming months (p-value = 0.037), while non-doers in C2 were 2.7 times more likely than doers to think that it was not at all likely that their children would get diarrhoea (p-value = 0.017). In C1 most doers felt that diarrhoea was a 'very serious problem' and were 2.92 times more likely to give this response when compared with non-doers (p-value = 0.02). In C2 this difference was not observed. The perceived action efficacy was high in C2 with both doers and non-doers believing that handwashing with soap at critical times can prevent diarrhoea (83% overall). It was considerably lower in C1 (61% overall) and in this camp doers were more likely to doubt the action efficacy of handwashing against diarrhoea.

Religion, culture and policy

In both camps, no significant difference existed between the doers and non-doers regarding religion, culture and policy. The vast majority of participants in both camps did not believe that it was 'God's will' that determined whether children got diarrhoea (94% in C1 and 92% in C2, p = 0.5 in both camps). All participants in both camps said that there were no cultural taboos that prevented handwashing. In C1 non-doers were more likely to report that there

Table 6. Comparison of the doers and non-doers in each camp regarding the perceived access to soap and water.

	Camp 1					Camp 2				
Participant Responses	**Doers**	**Non-Doers**	**Difference**	**Odds ratio**	**P value**	**Doers**	**Non-Doers**	**Difference**	**Odds ratio**	**P value**
How difficult is it to get the soap and water you need to wash your hands at the five critical times each day?										
Very difficult	18 (40%)	21 (47%)	-7%	0.76	0.335	32 (71%)	33 (73%)	-2%	0.90	0.500
Somewhat difficult	15 (33%)	13 (29%)	4%	1.23	0.410	10 (22%)	11 (24%)	-2%	0.88	0.500
Not difficult at all	11 (24%)	10 (22%)	2%	1.13	0.500	2 (4%)	1 (2%)	2%	2.05	0.500

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Table 7. Comparison of the doers and non-doers in each camp regarding the cues to action.

	Camp 1					Camp 2				
Participant Responses	**Doers**	**Non-Doers**	**Difference**	**Odds ratio**	**P value**	**Doers**	**Non-Doers**	**Difference**	**Odds ratio**	**P value**
How difficult is it to remember to wash your hands with soap at the five critical times each day?										
Very difficult	1 (2%)	0 (0%)	2%		0.500	0 (0%)	1 (2%)	-2%	0.00	0.500
Somewhat difficult	2 (4%)	8 (18%)	-13%	0.22	0.045*	6 (13%)	10 (22%)	-9%	0.54	0.204
Not difficult at all	42 (93%)	37 (82%)	11%	3.03	0.098	39 (87%)	34 (76%)	11%	2.10	0.141

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were community laws or rules in place to encourage handwashing (doers = 31, non-doers = 39, p-value = 0.037). Specifically, they referred to the role of non-governmental organizations in promoting handwashing. Doers in C1 were 2.4 times more likely to report that no such rules existed (p-value = 0.037). In C2 there were no significant differences between doers and non-doers; however, participants in this camp were more likely to report the absence of any community rules (rules present = 40%, rules absent = 60%).

Discussion

This study used the Barrier Analysis method to explore the determinants affecting handwashing with soap among IDP populations in two camps in KRI. Here we summarise the findings according to the classification of doers and non-doers and compare behaviour in the two camps. We also reflect on the Barrier Analysis method, highlighting the strengths and weaknesses of the approach.

Summary of the findings

Our study identified a surprising level of homogeneity between the reported behaviour, beliefs and perceptions of doers and non-doers in relation to handwashing with soap. Doers and non-doers both felt able to wash their hands (self-efficacy) and believed that it would prevent them getting diarrhoea (action efficacy). Both groups believed that religion and culture had minimal effects on handwashing and both groups described similar difficulties, benefits, and levels of access to soap and water. These similarities are likely to be a reflection of the fact that the populations and physical environment within each camp were homogeneous.

Table 8. Comparison of the doers and non-doers in each camp regarding the perceived risk.

	Camp 1					Camp 2				
Participant Responses	**Doers**	**Non-Doers**	**Difference**	**Odds ratio**	**P value**	**Doers**	**Non-Doers**	**Difference**	**Odds ratio**	**P value**
How likely is it that your child will get diarrhoea in the coming three months?										
Very likely	17 (38%)	19 (42%)	-4%	0.83	0.415	8 (18%)	4 (9%)	9%	2.22	0.176
Somewhat likely	14 (31%)	6 (13%)	18%	2.94	0.037*	18 (40%)	11 (24%)	16%	2.06	0.088
Not likely at all	14 (31%)	20 (44%)	-13%	0.56	0.138	19 (42%)	30 (67%)	-24%	0.37	0.017*
How serious would it be if your child got diarrhoea?										
Very serious problem	36 (80%)	26 (58%)	22%	2.92	0.020*	33 (73%)	34 (76%)	-2%	0.89	0.500
Somewhat serious problem	5 (11%)	11 (24%)	-13%	0.39	0.083	9 (20%)	5 (11%)	9%	2.00	0.192
Not serious at all	4 (9%)	6 (13%)	-4%	0.63	0.370	3 (7%)	6 (13%)	-7%	0.46	0.242
How likely is it that your child will suffer from diarrhoea if you wash your hands with soap at the five critical times each day?										
Very likely	4 (9%)	0 (0%)	9%		0.058	0 (0%)	1 (2%)	-2%	0.00	0.500
Somewhat likely	17 (38%)	13 (29%)	9%	1.49	0.251	7 (16%)	7 (16%)	0%	1.00	0.614
Not likely at all	24 (53%)	31 (69%)	-16%	0.52	0.097	38 (84%)	37 (82%)	2%	1.17	0.500

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Generally, participants across both camps felt that there were minimal negative consequences of handwashing. However, doers in C1 were more likely to report skin irritations, while in C2 this was more common among non-doers. Participants cited a range of benefits associated with handwashing but interestingly non-doers, particularly in C1, were more likely to report that the primary benefit was the removal of dirt from hands (p-value C1 = 0.042). One possible explanation for this finding is that non-doers may be more likely to reactively wash their hands when hands are visibly dirty rather than at critical times. There is evidence from others studies about visible dirt acting as a key motivator for handwashing with soap. [12,31]

Most participants said that they were self-motivated to wash their hands and did not require support from others. However, doers in C1 were more likely than non-doers to receive social approval from their mothers to practice handwashing with soap (p-value = 0.015). This finding was not replicated in C2. Most participants said they found handwashing easy to remember. However, non-doers in both camps were more likely to report challenges remembering to always wash their hands with soap at critical times. This finding was particularly pronounced in C1 (p-value = 0.045). Doers were more likely to feel that their children were susceptible to diarrhoea (p-value C1 = 0.037, p-value C2 = 0.017). Doers in C1 were more likely than non-doers to describe diarrhoea as a 'very serious problem' (p-value = 0.02), but no such difference was observed in C2. Doers in C1 were more aware of 'policies' which supported handwashing with soap, specifically citing the role of non-governmental organizations in promoting handwashing (p-value = 0.037). No such difference was observed in C2.

Several of our findings may at first seem to run counter to logical assumptions about behaviour. For example, in C2 non-doers were more likely to report that there were no negative consequences to handwashing. One explanation for this finding is that since non-doers wash their hands less frequently they may have also not encountered some of the negative consequences that doers reported (e.g. skin irritation). In C1 doers doubted the action efficacy of handwashing more than non-doers. One explanation for this finding might be that doers, as regular hand-washers, realise that handwashing is important but not sufficient to block all routes of diarrhoeal disease transmission. Alternatively, it may be that these findings occurred by chance.

The similarity of the findings is interesting given that the populations in the two camps were quite different–people came from different geographical locations, were from different cultures, had different religions and had been displaced for different periods of time. There was also a difference in the quality of WASH services provided in the two camps, with C2 having objectively better conditions (namely because WASH facilities were not shared). Despite having objectively better conditions, participants in C2 reported a greater number of barriers to handwashing. This may be because at the acute stage of a crisis (as in C1) people are relieved to receive basic WASH provisions. However, when populations are displaced for an extended period of time (as in C2) they begin to tire of WASH conditions that are substantially poorer than what they were accustomed to prior to displacement. Overall there were more pronounced differences between doers and non-doers in C1 than in C2. This may indicate that camp environments tend to create new emergent norms [32]. That is to say that when people live in condensed living environments for an extended period of time, their behaviour and beliefs become more similar.

The findings highlighted in this study are not dissimilar to studies which have explored the determinants of handwashing behaviour in non-emergency settings. However, there are a few notable exceptions to this. In both camps, the trauma experienced by the populations appeared to affect their behaviour. Some people said that their mental health impaired their ability to wash their hands with soap while others said that handwashing helped them to 'feel more

relaxed psychologically'. Studies in this region have estimated that almost all Yazidi survivors exhibit symptoms of psychiatric disorders [33–35]. Anecdotal evidence indicates rates are likely to be similarly high among Arabs displaced from Mosul [36,37]. It is likely that mental health may be a factor that influences handwashing behaviour in other crisis-affected contexts yet this was unable to be sufficiently documented through the Barrier Analysis method since there were no specific questions exploring this.

Secondly, our findings suggest that people in displacement camps may be more likely to attribute handwashing challenges to factors in the external environment, beyond their control. When asked about handwashing difficulties, people reported being disgusted by the camp environment, describing it as 'dirty,' 'overcrowded' and 'uncomfortable.' They also described feeling motivated to wash their hands because of their increased sweatiness and exposure to the summer heat (they were used to hot temperatures prior to displacement but were now much more directly affected by the weather due to living in tented shelters). People were also dissatisfied with the quality of WASH services in the camp. Frustration with the distance to facilities and the appropriateness of the design of handwashing facilities is likely to be less commonly reported in non-emergency situations where populations are responsible for purchasing and building their own handwashing stations.

Our findings suggest that behavioural interventions targeted at IDPs within these contexts should try to increase perceived social support for handwashing, provide cues to trigger behaviour, and increase perceived risk in relation to both susceptibility and severity. Providing a more dermatologically-friendly soap might help to reduce the perceived negative consequences of handwashing. Improving the design and location of handwashing facilities so that they are more acceptable and convenient is likely to reduce perceived barriers to handwashing practice. Improving handwashing facilities [38–41] and adding behavioural cues [42–44] has been demonstrated to work in other studies in stable settings. Increasing risk should be done with care so as not to create unintended consequences [45]. There is some evidence from other crises that heightening fear only has short term benefits on handwashing behaviour [14,46].

Reflections on the barrier analysis approach

The Barrier Analysis approach proved feasible to do in an emergency context as it was conducted in both sites, in 14 days, by two staff. The appeal of the approach to practitioners is its ability to translate qualitative responses into quantitative data. Its reliance on 'statistically significant' differences helps practitioners who are new to the field of behaviour change to pinpoint which barriers to focus on.

However, in this study it was this perceived strength, that limited the generation of meaningful insights about behaviour. The standard Barrier Analysis approach is perhaps less suited to settings with high homogeneity (both in terms of population characteristics and the physical settings/access to resources) or where handwashing rates are already relatively high. This is because it is powered to detect major differences in the determinants of behaviour. Our results indicate that in Middle-Eastern camp settings differences between doers and non-doers are likely to be more subtle.

We followed the statistical analysis process recommended by the Barrier Analysis approach. However, we feel there are several limitations of this. Firstly, we feel that Fisher's exact test may be more appropriate than a Pearson chi-square test because of the small sample sizes recommended for Barrier Analysis surveys [47]. Secondly, some of the standard Barrier Analysis question collect ordinal data (See Tables 6,7 and 8). It would be more appropriate to use a Kendall rank correlation coefficient to assess these questions where there are two ordinal-scaled

variables[48]. Even with limitations of the statistical methods recommended by the Barrier Analysis method, there were relatively few 'statistically significant' differences between doers and non-doers in our results. A standard analysis of these results would suggest that there were minimal changes that needed to be made to improve handwashing behaviour in this context. The reliance of the Barrier Analysis method on 'statistically significant' results is also inconsistent with current thinking on statistical interpretation [49] and may down-play the value of the full set of open-ended responses which in this case were rich, varied and programmatically relevant.

We may have observed minimal differences between doers and non-doers because this population was highly exposed to hygiene promotion activities, therefore their responses to self-reported questions may have been affected by social desirability bias. This is a widely recognised limitation of self-reported measures of assessing handwashing behaviour [50,51]. This potential bias, further justifies the need to combine the Barrier Analysis with other methods for exploring behaviour such as proxy measures, monitors, sticker diaries, observation or script-based covert recall [50,52,53]. It is also possible that Barrier Analyses are more appropriate for behaviours where there is a clear way of measuring whether people are doers and non-doers (such as smoking cessation [54]). For a routine behaviour like handwashing with soap, the dichotomy between doers and non-doers may be false—with any given individual remembering to practice on some critical occasions and not on others.

We also found that the questions relating to norms, religion, culture and policy were too narrow, given that they are each assessed with a single closed answer question. We feel that this may have prevented deeper learning about these topics, which are likely to be even more critical in crisis contexts. Future application of Barrier Analyses in conflict-affected settings might consider additional questions on these topics and drawing on a broader literature of norms assessment [55,56].

During our surveys, people often wanted to talk about topics other than handwashing. People often answered the set questions but then went on to share their experiences of the conflict or discuss the broader challenges they faced in the camp. These patterns in participant responses raise some ethical concerns about the appropriateness of very narrow assessment tools in crisis-affected contexts. While Barrier Analysis provides a feasible, rapid way of assessing behaviours that are of interest to public health practitioners, these behaviours may be of relatively low priority to crisis-affected populations given their current predicament. If multiple, similar types of assessments were to be done, as they often are in a crisis, this may cause crisis-affected populations to develop a sense of frustration with the humanitarian system. If others are planning to use the Barrier Analysis approach, then they should plan to locate the method within a broader community dialogue and have in place referral mechanisms to address unanticipated topics that may arise while conducting the questionnaire.

Our study may have been limited by the fact that all 180 questionnaires were conducted by just two people. Larger teams are typically involved in the Barrier Analysis data collection and coding process. While we do not feel this substantially affected the data quality, a larger team may have reduced interviewer fatigue and lead to a richer discussion between team members during the thematic analysis.

Conclusion

Implementing the Barrier Analysis approach in post-conflict, camp settings was feasible and highlighted some behavioural barriers that could be addressed through hygiene programming. The homogeneity of our results, within and between the two camps, may indicate that routine behaviours like handwashing tend to vary less in camp settings where populations have been

through similar experiences and have access to the same physical infrastructure. Future work in camp-based, post-conflict settings could benefit from combining rapid assessment tools like Barrier Analysis with other more holistic qualitative methods that rely less on self-reported behaviour and which are more sensitive to the diverse needs of displaced people.

Supporting information

S1 File. Barrier analysis questionnaire.
(DOCX)

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Author Contributions

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Chapter 5: How does hygiene behaviour change over the course of displacement? A qualitative case study in Iraq and Kurdistan.

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RESEARCH ARTICLE

How is hygiene behaviour affected by conflict and displacement? A qualitative case study in Northern Iraq

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Abstract

This research aimed to qualitatively explore whether the determinants of handwashing behaviour change according to the duration of displacement or the type of setting that people are displaced to. We conducted an exploratory qualitative study in three different post-conflict settings in Northern Iraq–a long-term displacement camp, a short-term displacement camp, and villages where people were returning to post the conflict. We identified 33 determinants of handwashing in these settings and, of these, 21 appeared to be altered by the conflict and displacement. Determinants of handwashing behaviour in the post-conflict period were predominantly explained by disruptions to the physical, psychological, social and economic circumstances of displaced populations. Future hygiene programmes in post-conflict displacement settings should adopt a holistic way of assessing determinants and design programmes which promote agency, build on adaptive norms, create an enabling environment and which are integrated with other aspects of humanitarian response.

Introduction

Conflicts often create the 'perfect storm' of circumstances to enable communicable disease transmission [1]. This is because in the wake of conflict infrastructure and water and sanitation systems are often damaged, populations are displaced to densely populated areas, markets collapse, and health facilities are weakened or overburdened [2]. Consequently diarrhoeal and respiratory infections are the leading cause of preventable illness and death during crises [3]. Handwashing with soap has the potential to reduce the burden of diarrhoeal diseases, respiratory diseases and other outbreak-related pathogens [4–6]. However, handwashing rates are low globally [7] and likely to be even lower in post-conflict displacement contexts.

Behaviour change theorists suggest that for behaviour change programmes to be effective, they must address the determinants that influence the behavioural outcome [8–11]. A recent systematic review of the determinants of handwashing behaviour found that the quality of

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studies on hygiene behavioural determinants remained poor and that studies disproportionally reported on personal characteristics and cognitive determinants [12]. Determinants such as routines, norms, contextual factors, motives, and the physical and biological environments were less frequently described in the literature. Although the review conducted a sub-analysis about the determinants of handwashing behaviour during humanitarian crises, no conclusions could be drawn due to the limited number of studies in these settings. Other reviews have also highlighted the lack of hygiene behaviour change research specific to crisis-affected settings, the poor quality of this research and the challenges of doing handwashing behaviour change in these settings [4,13,14]. However, broader literature indicates that major life events, and changes to physical and social circumstances, are likely to interrupt prior habits, create new norms, and introduce new enablers or barriers to behaviour [15,16], meaning that behavioural changes are likely to occur during crises even if poorly understood to date. Understanding the determinants of handwashing behaviour during crises has therefore been identified as a sector priority [17,18], particularly as humanitarians are under increasing pressure to develop guidelines and programmes that are based on evidence-based [19,20].

Most studies on handwashing behaviour in crisis-affected settings have used survey-based methods to understand determinants and self-reported behaviour [21–25]. Survey-based approaches can only explore determinants that they identify in advance and these typically focus on knowledge, risk perception, personal characteristics, and capability. Self-reported handwashing behaviour measures are also known to over-estimate actual practice [26,27]. Given that the determinants of hygiene are a poorly understood phenomenon, rooted in human experience, and often driven by sub-conscious factors, qualitative methods may be better placed to facilitate meaning making on this topic.

This research aims to qualitatively explore whether the determinants of handwashing behaviour change according to the type of setting that people are displaced to, and the stage of their displacement.

Methods

Study sites

This study took place in three study sites in Northern Iraq between June and August 2017 during the peak of the offensive against the Islamic State of Iraq and the Levant (hereafter referred to as *Da'ish*).

We selected research sites purposively to reflect different durations of displacement (e.g. a short-term displacement camp, a long-term displacement camp and returnee villages), different social and physical settings within a conflict (e.g. comparing 'closed' verses 'open' camp settings, and comparing tented shelters to damaged buildings), and differences in water, sanitation, and hygiene (WASH) coverage. The first site was the tented Nargizliya Camp located within Dohuk Governorate in the Kurdistan Region of Iraq. Founded 6 months prior to data collection, Nargizliya housed 9,905 people who were predominantly Arab and had fled from the city of Mosul and its surrounding villages. As a 'closed camp', residents in Nargizlyia were not allowed to leave without permission, and access to communications (e.g. mobile phones) was not permitted. The second site was Sheikhan Camp, another tented camp in Dohuk Governorate. Sheikhan Camp held a population of 5,371 Yazidi (Êzidî) people who had fled from the city of Sinjar and its surrounding villages in summer 2014 and who had resided in the camp for three years. Residents in Sheikhan were able to come and go from the camp freely and many worked in the nearby town. The third site included two neighbouring villages on the outskirts of Mosul in the Ninewa Governorate of Iraq. Residents of these villages had been displaced during the conflict and had returned within the last few months to homes damaged

Table 1. WASH characteristics informing the selection of the three research sites.

WASH activities	Nargizlyia Camp	Sheikhan Camp	Villages
Toilet facilities	Shared between 6 tents, built by NGOs*	Private, built by NGOs	Private, built by households
Bathing spaces	Shared between 6 tents	Private built by NGOs	Private, built by households
Kitchen facilities	Shared between 6 tents, built by NGOs	Private, built by NGOs	Private, built by households
Water supply	Tank at the shared WASH facilities	Tank at the shared WASH facilities	Water trucking or piped water
Hygiene products	Distributed by NGOs	Purchased by households	Purchased by households, irregular access to markets

*NGOs = Non-government organisations.

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during the conflict. At the time of the research, 134 Arab or Shabak families had returned to these villages. The villages were also home 30 additional families who were ethnically similar Internally Displaced Persons (IDPs) from neighbouring villages. Displaced families either shared homes with residents of the village or lived in damaged buildings which others had not returned to. Table 1 summarises the WASH characteristics of all sites.

Research framework

This research used observations, focus group discussions, in-depth interviews and handwashing demonstrations to explore behavioural determinants. The research was informed by Behaviour Centred Design (BCD) [9] which draws on evolutionary and environmental psychology to define domains of behaviour including cognitive processes, socio-demographic characteristics, the settings where behaviours take place (and the infrastructure, objects, norms, roles and routines that are associated with these settings) and the physical, social and contextual environment. In total, 16 categories of determinants were pre-identified for exploration [28]. S1 Appendix defines each of the BCD determinants in relation to handwashing and indicates which methods were used to explore them. The group discussions and interviews were designed to explore current handwashing behaviours in each study site and perspectives on what shaped behaviours pre and post the conflict. Observations and demonstrations helped to understand current behaviour in context.

Data collection methods

Observations. Unstructured observations took place in 20 households across the three sites and were designed to understand behaviour within a contextual setting. Observations were scheduled for 3 hours, typically beginning at 8am (depending on local security). Observers wrote down all actions done by household members and the time actions took place. Observers recorded the availability of soap and participant behaviour during 'critical moments' for handwashing which were defined as handwashing after using the toilet, or cleaning a child's bottom, and before preparing food, eating food or feeding a child. Households participating in the observation were informed that we were interested in learning about 'daily routines' and were therefore not aware that the study was specifically interested in handwashing, so to reduce reactivity. Given that we were taking notes on all action that occurred, it was also unlikely that participants could deduce that we were interested in handwashing behaviour. To monitor the quality of the data recorded, two households were observed at the same time (by two of the authors—DI and WKI) while the lead researcher (SW) moved between households and took notes to allow cross-checking and consistency.

Focus group discussions. Ten group discussions were completed across the study sites involving 93 people. Four participatory activities were included in the group discussions to

explore current and past hygiene challenges, priorities, perceived risk and preferences related to infrastructure and soap. Participatory activities included free listing and categorisation of priorities, risk scaling and appraising the characteristics handwashing products and infrastructure. See S2 Appendix for detailed descriptions of the participatory activities. Group discussions were 1.5 hours in duration.

In depth interviews. A total of 98 interviews were completed across study sites. A total of 8 participatory activities were used within the interviews to explore current and past hygiene challenges, water use, roles, routines, norms, motives, social networks, and contextual determinants. Participatory activities included the ranking of hygiene challenges, eliciting responses to scenarios about water use, routine scripting, predictions about the normative behaviour of others, social network mapping and drawing exercises to understand experiences of the conflict and displacement. S3 Appendix provides a detailed description of the participatory activities undertaken within interviews. Interviews were 45 minutes in duration.

Handwashing demonstrations. Handwashing demonstrations were conducted with 24 individuals. Participants demonstrated how they normally wash their hands after using the toilet. This method typically reflects the participant's 'ideal practice' (since they are aware of the observer and the target behaviour), but can be useful for understanding barriers and enablers within the behavioural setting [29].

Sampling

Participants were selected purposively to reflect a diversity of age, gender, geographies, ethnicity or religion, and access to resources. Local maps were reviewed with camp managers or village leaders and used to identify households. Sampling continued until a degree of saturation was met for each method. The number of people involved in each method is summarised in Table 2 and explained in more detail in S2 and S3 Appendices.

Data collection, management, and analysis

Interviews, group discussions and observations were conducted by the three authors (SW, DI and WKI). We were a team with mixed cultural backgrounds (SW is British and DI and WKI are Kurdish) and all had prior experience with qualitative data collection. SW provided two days of classroom-based training on the research methods and we spent two days piloting the methods in a similar setting to ensure all research team members understood the methods and were able to apply them in a consistent way. All interviews and group discussions were conducted in Kurdish or Arabic, audio recorded and transcribed and translated. Observation notes were taken by hand and entered into a digital spreadsheet the same day. The handwashing demonstrations were video recorded.

Preliminary data analysis was done concurrently with data collection. This allowed us make theoretical and methodological notes [30] and decide when we had reached a point of

Table 2. Summary of the number of participants per method.

	All sites	Nargazliya Camp	Sheikhan Camp	Villages
Unstructured Observation	20 households	7 households	7 households	6 households
Focus Group Discussions	10 groups	6 groups*	2 groups	2 groups
In-depth Interviews	98 participants	26 participants	33 participants	39 participants
Handwashing Demonstrations	24 participants	6 participants	6 participants	12 participants

Note: Some people participated in more than one method.

*Group discussions had to be smaller in size in this camp.

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saturation. Audio recordings from interviews and group discussions were transcribed and translated. Methods with ranked or scaled data were summarised in spreadsheets. Drawings, photos and videos were descriptively summarised. All data was imported into NVivo 12 software. The data analysis was informed by the process outlined by Braun and Clarke [31]. Data were classified according to study site, gender and method and comparisons were made between study sites and between current practices and reported behaviours prior to the conflict. A top-down coding framework was applied based on the BCD checklist and emergent themes were added. The coding was primarily done by SW, with sub-set of coding cross-checked for validity by TH, DI and WKI.

Ethics and consent

Informed written consent was obtained from each participant. Ethics approvals were given by the London School of Hygiene and Tropical Medicine (Protocol 13545) and Hawler Medical University. Permission was also granted by the Board of Relief and Humanitarian Affairs in Kurdistan. Organisations working in the area were informed of our work and preliminary findings were shared immediately after data collection to enable utilisation within programmatic work.

Results

In total, 159 people took part in this research—58 in Nargizlia Camp, 49 in Sheikhan Camp and 52 across the two villages. Most respondents were women (68%) reflecting both that domestic hygiene often fell to the female household head and that many households did not have a male household head due to the conflict. Patterns of displacement reflected the complexity of the crisis, with many people being displaced multiple times. Table 3 summarises the characteristics of the sample.

WASH access was in line with the Sphere Humanitarian Standards [32]. Most families in the camps had received hygiene kits at some point (100% in Nargizlia and 98% in Sheikhan) and had been exposed to hygiene promotion (93% in Nargizlia and 78% in Sheikhan). In contrast, 32% of participants from the villages had never received kits and 61% had not been exposed to hygiene promotion. S4 Appendix provides greater detail on exposure to hygiene kits and promotion.

Behaviour

While this research intended to focus on handwashing behaviour, participants commonly conceptualised handwashing as linked to a broader set of household cleaning behaviours rather than as a stand-alone behaviour.

When asked, all participants reported they would always wash their hands with soap after the toilet or before preparing or eating food. Household observations confirmed hand cleaning was frequent aspect of daily routines in the camp settings but varied by household within village settings. However, at critical handwashing times, handwashing with soap was relatively low across all three settings (27–29%). S5 Appendix summarises observed handwashing behaviours across 20 households participating in this method.

Handwashing determinants unaffected by displacement

We identified 33 specific determinants influencing handwashing behaviour in these contexts. Of these, 12 appeared to be unaffected by displacement (i.e. these determinants had a similar influence on behaviour pre and post the conflict). Social approval, the motives of status and

Table 3. Socio-demographic characteristics of all participants across the two camps and two villages.

Socio-Demographic characteristics	Total N = 159	Nargazliya Camp N = 58	Sheikhan Camp N = 49	Villages N = 52
Gender				
Female	108 (68%)	41 (71%	31 (63%)	36 (69%)
Religion				
Muslim	112 (70%)	58 (100%)	0 (0%)	52 (100%)
Yazidi	47 (30%)	0 (0%)	49 (100%)	0 (0%)
Ethnicity				
Arab	92 (58%)	55 (95%)	0 (0%)	37 (71%)
Kurdish	50 (31%)	1 (2%)	49 (100%)	0 (0%)
Turkmen	2 (1%)	2 (3%)	0 (0%)	0 (0%)
Shabak	15 (9%)	0 (0%)	0 (0%)	15 (29%)
Literacy				
Literate	95 (60%)	37 (64%)	29 (59%)	29 (56%)
Household Size				
Average	8.7	6.8	8.2	9.62
Range	2–28	2–18	2–16	3–28
Displacement status				
Internally Displaced	113 (72%	58 (100%)	49 (100%)	8 (15%)
Returnee	43 (27%)	0 (0%)	0 (0%)	42 (81%)
Host community (did not leave)	2 (1%)	0 (0%)	0 (0%)	2 (4%)
Period since displacement (range)	2 weeks—3 years	2 weeks– 6 months	6 months– 3 years	2 weeks– 5 months
Period since return (range)	1 day—1 year	-	-	1 day—1 year
How many people share the same toilet				
Average	10.3	11.3	8.5	11.6
Range	2 to 28	5–18	2–16	3–28

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disgust, and being female reportedly had a positive influence on behaviour prior to displacement and appeared to continue to be influential across all sites after the conflict. Prior to and post displacement, children were thought to need parental support to practice handwashing and older people were perceived to face barriers to handwashing because of reduced mobility. several determinants outlined within the BCD framework did not appear to facilitate or deter handwashing behaviour before or after displacement. These included determinants related to the biological environment (e.g. the presence of insects and snakes), literacy or education levels, employment status, ethnicity and religion, the motive of fear and knowledge about disease transmission. Across all sites, handwashing knowledge was high, with 99% of participants being able to explain disease transmission and believing that handwashing had health benefits. Participants perceived personality to be one of the strongest determinants of handwashing. Multiple participants explained that if you were hygienic before the crisis, then you would continue to be hygienic when displaced.

Handwashing determinants affected by displacement

The remaining 21 determinants appeared to have a different influence over handwashing behaviour in the displacement period. In the sections below we describe these patterns against the determinant categories of the BCD framework, bringing together findings from across the research methods.

Characteristics and capabilities. In general, the influence of personal characteristics on handwashing was unaffected by the conflict, however larger families were less able to practice

handwashing in the post displacement period. In the camps, larger families reported that hygiene kit products ran out quickly. In the villages multiple families were often sharing one house because of the destruction and this made it harder to maintain hygiene.

Participants felt handwashing was easy and within their capabilities. However, without prompting 25 participants said they had been experiencing mental health challenges because of the conflict. For some people this meant they felt less able to undertake daily tasks, including those related to hygiene:

> *"We have difficulties with psychological problems, otherwise if we didn't have this challenge, we could be more clean within our homes, and in the way we look and everything."*–Woman living in Nargizlia Camp

Others explained handwashing had become a coping mechanism that made them feel more at ease and aided them to manage their trauma and worries:

> *"I feel comfortable when I wash my hands. . .If I don't wash them I feel like it affects me and I start feeling more worried and stressed"*–Woman living in a village

Physical and social environment. The physical environment includes factors in the natural or built environment, climate and geography. The physical environment had a substantial influence on behaviour because it was so different to the circumstances people were accustomed to prior to the conflict, however this was more pronounced in the camp settings. In the camps there were three interlinking aspects of the physical environment which heightened the frequency of handwashing behaviour. These were the perceived dirtiness of the camps, the tented shelters which were hard to keep clean, and the extreme summertime heat.

In the camps people described their settings as dirty, with some people expressing that their living circumstances were so disgusting that they felt like animals:

> *"Here is no place to stay as a human. As much as we can, we clean, but it is still dirty, there is not enough soap. . .our bodies are not clean and not comfortable. . . it has affected me a lot and now I feel we are animals, not human."*–Woman living in Nargizlia

Camp residents explained it was not easy to adapt to living in a tent and it required them to spend much of the day cleaning:

> *"Before we were living in nice houses, none of us have ever lived inside a tent before so it's a big change in the environment. Before it was easy for us to clean the ceramic tiles in our house but now our floor is made from dust and our walls from plastic."*—Man living in Nargizlia Camp

The weather was mentioned as a challenge by all participants in the camps. Residents were used to the summer heat but felt less able to cope with it in the camp settings and were observed to regularly splash their hands, face, feet and bodies with water to cool down. This new behaviour appeared to deter handwashing with soap at critical times as hands were perceived to have been cleaned recently.

In the villages people did not perceive their physical environment to influence handwashing. Participants felt relieved to be back home and reported that their lives and their behaviours had gone back to normal:

"We were happy when we returned. . . now we feel safe again and even though many things have changed, like this room [she points to a crack running the length of the wall] we are able to do all of the behaviours we were used to doing"–Woman living in the villages

Some participants did report they had to clean more frequently because houses and water systems were damaged during the conflict. However, observations in the villages indicated cleaning and handwashing was done less frequently than in the camps.

The social environment includes people's social networks, and how they perceive themselves within these. It also covers how people socialise and influence with others. One of the participatory methods involved mapping social networks before and after the conflict. This indicated that people's social networks decreased in size with displacement and that key relationships, such as close friends and extended family, were lost. Both these groups were reportedly important for supporting good behaviours prior to the conflict. People in the camp settings also reported choosing to be less social. Despite this lack of sociality, the densely populated living environments in both camps meant people did notice the hygiene behaviour of others. However, the lack of personal connection and the recognition that people had been through difficult circumstances meant people would avoid reminding others to be more hygienic:

"No one would say anything [about whether I wash my hands or not] because they don't know me. If I don't know them, what could I say, I can't correct their behaviour either."–Woman living in Nargizlia

"In [my home town] it was not a big deal to remind your family or friends to be hygienic . . . and they will pay attention and follow you. But here if people do the wrong thing, then I would be afraid to tell them, it's difficult here, I would be afraid they would do something like suicide."–Man living in Shikhan Camp

In contrast, the built environment of the villages meant handwashing was not able to be noticed between neighbours:

"Everyone is in his house when he is doing those things [handwashing] so no one knows what you are doing."–Woman living in the Villages

Behavioural settings. Behavioural settings incorporate the proximal aspects of the social environment (roles, norms and routines) and physical environment (the 'stage', props and infrastructure) that result in regular sequences of behaviour, and which enable or prevent handwashing from taking place in the settings where it needs to happen (e.g. kitchens or toilets) [29].

The characteristics of the physical locations where handwashing took place were different across the three settings, but relatively homogenous within each setting. In Nargizlia Camp people washed their hands in either the kitchen or the bathroom. Taps had been established for purposes other than handwashing and this meant people had to bend over when trying to wash hands. Given that WASH facilities were shared, families often kept soap away from these facilities, inside their tents. Households only had one type of soap (distributed by NGOs) and this was used for all purposes. In some cases, shared WASH facilities acted as a barrier to handwashing:

"When my wife is going to wash her hands in the kitchen she is always thinking she should hurry up because her neighbour is waiting their turn."–Man living in Nargizlia Camp

In Sheikhan Camp hands were washed in settings similar to Nargizlia Camp. However, in Sheikhan Camp facilities were not shared and consequently most families had personalised these spaces so that handwashing was easier to practice. This included adding mirrors, soap dishes and seats to enable handwashing in spaces where taps were positioned at a low height. In Sheikhan there was a more diverse array of soaps available which were used for different purposes:

> *"We buy different types of soap, for laundry we use the powder, we buy liquid detergent for dishes, for showering we buy the shampoo and soap with a nice smell and for handwashing we buy this bar soap."*—Man in Sheikhan Camp

In villages people were accustomed to washing their hands at porcelain basins with piped water. These facilities often had mirrors placed above them, liquid soap dispensers or soap dishes. Such facilities were located outside bathrooms or at entrances to houses. Only one of these facilities was observed to be in working order at the time of the research as most were damaged during the conflict or were no longer connected to piped water. Instead, most families now washed their hands by pouring water from a jug. In villages soap was scarce, with some households not having any soap and others using laundry powder or shampoo for handwashing.

Participants involved in group discussions across all research sites expressed similar desires in relation to handwashing infrastructure. People felt that mirrors above the facility, liquid soap and a basin to catch wastewater were the design factors most likely to increase handwashing frequency. In Nargizlia having private facilities also emerged as a priority. A full summary of these results is provided in S6 Appendix. Participants explained that since displacement, the primary factors influencing their decision-making around soap were cost, availability and how well the soap lathered.

In all three settings cleaning took up a greater proportion of day-to-day routines since displacement. Largely, this was because tents and damaged buildings were hard to keep clean, however in the camp settings cleaning also took place due to a lack of alternative pastimes:

> *"Back home it didn't feel like we had a set routine, every day we had different duties. But here in the camp every day is the same routine—breakfast then wash dishes and clean, lunch time then wash dishes and clean, then dinner, it's just the same thing in repetition."*–Woman in Sheikhan Camp

The frequency of cleaning-related activities throughout the day was observed to be associated with a decreased likelihood of handwashing with soap at critical times. This was because hands were often washed in conjunction with these other cleaning tasks instead.

A person's roles, identity or perceived responsibilities can shape their handwashing practice and the extent that they encourage this behaviour among others. Participants reported that they felt they had acquired a new 'label' of being an IDP and this was associated with a perceived loss of agency and sense of individuality:

> *"Everything was in our control before, nothing seemed difficult but when you become an IDP it's not within your ability to control the situation. You have to start from zero. When we were displaced, I had to ask NGOs even for the most simple things. Before I would never dream an organisation would have to provide me with rice or soap."*–Man living in the villages (describing a period when he was displaced to a camp)

This 'IDP label' made people in the camp settings feel like they were less able to practice handwashing and less able to support their children to be hygienic. In contrast one man living in the villages explained because he was an IDP, others in the village would not see his family as being 'like them' and would assume his family were unhygienic. Consequently, he felt he had to remind his children to always wash their hands and look nice so they would be accepted in the community.

One of the participatory activities in the interviews was designed to understand social norms and social expectations around handwashing. Handwashing was seen to be a socially desirable norm across all settings, with all participants saying that if you asked 100 people within their area whether they wash their hands with soap at critical times, they would all say yes. Accordingly, participants also felt people would judge them negatively if they did not wash their hands. However, in all three sites, participants questioned whether handwashing was a descriptive norm, meaning that participants felt it was not always performed by others. People in the camp settings mentioned handwashing behaviours were influenced by neighbours mimicking each other's behaviour as they tried to fit in:

"Some people care about hygiene and some not so much. If someone is not hygienic and you visit them, then this will affect you too, because people here mimic their neighbour's behaviour more than back home."–Woman living in Sheikhan Camp

Cognitive determinants. When participants were asked about the hygiene challenges they experienced since displacement, no one spontaneously mentioned handwashing. When we encouraged people to rank handwashing in relation to their other hygiene challenges, it was ranked last by most of the participants. Despite this handwashing was valued by participants:

"I am always washing my hands with water and soap. In our family the most important thing is hygiene."—Man living in Sheikhan Camp

Participants were observed to make trade-offs in relation to the costs, benefits and ease of practicing handwashing with soap. The most influential determinant in this category was the cost of having soap in sufficient quantities as people had experienced changes to their income due to the conflict. In Nargizlia Camp an informal system emerged to allow people to exchange other items for soap:

"When hygiene kits are delayed and I can't buy these things, our children will be dirty and not clean and they will get diseased. . .the only thing we can do is to sell our food and buy these hygiene items but we are not supposed to do that."–Man living in Nargizlia Camp

In Sheikhan Camp the cessation of hygiene kit distributions was a source of worry. The population used most of their income to buy hygiene products:

"We have a problem in that money is not enough because we only earn 50,000 Iraqi Dinar and easily all the money can get spent on soap and detergent."–Man in Sheikhan Camp

In the villages, markets had not resumed and so people had to travel further and pay more for soap. Across all sites these circumstances led to people conserving soap or buying poorer quality soap than they would have done prior to the conflict, making handwashing less desirable to practice:

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"We used nicer quality soap before Da'ish and we remember that nice experience, but now we can't buy them [nice soap] because we don't have enough money."–Woman living in the villages

"You know it doesn't mean we are not clean, it's just that sometimes we don't have hygiene kits so then we have to use soap less and preserve some in order to control our lives."–Woman living in Nargizlia Camp

In the villages, people were observed to just rinse their hands without using soap, while others described skipping showers to conserve soap. In the camps soap was prioritised ahead of other needs (e.g. food) and people stockpiled of soap.

Illnesses associated with handwashing–such as diarrhoea–were of limited concern to respondents across all three sites. Participants were concerned with chronic health conditions, skin diseases and mental health.

Diarrhoea-related risk perception varied across the study sites with participants in Nargizlia Camp perceiving that their children were more likely to get diarrhoea now they are living within the camp as compared to prior to displacement. Participants in Nargizlia Camp were also more likely think diarrhoea was a major cause of concern and that it could have a serious impact on the whole family. In Sheikhan Camp, participants perceived their risk to be greater than prior to displacement but acknowledged people within the camp were generally hygienic so this minimised the risk. Participants in the villages were the least concerned about diarrhoea and felt that even if their children got diarrhoea, it was unlikely to cause serious illness or death. People in the villages did not perceive that their likelihood of getting diarrhoea had increased in comparison to prior to the conflict. There was agreement across the research sites that diarrhoea could sometimes be prevented through handwashing, and in the two camp settings people did report increasing their handwashing frequency because of their perceived increased risk. A heat map of the responses to risk-related questions is available in S7 Appendix.

Participants were asked to describe motive-based responses to handwashing scenarios. Motivational responses across all study sites were relatively similar. There was consensus that handwashing at critical times was associated with being a respectable person (status), disgust and comfort. Nurture ('that person would be a good parent'), affiliation ('that is the kind of person I would want to be friends with'), attract ('I would find that person attractive') and fear were less associated with handwashing.

In interviews, discussions and observations in the camp settings hygiene behaviour was triggered by a desire to feel comfortable and 'fresh' despite their surroundings. During observations in the villages, hands were typically only washed with soap when they were visibly dirty or smelly.

Handwashing determinants before and during displacement. Overall, we identified 33 specific determinants through our research and grouped these within the 16 'determinant categories' outlined by the BCD framework. Table 4 synthesizes findings from all data collection activities and summarises the reported and observed determinants of handwashing behaviour prior to displacement and across the three research sites.

Discussion

This research revealed that the determinants of hygiene behaviour do appear to differ in the wake of a conflict and that the influence of certain determinants is contingent on the type of setting people are displaced to. Populations in this study were aware of the health benefits of hygiene, and handwashing was found to be valued and a socially approved norm. However,

Table 4. Associational relationships between identified determinants and handwashing with soap at critical times.

Determinants		Prior to displacement	Nargizlia Camp (Early displacement)	Sheikhan (Longer-term displacement)	Villages (Returnees & IDPs)
Behavioural measure		Self-report	Self-report & observation	Self-report & observation	Self-report & observation
Individual characteristics	Gender (being female)	+	+	+	+
	Being a child or an older person who needs support to wash hands	-	-	-	-
	Ethnicity	o	o	o	o
	Religion	o	o	o	o
	Personality type–being a neat person	+	+	+	+
	Literacy	o	o	o	o
	Large family size	o	-	-	-
Capabilities	Having mental health challenges	o	-\+	-\+	-\+
Physical environment	Hot weather	o	+	+	o
	Living environments are perceived to be dirty and hard to clean	o	+	+	o
Social Environment	Social support to encourage handwashing	+	-	-	+
	Sociality and interaction with others	+	-	-	o
	Social judgement or social sanctions if handwashing is not practiced	+	o	o	o
Biological Environment	Presence of insects or vermin	o	o	o	o
Stage	Using shared WASH facilities	o	-	+	-
Infrastructure	Having sufficient access to water availability	+	+	+	-
	Water quality (hard or salty water which prevented lathering)	o	o	-	-
	Having a dedicated handwashing facility	+	+	+	-/+
	Having a soap dish or dispenser	+	-	+	-
Props	Having access to sufficient quantity of soap	+	-	+	-
	Having access to sufficient quality of soap	+	o	+	-
Roles	Being an IDP	+	-	-	-
Routine	Frequency of water-related cleaning activities*	o	-	-	o
	Having other pastimes	-	+	+	o
Norms	Handwashing is seen as something that is socially approved	+	+	+	+
	Perceived handwashing practices of neighbours, friends and family	+	+	+	o
Executive Brain	Knowledge about the health benefits of handwashing	o	o	o	o
	Perceived severity of diarrhoeal disease	-	+	+	-
	Perceived vulnerability to diarrhoea disease	o	+	+	o
Discounts	Cost of soap	+	+	o	-
Motivated Brain	Fear	o	o	o	o
	Nurture	+	o	o	o
	Status	+	+	+	+
	Comfort	o	+	+	o
	Hoard	o	-	-	-
	Disgust	+	+	+	+

Determinants which positively influence behaviour are coloured green (+), those which have no effect on behaviour are allocated coloured grey (o) and those with a negative effect on behaviour are coloured red (-). Where results were mixed or varied at an individual level they are yellow (-/+).

* *This negatively effects handwashing at critical times but increases hand rinsing and handwashing with soap at non-critical times.*

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among the competing priorities of populations in this study, handwashing was not defined as a problem in the way that other social, economic or health challenges were.

We observed that different behavioural patterns were associated with different physical settings that populations were displaced to. In the camp settings a new 'hyper-hygienic norm' formed, driven by a heightened perceived risk of disease and a desire to create order, comfort and cleanliness within challenging living environments. The hyper-hygienic norm led to an increased amount of time being spent on cleaning-related activities and an increased interaction with soap and water, but it did not always result in hands being washed at critical times. Participants who had returned home to their villages post-displacement, felt relief at being somewhere familiar and 'safe' and this prevented participants from seeing that physical damage to infrastructure (caused by the conflict) created new disease risks. Positive memories of 'home' are thought to be a strong motivator for displaced persons to return home following conflict [33,34], and may in the short-term blind people to the extent of change that has occurred in these locations, affecting people's likelihood of prioritising protective behaviours like handwashing.

In addition to the physical settings, we found that many of the determinants which detrimentally affected hygiene behaviours, relate to the broader psychological, social and economic consequences of conflict. Mental health was voluntarily reported in our study, but our findings indicate that depression and trauma associated with conflict and displacement may cause some people to deprioritise handwashing, while others may increase their handwashing to cope with their circumstances. Research in stable settings has found students with depression had lower rates of handwashing [35,36] and that experiences of disgust, discomfort, trauma and stress can cause the emergence, or worsening, of obsessive-compulsive handwashing [37–40]. The association between mental health and hygiene warrants further research in humanitarian crises.

Our research also found that, during displacement, hygiene behaviour is influenced by disruptions to people's sense of identity and their perceived agency. Participants had a heightened awareness about what humanitarians and others may assume about their hygiene behaviour because they were labelled as 'IDPs'. Participants used handwashing and other observable hygiene behaviours (e.g. tidiness of households) as a way to assert some degree of control over the unpredictability of their circumstances and their new physical environment. Anthropological and geographical work in conflict-affected settings has described how displaced persons regain agency and subvert imposed identities by creating order and homeliness in otherwise hostile environments and by maintaining routine, ordinary behaviours from their place origin [41–46]. Handwashing appears to be part of this set of 'ordinary restorative behaviours'. In our study we found handwashing also became a 'social indicator'–a visible way of demonstrating good values and enabling people to gain acceptance and fit in to their new social environments. This makes sense given that displaced populations are often faced with a dissolution of pre-existing social orders and norms and have to navigate new relationships among unfamiliar neighbours [47,48].

Our findings align with existing literature about handwashing during crises. For example, research found that the availability of soap, water and handwashing facilities were a key determinant of handwashing practice. Actual or perceived scarcities of water and soap and the deprioritisation of these items for handwashing (as opposed to other household tasks) have been identified as common challenges in the wake of humanitarian crises [49–52]. The availability of desirable and conveniently located handwashing facilities is thought to be one of the most influential determinants of hygiene behaviour in stable settings [7,12,53] and improving handwashing infrastructure may have an even greater influence among displaced populations [51,54,55].

Our study found handwashing was most strongly influenced by motives of disgust, status and comfort. Other studies among displaced populations have suggested motives of nurture and affiliation should be utilised by hygiene programmes in humanitarian settings [51,56,57]. The use of emotional drivers in hygiene programming remains contentious. If motives are used with a lack of contextual understanding, programmes could lead to stereotyping and stigmatisation [58–60]. Our results indicate motives like nurture and affiliation should be used with caution given that participants felt less able to care for their children during displacement and felt disconnected from the social group to which they belonged. Variation between our results and other studies among displaced populations could also be due to inconsistent methods for assessing motives. For example, most studies focus on the general appeal of one motive over another [51,56], while our study specifically explored motives in relation to the target behaviour. More work is needed to assess the validity and reliability of methods for assessing motives.

Recommendations

As in stable settings, programmes which focus only on imparting hygiene information are likely to be insufficient to create change in conflict-affected settings where knowledge is already high and there are numerous competing priorities [7,12]. Improving handwashing in the camp settings could draw attention to new norms and link these to critical handwashing occasions. There are opportunities for hygiene promotion programmes to contribute to re-building a sense of individuality and agency among IDPs. For example, in Sheikhan Camp some flexibility in WASH services had allowed participants to personalise and decorate their WASH facilities–actions which encouraged and enabled behaviour. Programming could easily incentivise the customisation of handwashing facilities so to position handwashing as a behaviour that is desirable, pleasurable and refreshing. In the out-of-camp settings hygiene programmes could draw attention to new risks in the physical environment and heighten disgust in relation to these, as both can be powerful drivers of hygiene behaviour [53,61–63]. Programming could provide social and financial incentives to encourage families to re-build damaged handwashing facilities and thus cue behaviour [7,12]. Most importantly, WASH actors should not view hygiene as a narrow public health issue but rather design behavioural assessments which explore a range of determinants, including aspects of the physical and social environment. Hygiene programme design could be strengthened by integration with psychosocial support and livelihoods initiatives.

The utility of qualitative research in crises

The use of multiple rapid qualitative methods was feasible in these displacement settings because behaviour was relatively homogenous within each study site, allowing us to reach saturation quickly. We conducted these methods alongside a more traditional survey-based approach to assess behaviour determinants [21]. While the results between the two approaches showed some consistency, the qualitative approach generated data which is likely to be more useful for informing programme design.

Limitations

There is no agreed way of understanding and measuring the determinants of handwashing behaviour [12]. In our study we relied quite heavily on self-reported perceptions of the determinants that influenced current behaviour and recall of the factors that influenced behaviour in the past. Given that handwashing is a socially desirable behaviour these self-reported perspectives are likely to be biased with people presenting more favourable versions of their

behaviour [27,64]. 'Talk-based' methods such as interviews and group discussions are also likely to generate a partial view of behaviour given that people are typically less able to describe sub-conscious determinants of behaviour [29,65]. We also asked participants to recall their handwashing behaviours prior to the crisis and long-term recall like this is known to be prone to errors and misremembering [66,67]. To compensate for these limitations, we triangulated data across the methods used and employed visuals, props and scenarios as part of participatory activities in order to illicit different types of responses. We also complemented talk-based approaches with observations and demonstrations. Some of the activities we used within interviews and group discussions, were also developed for this research or have only been piloted in a small number of other studies. Therefore, the validity and reliability of these tools should be tested further. Given the methodological limitations we were working with, our research was only able to describe apparent associational relationships between determinants and handwashing behaviour, rather than quantify or definitively state the impact of determinants on behaviour.

This research was conducted in partnership with Action Against Hunger (AAH) and our research team were required to wear a branded vest throughout data collection. Given that AHH have a history of working on WASH projects in this region, respondents may have given socially desirable answers or behaved differently during observations given their contextual awareness of AAH's role. In our daily reflection sessions, we actively discussed our individual and collective positionalities and how this may have shaped the research.

While our research sought to be purposively select research sites to consider different types of post-conflict displacement, contextual factors may limit the generalisability of these findings. Therefore, additional research exploring the determinants of handwashing behaviour in other displacement settings would be merited.

Conclusion

Our findings strengthen the evidence base on handwashing determinants in the post-conflict displacement period. Our work supports prior research in that it suggests programmes are likely to be most effective if they go beyond hygiene education and instead try to overcome a range of behavioural barriers. Variations in the physical environment and WASH services within each of our research sites also point towards opportunities for humanitarians to shape behaviour by creating enabling infrastructure and providing access to desirable products. Lastly our work highlights the importance of treating behaviour holistically and integrating hygiene programming into other sectors.

Supporting information

S1 Appendix. Handwashing determinant definitions adapted from on the BCD checklist of determinants and accompanied by method selection.
(DOCX)

S2 Appendix. Purpose, description and sample size for each of the methods done within group discussions.
(DOCX)

S3 Appendix. Description and sample size for all methods done at a household or individual level.
(DOCX)

S4 Appendix. Exposure to hygiene promotion among interview participants.
(DOCX)

S5 Appendix. Summary of household observations of handwashing.
(DOCX)

S6 Appendix. Handwashing facility design factors that group discussion participants thought would be most likely to increase their handwashing behaviour.
(DOCX)

S7 Appendix. Heat map of scaled group discussion responses to diarrhoeal risk related questions.
(DOCX)

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Chapter 6: How does handwashing behaviour change in response to a cholera outbreak? A qualitative case study in the Democratic Republic of the Congo.

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RESEARCH ARTICLE

How does handwashing behaviour change in response to a cholera outbreak? A qualitative case study in the Democratic Republic of the Congo

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Abstract

Background

Handwashing with soap has the potential to curb cholera transmission. This research explores how populations experienced and responded to the 2017 cholera outbreak in the Democratic Republic of the Congo and how this affected their handwashing behaviour.

Methods

Cholera cases were identified through local cholera treatment centre records. Comparison individuals were recruited from the same neighbourhoods by identifying households with no recent confirmed or suspected cholera cases. Multiple qualitative methods were employed to understand hand hygiene practices and their determinants, including unstructured observations, interviews and focus group discussions. The data collection tools and analysis were informed by the Behaviour Centred Design Framework. Comparisons were made between the experiences and practices of people from case households and participants from comparison households.

Results

Cholera was well understood by the population and viewed as a persistent and common health challenge. Handwashing with soap was generally observed to be rare during the outbreak despite self-reported increases in behaviour. Across case and comparison groups, individuals were unable to prioritise handwashing due to competing food-scarcity and livelihood challenges and there was little in the physical or social environments to cue handwashing or make it a convenient, rewarding or desirable to practice. The ability of people from case households to practice handwashing was further constrained by their exposure to cholera which in addition to illness, caused profound non-health impacts to household income, productivity, social status, and their sense of control.

(2022): Interviews and group discussions with crisis and outbreak affected populations in the Democratic Republic of the Congo on handwashing determinants. figshare. Dataset. https://doi.org/10.6084/m9.figshare.19469270.v1 Please note that this includes transcripts in English of all interviews and focus group discussions which have been redacted to remove any identifiable information. Interested researchers may also contact the corresponding author or the Research Governance and Integrity Office at LSHTM: RGIO@lshtm.ac.uk to access additional data.

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Conclusions

Even though cholera outbreaks can cause disruptions to many determinants of behaviour, these shifts do not automatically facilitate an increase in preventative behaviours like handwashing with soap. Hygiene programmes targeting outbreaks within complex crises could be strengthened by acknowledging the emic experiences of the disease and adopting sustainable solutions which build upon local disease coping mechanisms.

Introduction

For centuries cholera has been a marker of social inequalities, affecting the most vulnerable members of society and commonly occurring amid social and economic upheaval or disaster [1]. Cholera cases remain underreported but it is estimated that there are 2.9 million cases and 91,000 deaths annually due to the disease [1, 2]. In 2017 major outbreaks occurred in Yemen, the Democratic Republic of the Congo (DRC), Nigeria, Somalia and South Sudan leading to the highest global numbers of cases in history [3].

In the past, cholera was viewed as a waterborne disease, with environment-to-human transmission of *vibrio cholera* believed to be responsible for the majority of transmission [4]. However, recent spatiotemporal analyses of cholera outbreaks have demonstrated how cases cluster among close contacts [5–8]. This human-to-human transmission is heightened in dense living environments, and where water access is limited or intermittent, causing hygiene to be compromised [8].

Handwashing with soap is frequently recommended by international response agencies as a key household-level cholera prevention behaviour [9]. A recent meta-analysis of case control studies conducted during cholera outbreaks found that self-reported good hygiene practices and the availability of handwashing materials had the highest protective affect of any of the water, sanitation and hygiene (WASH) factors assessed [10]. Another broader review of cholera risk factors also found that handwashing had smaller but still protective effect against symptomatic cholera [8]. The authors acknowledged that the included studies used inconsistent measures of self-reported behaviour, likely to result in overestimates of actual handwashing behaviour [11].

Another review assessing the impact of water, sanitation and hygiene (WASH) interventions on cholera control found that handwashing promotion programmes during outbreaks generally had a positive affect but were limited by the behavioural and health outcomes they used (e.g. self-reported symptoms rather than laboratory confirmation). A more recent study in Bangladesh was able to overcome measurement limitations, and demonstrated that case-targeted interventions to promote handwashing and water treatment were successful in increasing behaviour which consequently reduced secondary transmission to household contacts by almost half [12]. However the majority of handwashing interventions during cholera outbreaks continue to focus only on health education [13]. This is problematic because knowledge of the health benefits of handwashing is unlikely to be sufficient to realise sustained behaviour change [14, 15]. During outbreaks there is a tendency for both researchers and practitioners to overemphasise the effect of cognitive determinants such as health knowledge, risk perception and fear, rather than taking a more holistic view of the determinants that could influence handwashing behaviour [15]. Outbreaks may also cause theory-informed processes for designing behaviour change programmes to be compromised due to the perceived need to act right away, rather than consult and learn from populations [16].

There have been calls for more qualitative research into hygiene behaviour during cholera outbreaks and new, scalable approaches to doing community engagement to support preventative behaviours [1, 17, 18]. This research responds to these calls and draws on anthropology and behavioural science to understand how individuals and communities experience and respond to outbreaks and whether this affects their handwashing behaviour. We explore both the consequences of cholera on people's lives and the determinants of handwashing behaviour during the 2017 cholera outbreak in the eastern part of DRC.

Methods

Study site

This study took place in South Kivu in the eastern part of the DRC at the height of the 2017 cholera outbreak (October and November). The region experiences both endemic and epidemic cholera and in 2017 the outbreak was the largest in recent decades with >53,000 reported cases and 1,145 deaths [19]. The research took place in a town on the shores of Lake Kivu (known to be an environmental reservoir for cholera) [20, 21], which is home to about 200,000 people. The region was purposively selected because it was described as a cholera 'hot spot'[19]. It also hosts a large number of internally displaced persons (IDPs) who have fled armed conflict in neighbouring villages. At the time of this research, the government provided IDPs with a small plot of land (~3m2) within one of two informal camps in the town. IDPs were responsible for constructing their own makeshift shelters from tarps and branches. In addition to these camp-like settings, some IDPs rented homes from permanent residents. Host community members typically lived in brick or compacted mud houses with corrugated iron roofs. Both IDPs and host community members typically worked in agriculture or as small-scale market vendors, although IDPs would typically earn less than host community members on a daily basis. Water and sanitation access in the region was poor. Pit latrines were common but often in poor condition and shared by many households, particularly in the informal camps. Water was considered scarce and was intermittent. IDPs and host communities had access to the same water sources which included tap stands and boreholes or water collection from rivers and lakes.

Multiple non-government organisations (NGOs) had worked in the region as part of sporadic emergency response initiatives oriented towards health and WASH. At the time of the research a temporary Cholera Treatment Centre (CTC) had been established by an NGO and was providing free care for cholera cases. Handwashing promotion was widespread and predominantly consisted of health education delivered by volunteer *relais communautaires* (health volunteers from the community) who were trained by NGOs. Health awareness sessions focuses on cholera transmission and prevention behaviours. Exposure to hygiene promotion was similar among IDPs and host communities, with the exception that those living further outside of the town in were exposed less frequently.

Research framework

This research used unstructured observations, in-depth interviews (IDIs) and focus group discussions (FGDs) to explore a range of behavioural determinants. We used the Behaviour Centred Design (BCD) framework [22] to develop a list of determinant categories and to refine appropriate methods for exploring each. BCD draws on evolutionary and environmental psychology to define critical domains of behaviour including cognitive processes, individual characteristics, the settings where behaviours take place and the broader physical, social and contextual environment. S1 Table defines the 16 BCD determinant categories that were assessed within this research in relation to handwashing. It indicates which methods were used

to explore them and how these methods were developed. All of the methods aimed to identify contextual associational relationships within these broader determinant categories. The methodology adopted in this research replicated a process used in Iraq to understand how behaviour was affected during post-conflict displacement [23].

Sampling

For the observation and IDIs participants were selected purposively based on their exposure to cholera. To do this we worked with health staff to identify cholera cases registered within the last three months. Using this sampling frame, we purposively selected for a diversity in age, gender, geography (rural or urban) type of residence (residing in a camp or residing in the community). Once case households had agreed to participate in the research, we also approached other households in the nearby vicinity to be part of the research. We sampled these 'comparison households' against the same criteria for diversity. Some households participated in more than one method. Sampling continued until a degree of saturation was met for each method. FGD participants were sampled purposively to be similar in terms of gender, geographical regions and type of residence.

Data collection methods

Unstructured observations. Unstructured observations were designed to provide contextual detail about handwashing. Observations took place in eight case households and eight comparison households. Observations were for 2–3 hours, typically beginning at 6am and finishing when the participant had to depart for work. Observers wrote down all actions that that were done by all household members and the time actions took place. Observers paid attention to 'critical times' for handwashing which were defined as handwashing after using the toilet, or cleaning a child's bottom, and before preparing food, eating food or feeding a child. Observers noted whether hands were washed at these critical times and whether soap was used.

In-depth interviews. A total of 51 IDIs were completed, involving 24 people from case households and 27 people from comparison households. Seven of the participants who took part in the observation also took part in the IDIs. For case households, we selected the individual who had cholera if they were over 18 and well enough to participate. Alternatively, the person primarily responsible for caring for the case was selected. Participants of a similar age and gender were then invited to participate from neighbouring comparison households. A total of eight participatory activities were used within the IDIs to explore perceived hygiene challenges, the enabling environment, water use, roles, capabilities, routines, norms, social networks, and broader contextual determinants. See S2 Table for details on these activities.

Focus group discussions. 43 people participated in the FGDs. Four FGDs were conducted with women, two of which comprised women residing in the IDP camps and two which were with host community members. Three FGDs were conducted with men, two of which were with IDPs and one with host community members. Six participatory activities were included in FGDs to explore the prioritisation of hygiene challenges, perceived risk of cholera, attitudes towards people who had cholera, preferences related to infrastructure and soap, and motivations of behaviour. See S3 Table for descriptions of these activities.

Data collection. The data was collected by four of the authors (SW, ACM, MMB, FKM). We were a team with mixed cultural backgrounds (British and Congolese). Two days of classroom-based training was provided on the research rationale and the methods. We then piloted the methods in a similar setting and adapted the tools as necessary. All IDIs and FGDs were conducted in Congolese Swahili and audio recorded. Observation notes were taken by hand.

At the end of each day of data collection we reflected on our findings and captured this through written field notes [24].

Data management and analysis. Preliminary data analysis was done concurrently with data collection. This allowed us make theoretical and methodological notes [25] and decide when we had reached a point of saturation. All audio recordings from IDIs and FGDs were transcribed and translated. Methods with semi-quantitative data such as ranked or scaled information were summarised in spreadsheets. Visual data such as drawings, photos and videos were descriptively summarised. All data and the field notes were imported into NVivo 12 software. The data analysis followed the process outlined by Braun and Clarke [26]. Data were classified according to whether the participant was from a case household or a comparison household. An initial top-down coding framework was applied based on the determinants of the BCD checklist. A second phase of coding was then conducted based on emergent themes. Coding was conducted by the first author and then theme summaries were validated by ACM, MMB, FKM and TH.

Ethics and consent. Informed written consent was obtained from each participant. The research was approved by the ethics committees at the London School of Hygiene and Tropical Medicine (Submission ID: 13545) and the School of Public Health at the University of Kinshasa (Submission ID: ESP/CE/038/2017). Permission to undertake this work was given by the Departments of Health in North and South Kivu. Organisations working in the area were informed of our work and preliminary findings were shared immediately after data collection to enable utilisation within programmatic work. Further detail on research permissions and stakeholder engagement is provided in an Inclusivity Questionnaire in S4 Table.

Results

Participant characteristics

In total 104 people took part in this research with 40% of these coming from households with one or more cholera cases in the last 3 months. A higher proportion of women were included in the sample, this purposive selection reflected the fact that women in this region were more involved with hygiene-related tasks and caregiving. Almost half of the participants were illiterate and average family size was 6.5 people. The linguistic diversity of participants and the high levels of internal displacement and people returning post-displacement (62% experiencing displacement) are reflective of decades of conflict in this region. Table 1 summarises the socio-demographic characteristics of the sample.

Handwashing behaviour. Handwashing with soap (HWWS) and hand rinsing were uncommon at critical times (HWWS = 1%, hand rinsing = 11%) and there was no discernible difference between behaviour in case households and comparison households or between IDPs and host community hosueholds. When handwashing with soap did occur, it was typically performed following dirty household cleaning tasks (such as sweeping or cleaning the toilet). Hand rinsing was commonly practiced before eating and feeding children. While people knew that ash could be used as an alternative to soap, this practice was not seen during any of the observations.

Determinants of handwashing behaviour. We identified a range of context specific determinants of handwashing behaviour across the 16 BCD categories (See S5 Table for full list of determinants and their association with handwashing behaviour). Some of the determinants assessed appeared to have no impact on handwashing behaviour including ethnicity, religion, education level, sociality, access to ash, descriptive norms, knowledge about key handwashing moments, and the motives of comfort and affiliation. Below we describe determinants that had a reported positive or negative influence on behaviour.

Table 1. Socio-demographic characteristics of all participants across the two camps and two villages.

Socio-Demographic characteristics	Total N = 104	%
Sex		
Male	37	36%
Female	72	69%
Place of residence		
Camp	22	21%
Community	82	79%
Location		
Rural	34	33%
Urban	70	67%
Literacy		
Not literate	49	47%
Literate / Some literacy	55	53%
Cultural diversity		
Number of local languages spoken across participants	8	
Household Size		
Range	1–13 people	
Average	6.5 people	
Displacement status		
Internally Displaced	51	49%
Returnee (a person who has been displaced in the last 5 years and has returned to their home)	13	13%
Host community	40	38%
Duration of displacement for IDPs		
Range	1 month to 20 years	
Average	4.5 years	
Cholera exposure		
Participants who had one or more cholera cases in their household in the last 3 months	42	40%
Households with no recent direct exposure to cholera	62	60%
Duration since cholera cases were discharged		
Range	1–90 days	
Average	17 days	

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Knowledge. All participants were familiar with cholera, its symptoms (e.g. mentioning cholera-specific symptoms like 'rice water' stools), and recommended prevention behaviours. However, cholera was often used as a catch-all term to describe a range of diarrhoeal diseases. Handwashing knowledge was high with all participants able to list critical moments for handwashing and explain how handwashing can interrupt disease transmission. Participants attributed their familiarity with cholera and preventative behaviours such as handwashing to frequent exposure to hygiene promotion activities.

Physical environment and behavioural settings. Across the various settings within study site, there was little in the physical environment to enable or cue handwashing at key times. In discussions with participants, they would often differentiate between handwashing being easy to do as a behaviour, but difficult for them to practice because they lacked the products (soap) and infrastructure (water and handwashing facilities) which could facilitate it. Most research participants were agricultural labourers and spent the majority of their days outside the home. During this time people typically had no access to soap or water, preventing handwashing

from taking place. Within the camp settings, NGOs had constructed simple bucket-style handwashing facilities and in some of the rural settings tippy-taps had been promoted. However almost all of these were non-functional at the time of our research. Participants also admitted that even when these facilities were functional, water, soap and ash were not readily available at the stations. In FGDs participants agreed it was important to have "somewhere special" for handwashing. They felt handwashing stations acted as a reminder to wash hands at key times and helped to inculcate good habits in children. However, the basic handwashing facilities promoted by NGOs were seen as being "poor designs, for poor people". They tended to break easily and therefore failed to have a lasting impact on behaviour. Participants felt handwashing facilities should symbolise hygiene, rather than just facilitating handwashing:

> *"It is essential to have a beautiful, an attractive hand washing facility so one is at ease when washing hands. . . the hand washing facility has to be always kept clean so that it does not disgust, and a facility has to be respected by the whole family and everyone."* (Male FGD participant)

Almost all participants reported that water scarcity was a major barrier to hand hygiene and a source of stress within their lives. In general, participants did not think handwashing consumed much water. However, water access and usage was carefully calculated and prioritised for other household tasks like bathing, cooking, laundry and dishes. While water was often sectioned out for different purposes within the home, but no families felt they could easily put water aside for handwashing. Observations indicated people used a range of water for handwashing including washing their hands directly in nearby lakes and rivers and re-using grey water (e.g. water from dishwashing or laundry).

Soap was a valued and scarce commodity. Overall, 62% of households had no soap of any kind available at the time of our visit. Among those who did have soap, it was typically kept on a high shelf in the bedroom and therefore not conveniently available for handwashing. No one reported buying soap just for the purpose of handwashing. Rather, soap was typically purchased when laundry needed to be done and then a small leftover section may be used for bathing and handwashing. While laundry soap was affordable it was not desirable for handwashing:

> *"You know, this [laundry soap] is not a soap we want to use because it can damage hands, but we just use it because of poverty."* (Female FGD participant)

As with water, soap use within the household involved conscious trade-offs and decision-making between family members:

> *"Getting soap is not easy. . .In a house of nine children, you understand that a piece of soap will not be prioritized for hand washing. If we manage to afford the piece of soap for 100 Congolese Francs only once a week. . . How, and on what, can you use just a small piece of soap? Will you use for laundry? For bathing? Or for hand washing? Things become complicated."* (Female FGD participant)

Participants explained that it was relatively common to ask neighbours for soap and water if needed but said people would laugh at you if you asked for these items for handwashing.

The social environment—norms, routines and social influence

Daily routines were unpredictable for most of the participants, with individuals searching for employment in the fields of others on a day-to-day basis. Daily routines were further

complicated by intermittent water supplies and individuals could spend several hours per day searching for water they considered to be safe. Combined, these factors created time and financial pressure. The irregularity of routines, and the daily stressors that accompanied this, decreased the likelihood of handwashing habits forming. This was because there were few routine sequences of behaviour to cue handwashing and there was limited ability to make plans related to handwashing (e.g. to budget to have enough soap in the house).

Handwashing was seen as socially desirable and an injunctive norm. Hand hygiene norms were heightened by the outbreak, with participants estimating 65% of their community had increased their frequency of handwashing due to cholera concerns. Despite this, social sanctions or judgment related to not washing hands was low:

> *"I cannot judge people around me for not being clean because sometimes I am not clean too. . . I think only about 30% of people would judge me negatively [if they saw me not washing my hands] because people are not focused on hand washing behaviour; they can take it as normal that people sometimes forget to wash their hands."* (Female IDI participant from a comparison household)

Participants explained that people easily forgave each other for not washing hands because of their difficult circumstances. Social support for handwashing was limited. Participants felt handwashing could be facilitated by family members reminding each other to wash hands at key times, but this rarely happened in practice. The importance of handwashing behaviour was consistently reinforced by NGOs and while some people felt the repetition of handwashing messages helped to remind people, others found it frustrating that these organisations were unable to realise changes to their broader circumstances which would allow them to practice handwashing more regularly.

Motives

In FGDs participants were asked about which motives were associated with handwashing. Motives of love, attractiveness and status (e.g. wealth, education and social respect) were thought to be strongly associated with handwashing:

> *"No one can fall in love with someone with dirty hands!"* (Female FGD participant)

> *"An attractive person is likely to remember to wash hands because she is used to looking nice, so, her hands have to look nice as well."* (Female FGD participant)

> *"Highly educated people are always clean because they do work with white papers and with clean things, and so they also have to have clean hands. And again, these educated people teach others; they cannot go in front, teaching others when they are unclean. They have to have clean hands so that people consider and respect them."* (Male FGD participant)

Handwashing was less strongly associated with nurture and was not seen to be associated with affiliation (fitting in with a group). Participants explained that even 'good parents' are unable to mind their children and encourage handwashing behaviour because everyone has to work long hours outside the home. Others explained that relationships were typically built on shared interests and needs and so handwashing didn't necessarily help a person to fit in. Participants in IDIs and FGDs agreed that if a person was hungry, poor or upset they would be unable to prioritise handwashing:

> *"Hygiene and good nutrition work together. Cleanliness cannot be visible in a house where food is absent. I can't think about handwashing when I am so hungry. Another thing is the*

kind of life I live, since I am IDP, it has brought me to trauma or psychological problems. Hygiene has become difficult because of the many thoughts crossing my mind like: How my children are going to eat? How am I going to get money? It's difficult." (Female IDI participant from a comparison household)

Hunger emerged as a particularly prominent barrier to hand hygiene in this setting. At critical moments for handwashing, such as preparing or eating food, people's hunger would override all else, causing people to forget handwashing. Hunger also caused prevented people from making plans that could facilitate handwashing. For example, participants explained that their limited daily earnings are entirely consumed by purchasing food:

"If I do not go to work in the farms all day, we shall not eat. . . But if you are only able to earn 2500 Congolese Francs, then all of this money will have to go on food. We ask ourselves whether to buy soap. . . but it is difficult to choose this rather than prioritizing food for our children." (Female FGD participant)

Demographic characteristics Certain personal characteristics influenced handwashing behaviour. Older adults and men who lived alone often were unable to collect sufficient water to meet their needs and therefore reported making handwashing compromises. Their reduced water availability was due to accessibility or cultural barriers associated with gender norms (i.e. generally it was only women who collected water). IDPs typically faced more challenging living conditions than host community members and often described feeling that they were living "like animal"' or "living a life that was not our own". Consequently, many IDP participants reported that the 'problem of handwashing' was new for them and if their old lives could be restored their behaviour would also improve:

"I can tell you that I had a good life, I was a rich person. . . but my life changed with displacement. . .the situation changed to bad and today I am as you see me. take me back to my previous life and you will see my feelings and emotions will change and then I will have a high chance of washing his hands with soap." (Male FGD participant)

Variations in experiences of cholera and behavioural determinants between participants from case and comparison households. The determinants of handwashing behaviour among case households were consistent with those in comparison households across the determinant categories described above. However, there were substantial differences between the two groups on cholera-related risk perceptions and the perceived or actual consequences of cholera on people's livelihoods and routines.

Participants from comparison households. Cholera was the main health concern of almost all participants, but among those who had not had a cholera case in their household, it was seen as a common, chronic challenge that was inseparable from other adversities they faced:

"Cholera is a major health problem here . . . because we work hard, earn less, eat less and rest less. As consequence, we lose weight and look pale and have poor nutrition. . . Then it is easy for the cholera disease to attack people." (Female FGD participant)

"It has been a long time since we do not have drinking water in this area and that is the reason why cholera disease attacked people. . . if you have bad food, unhealthy water and your hands are dirty then of course you will suffer from cholera." (Male FGD participant)

The high number of cases in the 2017 outbreak did heighten perceptions of risk and participants from comparison households reported realising cholera was serious within recent months. Participants from comparison households thought cholera generally affected children or people who were already 'sickly', 'unclean' or 'pale'. Host community members thought that cholera was primarily a problem that affected IDPs. In terms of the social and economic impacts of cholera, participants from comparison households said they feared people who had cholera and would avoid them while infectious. Those without direct personal experiences of cholera thought its impacts on the lives of cases or their families would be relatively temporary, given that disease was seen to be easy to treat and participants felt that people tended to recover quickly. Participants were divided about whether getting cholera would have a longer-term impact on a person's reputation:

> *"Someone who has had it [cholera] would not like people to know that he had it because cholera disease really affects a person's dignity, nobody can wish to get it. It leaves you with no reputation at all."* (Male FGD participant)

> *"Everyone understands. . .I mean most people know someone who has experienced cholera at some point. . . So the person who gets infected, he can still recover and get back to his normalcy."* (Male FGD participant)

In many ways local explanatory disease models were aligned with 'Western' biomedical messaging about the cholera (presumably because of the history of health promotion in the region). However, misperceptions about cholera persisted within the community despite familiarity with the disease. Several participants said others in their community do not take cholera seriously because they believe "black people don't die of germs". Similarly, some people believed that a certain degree of exposure to "dirtiness" helps to protect you because being too clean may leave you vulnerable to infection. Others felt the continued presence of cholera in Eastern DRC played to the interests of humanitarian organisations:

> *"We know that when [organisations] come just sensitizing about hygiene and cholera, they are paid on this—it's no use coming all the time disturbing us. They come for their own interest."* (Male IDI participant from a comparison household)

Over decades people had realised that most humanitarian aid was provided during cholera outbreaks. These were short term projects which subsided as cholera cases decreased. People had also learned how to make the most of a system that didn't always appear to have their ongoing interests at heart. For example, on several occasions during our research people from the community who were not participants, approached us with lists of 'cholera cases' who needed help.

Participants from case households. Participants from case households reported that they were easily able to recognise cholera symptoms. All of these households explained that cholera had affected them suddenly and unexpectedly. Some participants said this in a literal sense, reflecting that people commonly went from feeling healthy to suddenly experiencing vomiting and diarrhoea which lead them to become so weak that they were unable to do anything within hours. More commonly, when participants said cholera was "unexpected" they were expressing that they struggled comprehend how the disease had been able to launch a "surprise attack" on a family like them. Participants therefore attributed their illness to a one-off "mistake" in their behaviour.

When the disease initially "attacks", family members reported being worried. Patients described feeling "empty", "not of this world" and "seeing only death before them". When patients returned home from the CTC, their cholera experience was not over. Cholera cases described feeling "stuck" and "destabilized" in multiple aspects of their life. Patients were unable to do agricultural work or household tasks for about a month because they felt "weak like paper". Given the majority of households in this region survived day-to-day, earning less than 3000 Congolese Francs per day (1.5 USD), this inability to work rapidly put families in a state of economic crisis:

> *"I cannot say that my economy decreased—it was totally blocked!"* (Female IDI participant who had cholera)

> *"A huge economic impact was observed. . .during that period of our child's sickness, things really got harder. Although we generally eat badly, that particular time my husband was staying with the child at the hospital, we then ate more badly than usual because of the little amount of money—everything went really bad."* (Female IDI participant who had a child with cholera)

People also reported that cholera affected their roles, responsibilities, and sense of self. Participants felt cholera caused their attractiveness to "fade" and that they now "hated their outlook" due to the amount of weight they had lost. Parents who had been cholera cases felt worried that in the months following their discharge they had become unable to care and provide for their children:

> *"I became like a baby. . .I had to wait for somebody else to take care of me, like the neighbours, it is like I have lost my role of mother to all these children."* (Female IDI participant who had cholera)

> *"Suffering from cholera reduced considerably my responsibility as a father, I could not feel respected, and I could not feel myself as a father of the family because I was half-dead."* (Male IDI participant who had cholera)

Another woman explained that she relied on her neighbour to breastfeed her new born baby for several months while she was sick with cholera. Children and older members of the household often had to stand in for parents to do the household chores. Relationships with neighbours and friends also changed. Some participants explained neighbours were integral in helping them through their recovery and that they often gave them food, money and water (although it was expected the household would find a way to pay this back):

> *"I am still feeling weak and have no money to buy food because I am not working, so some neighbours give me food to eat, but you understand how difficult it is to depend on someone else's kitchen."* (Female IDI participant who had cholera)

Others explained that neighbours and friends stayed away following their illness and that they felt isolated and stigmatised:

> *"The relationship with neighbours does change because of gossip, they start saying that it is because of your uncleanness. . .they end up avoiding you"* (Man IDI participant who's elderly brother had cholera)

"I lived an isolated life during those hard periods of cholera cases." (Female IDI participant who had 3 children who had cholera)

However, participants from case households reported being more motivated to wash their hands, explaining this was because they recognised their vulnerability to disease. They also used handwashing as a way of countering any misperceptions from neighbours about their cleanliness. The latter concern seemed to prompt a range of demonstrative action around handwashing. For example, several participants said they have actively encouraged others to practice handwashing:

"Though we got infected, we cannot feel discouraged from doing hygiene practices. . .we even try to improve it and we are telling our neighbours that they should keep on practicing hygienic behaviour because that is the only way to prevent cholera. . .And other people around here, when they see how clean you are, even if you got sick with cholera, they can decide to take you as their good example of cleanliness" (Male IDI participant who had 2 children with cholera)

One participant built a dedicated place for handwashing near the toilet after his daughter was admitted to hospital with cholera:

"I realise that fighting this cholera disease is very serious these days and so I thought that once we are practicing hand washing, we will be able to prevent our family from this disease. . .So I decided I had to make the place for handwashing, a place that would be respected. . . Now the neighbours are just appreciating [the facility] and I am telling them to do the same as I did, but whether they agree or not, I will never give up with the practice." (Male IDI participant whose daughter had cholera)

However, households with cholera cases also felt their circumstances following their exposure to the disease made it more challenging to practice handwashing. This was due to their reduced physical health, their inability to collect sufficient water (most households reported being able to access half as much water in the period post discharge as compared to their normal circumstances), increased hunger and malnutrition (due to loss of income), and difficulties affording other basic daily necessities, such as soap. A minority of participants were given a small bar of soap and six water purification tables upon discharge from the CTC. Participants who received these distributions, reported trying to use these sparingly to make them last as long as possible.

Discussion

Our research found that in the Eastern region of DRC, cholera is generally conceptualised as a persistent and commonplace health challenge but also one that is easily treatable. Frequent hygiene promotion sessions in this region have led to high levels of knowledge about the health impacts of cholera, its symptoms and recommended preventative behaviours. However, handwashing with soap was observed to be rare in this setting. By using theory-driven qualitative methods we were able to identify that this was because the psychological, social, and environmental behavioural determinants affecting handwashing in this context combined to limit the ability of individuals to improve their handwashing behaviour. Major barriers to handwashing related to the physical environment or behavioural setting included the absence of handwashing facilities, water scarcity, the unaffordability of soap, the small make-shift houses where displaced populations lived, the use of shared sanitation facilities, and the extended periods

people spent working outside of the home. Handwashing behaviour was also hampered by broader experiences of living in poverty and within in a dynamic conflict-prone region with high rates of displacement and livelihood fragility. This was because handwashing was often deprioritised because of hunger, mental health challenges, the unpredictability of routines, and the lack of social support and sanctions around handwashing. The experiences of participants from case households indicated that in complex crises, cholera can have profound non-health impacts on a household's income, productivity, social status, and sense of control–factors which in turn create additional barriers to handwashing.

Despite low rates of actual handwashing practice, our research participants reported handwashing had increased as concerns about cholera were heightened. Many participants felt these changes in behaviour might be sustained beyond the outbreak. Prior literature has indicated self-reported handwashing behaviour tends to increase during outbreaks [15, 27–31], however, studies which use observational measures of behaviour show much lower rates of practice even during outbreaks [32]. Such findings act as a reminder that research exploring handwashing behaviour should prioritise including observational methods to gauge actual practice given that self-reported behaviour is commonly affected by social desirability bias, and that this bias may be heightened in outbreaks [33]. However, it may also be indicative how behaviour may fluctuate over the course of outbreaks. For example, initial gains in the frequency of handwashing behaviour at the onset of an outbreak seem to decline or vary over time as fear associated with the disease subsides or the disease is normalised [27, 34, 35]. One handwashing study published during the COVID-19 pandemic suggested that such patterns in behaviour may be explained through Terror Management Theory (TMT) [35]. This theory suggests that when the threat to our mortality from a disease is made more salient, we are more likely to adopt health behaviours, like handwashing, that can remove this threat from our focal attention [35–37]. This theory also explains that when the disease threat is no longer the focus of our attention, protective behaviours may start to decline. In our study participants were aware of the proximal threat of cholera in their region but adopted other psychological defences (such as perceiving others to be at greater risk than them and believing "black people don't die of germs") which avoided the threat and made this reality easier to cope with on a day-to-day basis. TMT might also explain why case households were more driven to take demonstrative action around handwashing following their recent brush with death. In contrast, comparison households in our study site were pre-occupied by more salient threats to their mortality such as hunger and conflict. As such their daily behaviour was geared to the reduction of these threats rather than cholera prevention behaviours. There are few studies which explore how stress or external threats may affect the prioritisation of handwashing behaviour, however, consistent with our results, one study among health care workers in a high-income setting indicated that stress, cognitive load and threats to mortality that appear more urgent or proximal, may impair a person's ability to practice handwashing [38]. Our findings challenge the common belief that if people understand the benefits of handwashing they will act 'rationally' during an outbreak and wash their hands more frequently to protect themselves and others [16, 39].

In our study, households with cholera cases experienced the disease as an exogenous shock to their already vulnerable state which plunged their household into a state of acute socio-economic crisis. This household-level crisis was characterised by a sudden but extended loss of income, increased hunger, isolation from social support systems, feeling unable to provide for family members, and feeling that their exposure to cholera may tarnish their social standing in the long term. These lived experiences of cholera are consistent with existing, but limited, literature from other settings where cholera outbreaks occur during complex crises or within fragile states and among populations with high levels of poverty [40, 41]. Our study found that

exposure to cholera decreased the household's access to food and made it hard to prioritise handwashing due to a reduced ability to access water purchase soap in the wake of their illness. This presents a critical challenge for cholera control given that hand hygiene is likely to be key to interrupting transmission during the 10 days when cases are hyper-infective following infection [42] and *v. cholerae* continues to be shed in their faeces. There is also some evidence that pre-existing and continued malnutrition during this period may prolong shedding [6]. Our findings support the likely effectiveness of targeted WASH interventions distributions of hygiene kits [12, 43] and suggests that these could be complemented by the distribution of food items in some settings.

Prior research in this region of DRC has highlighted that hygiene programming may be met with reduced acceptability if it is inadequately resourced, poorly contextualised, fails to acknowledge other priorities of the population, or does not address social and environmental factors that may constrain behaviour [44, 45]. Broader research has also indicated that during complex crises, experiences and responses to cholera outbreaks are associated with, and amplified by, structural and social vulnerabilities such as extreme poverty, conflict and displacement [46–48]. Our findings are consistent with this body of research and indicate that hygiene programming aimed at mitigating cholera transmission amid complex crises is likely to be more effective if it is integrated into longer-term initiatives that focus on these larger vulnerabilities, such as food security, livelihoods and psychosocial support initiatives. In contexts where cholera is endemic, handwashing programmers must move beyond health-education and work with communities to build enabling environments through investment in handwashing facilities and reliable water supply systems, and supportive social structures. Participants in our study highlighted the importance of conveniently located, desirable and durable facilities in cueing behaviour at key times and this is supported by broader literature [15]. Our research also identified examples of adaptive coping strategies utilised by the population to facilitate handwashing behaviour, reduce vulnerability, and increase their sense of control over the unpredictability of their circumstances. Coping strategies included the use of surface water or grey water for handwashing, the use of ash when soap was unavailable, the pooling or water and soap resources within compounds, the careful calculation of water and soap use to facilitate all necessary household tasks and encouraging neighbours to remind all children within a compound about handwashing. While these actions were taken by a minority of households in our study, they could easily be shared and adopted by others by utilising a positive deviance approach [49]. Research in previous outbreaks has highlighted the importance of understanding whether local coping mechanisms are aligned with, juxtaposed to, or are able to fill gaps in government and organisation-led disease prevention strategies [50–52]. Experiences during prior outbreaks has also emphasised that an overreliance on biomedical explanations of disease can be met with resistance from populations [16, 53, 54]. If health promotion fails to acknowledge emic perspectives and experiences it has the tendency to isolate the disease from its human host and the social experiences that facilitate transmission [55]. Our findings suggest that handwashing programmes should aim to change the public health discourse around cholera-related risk by focusing on local constructions of disease, the experiences of populations, and by communicating the non-health impacts of the disease. This may allow populations to adjust their decision-making and coping mechanisms towards prioritising behaviours like handwashing—particularly if it is seen to have health, social and economic benefits in the long term. Lastly, our research found that case households were more motivated to practice handwashing after their exposure and were better able to act upon their behavioural intentions to encourage the behaviour in others and create an enabling physical environment for handwashing. Humanitarians could build upon this by inviting cholera cases to share their experiences with others in the community. There is some evidence that this may be an effective way to

motivate health behaviour, challenge misperceptions around diseases and to heighten perceived vulnerability in a way that is more sustainable than focusing on fear alone [56].

Limitations

Our research was primarily interested in exploring how the determinants of handwashing behaviour were affected by a cholera outbreak. While observed and self-reported behaviours are described qualitatively in this study, the methods were not designed to be representative and therefore this data could usefully be complemented by further research which measures actual behaviour before, during and after outbreaks in regions that are prone to them.

Where possible we used participatory activities that have been used in prior research however some new approaches were developed to explore motives, water prioritisation and experiences of conflict. Replication of these methods would be useful to demonstrate their validity and reliability.

Our sampling was guided by case lists from the CTC, however in this region cholera case admission is not always laboratory confirmed. Other research from DRC has shown that only a minority of those admitted to CTCs actually had cholera [57] and therefore this may skew some of our research findings in relation to experiences of the disease. As noted, cholera was often used by research participants to be a catch all term for diarrhoeal diseases, this emic construction may have therefore also distorted the way people described their experiences and perceptions in relation to the disease.

This research was conducted in partnership with Action Contre la Faim and for security reasons our research team were required to wear a branded vest throughout data collection and travelled in a branded vehicle. Given that the organisation have a history of working on WASH projects in this region and that participants had been exposed to decades of humanitarian response programmes, this may have increased willingness to participate and resulted in more socially desirable answers. The research team tried to reflect on this during daily research discussions and consider how our individual and collective positionalities may have shaped our findings.

Conclusion

In addition to having severe health implications, outbreaks have the potential to disrupt people's social, psychological, and economic lives. By focusing on the lived experiences of cholera, our research highlighted that even when substantial shifts in behavioural determinants occur, it is not always enough to substantially influence the uptake of preventive behaviours like handwashing with soap. In this case, handwashing behaviour remained low during the outbreak due to the absence of enabling physical and social environments and the competing priorities and vulnerabilities of the population. Handwashing programmes targeting areas with endemic cholera or outbreaks within complex crises could be strengthened by acknowledging the underlying circumstances that create and perpetuate outbreaks, addressing the health and non-health impacts of diseases like cholera, investing in sustainable handwashing infrastructure, and identifying and sharing local disease coping mechanisms that facilitate the practice of preventative behaviours.

Supporting information

S1 Table. Handwashing determinant definitions adapted from on the BCD checklist of determinants (1, 2) and accompanied by method selections.
(DOCX)

S2 Table. Description and sample size for all methods done at a household or individual level.
(DOCX)

S3 Table. Purpose, description and sample size for each of the methods done within group discussions.
(DOCX)

S4 Table. Inclusivity questionnaire.
(DOCX)

S5 Table. Identified determinants and their associated influence on handwashing behaviour in Eastern DRC.
(DOCX)

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Chapter 7: How are hygiene programmes designed in crises? A qualitative study of the perspectives of humanitarians in the Democratic Republic of the Congo and Iraq

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Primary Supervisor	Dr Robert Dreibelbis		

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SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	I conceptualised the study, secured funding for the study, collected the data and led the analysis and drafted the manuscript. Thomas Heath was involved in securing funding for the study, supported the logistics of the research, provided validation of the results and revised and edited the manuscript. Anna C Mutula was involved in data collection and translation, the preliminary analysis, the validation of results, and revising and editing the manuscript. Robert Dreibelbis and Jennifer Palmer provided supervision and reviewed and edited the manuscript.

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How are hygiene programmes designed in crises? A qualitative study of the perspectives of humanitarians in the Democratic Republic of the Congo and Iraq

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Abstract

Background: Hygiene behaviour change programmes are complex to design. These challenges are heightened during crises when humanitarian responders are under pressure to implement programmes rapidly despite having limited information about the local situation, behaviours and opinions – all of which may also be rapidly evolving.

Methods: We conducted in-depth interviews with 36 humanitarian staff involved in hygiene programme design in two crisis-affected settings – one a conflict affected setting (Iraq) and the other amid a cholera outbreak (DRC). Interviews explored decision-making in each phase of the humanitarian project cycle and were thematically analysed.

Results: Participants considered the design and implementation of hygiene programmes in crises to be sub-optimal. Humanitarians faced sector-specific challenges as well as more general constraints associated with operating within the humanitarian system. Programme-design decisions were made naturalistically and relied heavily on the intuitions and assumptions of senior staff. National organisations were often side-lined from programme design processes despite being in a better position to gather situational data. Consequently, programme design and decision-making processes adopted by humanitarians were similar across the two settings studied and led to similar types of hygiene promotion activities being delivered.

Conclusion: Hygiene programming in crises-affected settings could be strengthened by initiatives targeted at supporting humanitarian staff during the pre-implementation programme design phase. This may include rapid assessment tools to better understand behavioural determinants in crisis-affected contexts; the use of a theory of change to inform the selection of programme activities; and funding mechanisms which encourage equitable partnerships, phased programming, regular adaptation and have programmatic components targeted at sustainability and sector capacity building. Initiatives aimed at sector reform should be cognisant of inter and intra-organisational

dynamics, the ways that expertise is created and valued by the sector, and humanitarian habits and norms that arise in response to system constraints and pressures. These micro-organisational processes affect macro-level outcomes related to programme quality and acceptability and determine or limit the roles of national actors in programme design processes.

Key words: programme design, humanitarian systems, localisation of aid, evidence-based practice, hygiene.

Introduction

Hygiene promotion is a critical part of humanitarian responses to crises and public health emergencies [123, 271]. Handwashing behaviour is recognised as a cornerstone of response because it has the potential to curb the spread of diarrhoeal [101] and respiratory diseases [408-410] which are among the leading causes of mortality in the wake of crises [170].

However, designing effective hygiene programmes in crises or public health emergencies is a complex task. Literature reviews have identified major gaps in our understanding of what works to change and sustain hygiene behaviour in stable, non-emergency settings [189, 411-414]. The majority of these reviews conclude that health information alone is unlikely to be sufficient to change behaviour. Evidence suggests that hygiene programmes must target a range of contextual barriers and enablers of behaviour (known as behavioural determinants) - including cognitive factors as well as factors in the social and physical environments that influence behaviour.

Evidence on the effectiveness of hygiene promotion during crises or outbreaks is even more sparce given the challenges of conducting research in these settings [3, 10, 36]. For example, little is known about the factors that may determine behaviour in these contexts [411] and behavioural and health outcome measurement has historically been poor [415]. In comparison to other components of water or sanitation programming in crisis-effected populations, hygiene behaviour change tends to be less well researched and resourced and is understood to require programmatic staff to have specialised capacities which are often lacking in crises [3-5, 7, 181]. Humanitarians designing hygiene programmes during crises and outbreaks also face unique constraints. For example, humanitarian staff are typically under pressure to act rapidly and yet are expected to utilise evidence-based approaches [416-419]; to contextualise programmes despite having imperfect data on the local situation, behaviours and opinions [420, 421]; to regularly adapt approaches based on the dynamic and phased nature of crises, public discourses and community and stakeholder feedback; and to provide programming which is sensitive to the needs of vulnerable crisis-affected populations.

There have been some attempts to document the ways that humanitarians navigate this complex set of circumstances to design hygiene programmes in emergencies [4, 5]. In these studies, humanitarian actors explained that hygiene programming in crises primarily consisted of health education and 'hardware' (e.g. building handwashing facilities) or hygiene kit distributions. They also reflected that hygiene behaviour was rarely given operational priority, that there was a lack of familiarity with behaviour change approaches and how these could be applied to crises, and that there were barriers to assessing behavioural determinants and translating these into contextualised programming in a timely manner.

Within the humanitarian sector more broadly, research has explored the ways in which humanitarians make decisions under pressure and amid such uncertainty. Campbell and Knox [419, 422] summarised four types of decision-making approaches that are used in humanitarian crises. These include 'classical/analytical decision-making' which requires humanitarians to identify a range of programmatic options, appraise these, and select the option that is likely to work best given the circumstances. In contrast, 'naturalistic decision-making' [423] involves humanitarians relying on intuition and learned mental shortcuts to identify relevant courses of action. Alternative approaches include the 'procedures and protocols' approach which encourages decision-making to be guided by previously established standards and the 'sensemaking' approach [424] which requires humanitarians to iteratively identify patterns within the constantly changing state of information and adapt programming accordingly. All of these types of decision-making may also be influenced by an individual's self-interests, ideals, and preferences [425]. Campbell and Knox conclude that there are inherent strengths, limitations, biases, and feasibility constraints to applying each of these to humanitarian decision-making approaches and identify the need for further applied research to test their generalised findings [422].

Programme design and decision-making during humanitarian crises is also influenced by intra and inter-organisational power dynamics and the broader system of coordination and financing within

the humanitarian aid sector. For example, in recent years there has been a strong push towards the localisation of aid through the Grand Bargain Commitments [426]; however donors, United Nations agencies, and international non-government organisations (INGOs) still dominate the sector in terms of financing and influence [427]. This greater influence enables certain types of programming norms to develop while limiting the participation and program design capabilities of national non-government organisations (NNGOs) or civil society actors [428]. To account for the influence of systemic and relational factors on decision-making, Heiss and Johnson outline a Unified Framework for Understanding International Nongovernmental Organizations. This highlights that actions taken by non-government organisations (NGOs) are influenced by 'macro factors' in the institutional environment and 'meso factors' related to the interactions between humanitarian actors, donors and nation states [425]. However, to date this framework has not been widely applied and has never been used to study the work of humanitarian actors.

This research set out to explore the ways that humanitarian actors involved in hygiene programme design, navigate the complexity of the humanitarian system, and imperfect states of evidence and contextual knowledge, to construct narrative accounts of what it is they do and why.

Methods

This research is grounded in a constructivist research paradigm and explores the topic through two comparative case studies in Iraq and the Democratic Republic of the Congo (DRC). The research uses in depth interviews with humanitarians professionals who work in the water, sanitation and hygiene (WASH) sector and were involved in community-based hygiene programming.

Study Sites

We intentionally focused our work in two different types of crises, in geographically different regions and included different types of humanitarians. This allowed us to explore the influence of the context on programme design and how experiences of programme design differed between

organisational types. In the Kurdistan region of Iraq interviews were conducted between April and May of 2017 and related to the humanitarian response to the conflict between the Iraqi government and their allies and the so-called 'Islamic State'. Hygiene was key to mitigating diarrhoeal diseases among those displaced by the conflict who typically resided in densely populated camps where WASH facilities were shared. Interviews were also conducted in the Democratic Republic of the Congo (DRC) in October 2017. These interviews took place during the largest cholera outbreak in recent decades [429] and amid the broader complex crisis in the Eastern region of the country where there has been decades of conflict and displacement [430]. In this setting hand hygiene was considered key for interrupting cholera transmission [123, 125].

Conceptual frameworks:

In developing a conceptual framework for this research we utilised behaviour change and intervention design frameworks [15, 431] and the humanitarian programme cycle [41]. While the terminology and specific steps outlined in these frameworks and programme cycles differ, there are a lot of commonalities too [5]. For example, the Behaviour Centred Design (BCD) Framework and the Steps for Quality Intervention Development (6SQuID) outline similar steps to guide programme design. These processes include a problem exploration phase where the behaviour and target group are defined, and available literature is assessed to map what is already known. The second phase involves actively building on this state of information through contextual learning with the target population. The third phase typically involves translating the learning in the first two phases into intervention activities by identifying malleable factors and potential change mechanisms. The fourth phase involves making plans for the delivery of the programme including piloting potential activities on a small scale, training staff, and putting mechanisms in place to support iterative adaptation. The final phase in both approaches is to develop a plan for monitoring and evaluating the program (although this is not covered in this research). Prior research has acknowledged that this 'ideal' process of behaviour change programme design is challenging to implement in humanitarian crises

and may not acknowledge all of the systemic constraints of working within these settings [5]. Therefore, in our work we choose to frame these intervention design steps within the humanitarian programme cycle which recognises additional aspects of programme design such as resource mobilisation and coordination, information management, capacity strengthen and sustainability. Table 1 below describes how these three frameworks were combined and defined within this research. These concepts and definitions informed the structure of the interview guides we developed.

Table 1: Definitions of the steps of humanitarian programme design as applied in this research.

Phase of programme design	**Detailed definition of each phase derived from the Behaviour Centred Design (BCD) Framework, the Steps for Quality Intervention Development (6SQuID) and the Humanitarian Programme Cycle.**
Developing programme proposals	• Assessment of the population's humanitarian needs in general and consideration of how to strategically respond to and prioritise activities which can meet needs in a coordinated fashion. • Problem exploration phase where available literature is assessed to map what is already known about behaviours, and ultimately define the specific behaviour and target group of the intervention. • Conduct additional contextual learning with the target population to address knowledge gaps. • Translate learning into intervention activities by identifying malleable factors and potential change mechanisms.
Resource mobilisation	• Secure funding to implement the humanitarian response programme and ensure proposed work is aligned to both donor requirements and to the work of other actors. • Ongoing negotiations and relationships with donors throughout programme design and implementation
Programme implementation and adaptation	• Deliver the programme - including piloting the approach on a small scale, training staff, and putting mechanisms in place to support iterative adaptation.

Coordination, information management, capacity and sustainability	• Ongoing coordination between humanitarian actors working within the same region (both within and between sectors) with the aim of sharing learning, reducing duplication and maximising the efficiency of the response in being able to meet population needs. • Ongoing information management to support programmatic learning and share resources and insights that could strengthen programme quality. • Mapping of capacity gaps among humanitarian response actors and subsequently developing or identifying appropriate resources, trainings or capacity sharing opportunities to address these gaps. • Inclusion and implementation of initiatives which are designed to support recovery and resilience building, sustain programming, or transition programming into the hands of local actors.

Participant sampling

For this research the national WASH Clusters in Iraq and DRC served as our focal point for identifying research participants. The Humanitarian Cluster System was established in 2005 to address identified gaps in humanitarian action [432]. The WASH Cluster forms one of the 11 thematic coordination mechanisms typically established in the wake of a crisis and aims to strengthen the coordination and capacity of organisations working on WASH programming with the ultimate aim of improving the relevance, quality, coverage and effectiveness of interventions. In both study sites the WASH Clusters involved international non-government organisations (INGOs), local non-government organisations (NGOs), United Nations Agencies and government actors. The research was presented and explained to all actors at a WASH Clusters meeting and organisations were invited to identify the staff member/s who would be best placed to discuss the management, design and delivery of their organisation's hygiene programming. In cases where the hygiene programming of an organisation could not adequately be summarised by one staff member, additional individuals were invited to participate. Follow up calls were made to organisations to identify suitable participants.

Data collection

Interviews in Iraq were conducted in person by SW, who is of British ethnicity and has a background in behavioural science and WASH. Interviews in Iraq were generally conducted in English but in one instance SW was accompanied by an Arabic translator who provided simultaneous translation. Interviews in DRC were conducted in person by SW with simultaneous translation to either French or Swahili by ACM. ACM is Congolese and had prior experience working with NGOs as part of humanitarian programming. In both settings interviews typically took between 45 minutes and 1.5 hours. Interviews were audio recorded, translated where necessary, and transcribed. Interviews continued until a point of saturation was reached or when all eligible organisations had been approached to participate.

Data analysis

A preliminary analysis was conducted by taking interview notes, discussing these within research teams and validating findings through a participatory workshop in both countries. In Iraq the participatory workshop included 71 representatives from 31 different humanitarian agencies and in DRC the workshops involved 88 participants from 26 different agencies. In both cases preliminary findings were presented and feedback was sought on the contextual interpretation of findings.

A subsequent in-depth thematic analysis was led by SW and conducted based on the approach described by Braun and Clarke [433]. The coding frame was developed deductively and informed by the four phases of humanitarian behaviour change programme design that are described in Table 1. Framework matrices were developed for each code and themes were defined and described. These were validated by ACM and TH. A secondary parsing of the data related to programmatic decision-making was done by comparing findings to the frameworks outlined by Campbell and Knox [422] and Heiss and Johnson [425].

Ethics and consent

Participants were informed about the study and that their opinions would be anonymised at an individual and organisational level. Written consent was provided by each participant. Ethics permission for the study was provided by the London School of Hygiene and Tropical Medicine (Protocol 13545), the University of Kinshasa's Public Health School (Approval no: 038/2017) and Hawler Medical University.

In Supplementary Material 1 we also describe how our work adheres to the Standards of Reporting Qualitative Research [434].

Results

A total of 24 interviews with 36 humanitarians were conducted, with 11 interviews taking place in Erbil and Dohuk in the Kurdistan Region of Iraq and 13 in Goma in Eastern DRC. The demographics of participants was consistent with the current state of senior staffing within humanitarian WASH response: the majority of participants were male (75%) and half were not nationals of the country where the crisis was occurring (50% foreign nationals). Similarly, the participating organisations reflected the composition of the WASH Clusters, with INGOs being the most common type of participant organisation (57%). The majority of people interviewed held WASH Programme Manager roles. A detailed description of characteristics is provided in Table 2.

Table 1: Summary of the characteristics of interview participants

Number of organisations (n=24)	
Iraq	11
DRC	13
Number of organisations interviewed in both countries	5
Number of humanitarians participating in interviews (n=36)	

Iraq	17
DRC	19
Gender of participants (n=36)	
Male	27
Female	9
Nationality (n=36)	
Congolese	12
Iraqi/Kurdish	6
Foreign nationals	18
Types of organisations participating (n=21)	
International Non-Government Organisations	12
National Non-Government Organisations	5
UN Agencies	3
Government	1

Developing programme proposals:

The process for developing the hygiene component of WASH proposals was described as ad-hoc and constrained by tight submission deadlines. Humanitarians recognised that the processes they used were sub-optimal but faced frustration and challenges in trying to operate differently:

> *"Sometimes when you are doing this work [programme design], you feel like you are a guinea pig stuck on a wheel. You can see what you want to do, what the right thing to do is, but for one reason or another you can't get there".* (INGO, DRC)

When designing hygiene promotion activities, participants explained that there was an over-reliance on the prior experiences and expertise of senior WASH staff, with limited contributions from frontline staff:

> *"So this is one of the weaknesses…With our organization [proposal writing] basically stops at the program manager level in terms of technical expertise…and so everything we do in terms of WASH is our own, not related to the organization, so there is no institutional documents or strategies or ways forward, so that is*

inherently kind of risky and short lived, because it can't last longer than the people do in the place." (INGO, Iraq)

If individuals required additional resources or information to support assessments or the development of hygiene promotion activities, most turned to resource collections that they had personally acquired over the years or used online search engines to find relevant materials:

"It is a bit of kind of feeling your way through. I mean this is why Google is a great thing to go and find documents and the support you might need because everything is there. It is better than just relying on one like theory or methodology or approach…But again…I wouldn't say this is good programming." – (INGO, Iraq)

Many participants explained that their organisations did produce a range of resources to guide programming but that these were often not user friendly. Participants admitted that behavioural theory was rarely used to inform programming, partly because there were "*so many books, so many approaches*" and that these were "*text heavy*" making it hard to find the information required. Organisational guidelines did seem to inform the overarching principles of a programme proposal. For example, certain organisations had preferred delivery mechanisms (e.g. setting up care groups [435]) or inclusivity principles (e.g. a focus on gender equity).

Most participants reported using standard assessment tools that were either used throughout their organisation's global programmes or standardised by the national WASH Cluster. These tools tended to be multi-sectoral and designed to prioritise humanitarian needs. If hygiene behaviours were specifically explored this was typically done through Knowledge, Attitude and Practices (KAP) surveys. Some organisations complemented this with key informant interviews or focus group discussions. These behavioural assessment tools were considered time consuming and required a

certain level of staff experience. Many organisations explained that they were not able to always conduct behavioural assessments prior to developing programme proposals:

> *"I would say no we don't do it [behavioural assessment] before the proposal. It's normally because… without having personnel and unrestricted funds to do it, like a KAP survey is not cheap because you have to have daily workers…you have to have the tablets available, you have to do the analysis, it's not quick and it's not easy." – INGO, Iraq*

Participants reported that KAP surveys and other common methods for understanding behaviour predominantly focused on access to products and infrastructure, handwashing knowledge, and reported practice. Available tools were less able to provide a more nuanced understanding of the determinants of hygiene behaviour in a particular context. Several participants acknowledged that populations typically understood the health benefits of handwashing, but that there was a gap between 'knowing and doing'. When asked about the determinants of handwashing behaviour in their context many participants indicated that this was the remit of experts or specialist researchers who were not feasible to engage in crises.

Given that organisations were often unable to conduct rapid assessments prior to proposal submission, many indicated that for the hygiene component of their programmes they had *"learned to be a bit vague in proposals on purpose"*. In such cases the programmatic scope of work and budget tended to be based on standardised approaches and materials, such as materials or guidance created by global or national WASH clusters, and then organisations would commit that these would be modified and contextualised over the course of the response as necessary.

National staff members within INGOs or NNGOs tended to be in a stronger position to get real-time information from communities or to make 'informed assumptions' that could guide programme

design based on their prior experiences of working within the context. During interviews national staff members appeared to identify with crisis-affected populations more directly. However, some national staff members were also more likely to form stereotypical judgements about the behaviours or attitudes of crisis-affected populations if they came from cultural groups or circumstances that were different to their own.

> *"We have like different levels of people. You have like the 'top level' and of course they are educated. If you go to them and you tell them about hand washing then maybe they are going to welcome you…So I think to start with them is good, as their mentality is already better than the poor people. The poor people will just say 'oh come on I'm living in a terrible situation and you are coming here wanting to talk to me about hygiene.'"* (NNGO, Iraq)

> *"The problem is that the cholera outbreak can be affected by the culture, because we can sensitize people, but others remain unchangeable… We can tell them to wash hands, but it is all about their mindset. We ask them to leave that kind of culture that our grandparents used to practice behind*" (NNGO, DRC)

Hygiene promotion initiatives were rarely standalone programmes but rather were integrated into broader WASH or disease control programmes. However, in both settings, hygiene promotion activities were, perhaps justifiably, considered to be less of a priority than other WASH components, for different context-specific reasons. In Iraq this was because humanitarians felt that the population typically had high rates of handwashing behaviour prior to the crisis and that therefore the priority was to restore damaged water systems to facilitate these behaviours again. In DRC most humanitarians felt that *"cholera is water"* meaning that contaminated water reservoirs and water scarcity were the primary factor contributing to both transmission and limited handwashing practices. Some participants also explained that the prioritisation of water and

sanitation infrastructure in proposals was because the *"technical side is the easy part"* and because it is more costly.

Resource mobilisation

Given that donors hold funding and shape funding calls and timelines, they were recognised to have substantial indirect influence on the content and quality of programming:

> *"The donors heavily influence our strategy in the sense that there is never enough money, so we have to kind of answer to them a bit. Unfortunately, we are not in a very good negotiating position yet to turn around and say 'no we don't want to do this', or to refuse money."* (INGO, Iraq)

> *"The funny thing about this emergency side of things is that often it is the grants and the donors that are the time constraint rather than the actual emergency. They could be the key to forming a good program... but they don't allow time to actually sit and plan out a good intervention."* (INGO, Iraq)

Participants generally felt that hygiene was underfunded in relation to other aspects of WASH and explained that this was because organisations and donors typically underestimated the cost of doing hygiene promotion well:

> *"One thing that is really important to me is to push people to include more budget for hygiene promotion. Because they [donors] want us to do a lot of things regarding hygiene promotion, huge targets, but all I have is a team of 9 persons and $5000 USD for the whole year. If you want to do nice things, or innovative things then it needs to be properly taken into account in the budget – it's an often forgotten area."* (INGO, Iraq)

Others explained that when donors asked them to reduce the budget of their WASH programme, hygiene was typically where financial cuts were made.

Hygiene programming was also affected by broader patterns in humanitarian funding. For example, participants remarked that humanitarian funding often came all at once or not at all, as it was so closely tied to the initiation of a crisis event or donor perception of the severity of the crisis. In Iraq people mentioned that the 'humanitarian circus' quickly moved from one conflict to the next in a way that rarely mirrored the needs of the population. In DRC, multiple participants described receiving emergency funding for short term soap distributions or water chlorination programmes during the peak of the cholera outbreak but felt that the money would have been better spent on building safe and effective water systems to prevent the next outbreak. Some organisations had started to exploit patterns in emergency funding by framing all their work within an 'emergency' discourse, even though cholera outbreaks in DRC are relatively predictable (i.e. they happen annually):

> *"You find only funding for emergency, so everybody is putting this in their presentations and everyone's communicating saying it's an 'emergency', because this is how you get funds."* (INGO, DRC)

Most NNGOs reported that they rarely received funding directly from bilateral or multilateral donors, but rather via UN Agencies or INGO partners who sub-contracted a lot of the hygiene activities to them. Commonly they felt that this was because international actors didn't trust their financial management or technical skills. This meant that NNGO actors were often unable to be as responsive as they could be at the outset of a crisis. The unpredictability of finances also made it hard for them to undertake transitional or development work:

> "*Most international organizations intervene in emergences only. It is a problem, they just come when there is an emergency and they say we are there ready to support you. But we are a national society, here all the time, and when there is no emergency, we cannot see any help*" (NNGO, DRC)

A representative from the Government in DRC expressed frustration at the funding of the humanitarian system, explaining that they had hoped that the establishment of a National Cholera Roadmap would make funding around hygiene more aligned to government plans. However humanitarian actors continued to secure funding directly with donors and often only came to the Government when grants had been awarded. With a lack of Government funds to support hygiene, the Government often just agreed to whatever organisations proposed - a situation that the participant compared to being "*like a lion if it is hungry - at that point we take what we can get*".

Programme implementation and adaptation

There was a relatively high level of consistency in the types of interventions delivered across countries and organisations. When asked about specific activities, participants typically described the delivery modalities rather than the content of their programming. Participants explained that hygiene interventions commonly included household-level visits, community meetings, the development of posters or other communication materials, collaboration with women's groups, or the distribution of hygiene kits. However, when asked what happened at household visits, for example, descriptions were more vague, with participants just saying that their staff '*sensitised*' or '*mobilised*' community members to adopt handwashing practice. None of the participants were able to articulate a theory of change for how they planned to influence hygiene behaviour.

Among INGO staff who had experience working across multiple crisis-affected contexts, there was a belief that hygiene programmes were rarely innovative. One participant explained that innovation is curtailed by the nature of crises which don't lend themselves to programmatic risk-taking:

> *"People are so worried about the potential risk of varying from these traditional approaches because they think they are just so involved in the business of saving lives that they don't have time to do any things better and more creatively, even if that might actually save more lives!...But I think part of the job is convincing and sensitising people within the sector that actually we can do something much more fine-tuned to improve hygiene programs. It doesn't require reinventing the wheel but just taking time to understand." (INGO, Iraq)*

Several participants felt that hygiene programmes were likely to be more effective if programmes were of a longer duration and if frontline staff regularly engaged with communities so that they could build meaningful relationships. At the same time others cautioned that just repeating messages through the same modality is likely to cause crisis-affected populations to disengage from hygiene promotion programmes:

> "*If it's just a one off first of all, you won't receive the impact so it is hard to measure, but if people know that we are coming back time to time as you follow up…then we act as like as social workers, we are not just NGO guys who distribute stuff, they will talk to us, know us by name and will be very friendly. Then you kind of lose this barrier of humanitarian worker and IDP, you become more similar.*"
> (INGO in Iraq)

> *"You have to change the way that you are transferring the message…I mean it's not really nice to go and make tent to tent visits on a daily basis, you shouldn't*

have to bother them, you have to find a new methodology, you have to make it something nice for the people. Otherwise if you are not doing a good program I'm sure they will get bored and they will tell you please we've heard a lot and we know how to practice, you just continue to teach us." (NNGO in Iraq)

Community engagement was mentioned frequently by participants as something that should happen throughout hygiene programming. However, there were inconsistent conceptualisations of what community engagement should be. For some, community engagement was primarily something that was considered at the assessment stage, for others it meant working in close collaboration with local governments or civil society organisations. Many actors suggested that community engagement was designed to encourage community ownership in relation to hygiene behaviour and the management of handwashing facilities. This was seen as important because of the short duration of most emergency hygiene programmes:

"We are preparing the community to take charge because we know that a day would come when the project will stop... So, only working with [INGO] staff while we know that one day [our organisation] will close its offices…could not be wise." (INGO, DRC)

Some organisations explained that community ownership was built through repeated trainings while others designed their programmes in such a way that there was an expectation that crisis-affected populations would be willing to 'volunteer' to share hygiene promotion messages or to be part of 'village committees' which would be involved in building or overseeing operation and maintenance of handwashing facilities. Some organisations paid community members small stipends for this work while others did not.

The majority of the participating organisations indicated that there were no formal processes informing programmatic adaptation and contextualisation. Participants explained that

contextualisation typically involved translating generic communication materials into local languages, adjusting images so that they looked more like people in the communities where they were working, changing the delivery channels or adjusting the contents of hygiene kits to include locally acceptable products. One participant explained that this type of contextualisation of hygiene programmes was too superficial:

> *"You have seen the [standard] tools which are made for hygiene promotion, they are a package, but to be honest they should always be adapted to a context. I have seen those tools replicated for the last 4 years in all the places…I once spent 3 days with other WASH fellows revising them but it was too much 'money for nothing', just to say oh the colour is not good, the hat people wear here is different… It is more important to really go in deep with communities and understand what is working or not – not just adapting those hygiene promotion tools for the sake of adapting the tools."* (INGO, Iraq).

Programmatic adaptation relied heavily on the prior experiences of WASH staff or the views of implementation staff about the communities where they worked. However, biases within these personal perspectives could sometimes compromise programme decision-making:

> *"When I came in, I had African-based views of what hygiene promotion should look like .... And this is not Africa and so I think people are kind of offended. I have heard these kind of comments from them – 'this is a rich country we don't need anyone to come and, you know, do these kinds of approaches'."* (INGO, Iraq).

The ability for programme implementers to adapt and address changing needs was often contingent on relationships with donors, the duration of the project, organisational priorities and the capacities of frontline staff:

"I think it depends on the time you have to implement your project. If you have a 1 year project then normally the donors are kind of flexible so you can kind of adapt your project…But if you have a 3 month project which is what normally happens in emergency areas, at most 6 months, then it is difficult to adapt." (INGO, Iraq).

Longer-term programmes, which did exist in DRC, were more able to conduct thorough initial assessments (post the grant being awarded), develop constructive two-way communication with donors and adapt to changing circumstances:

"For our [long-term project] we are saying that the project started in March, but the month of March and the month of April were only oriented towards doing the assessments and you understand that the assessments are accompanied by a report and the report that will be discussed with the donor, and all that follows is a discussion about how the programme will be designed to reflect the things we have learned." (INGO, DRC)

"If you have an intervention which is an ongoing intervention with competent trained staff, then there is no problem, you can react to a new cholera outbreak, for example. And it is likely that the quality and the speed of the interventions will be much better." (INGO, DRC)

Participants in both countries explained that hygiene programmes were often curtailed by security issues, which delayed humanitarian staff from gaining access to populations. Population movement was cited as a challenge in both countries. In DRC this was because target populations were often only displaced temporarily while others had been IDPs for many years. In Iraq the inability for some IDPs to leave camps limited the programming options available to staff. For example, they had to distribute hygiene items rather than use cash or voucher systems to facilitate access through

markets. Finally, perceptions towards displaced people by government authorities were raised as programmatic challenges in both countries, with humanitarians explaining that there was sometimes resistance towards providing high quality hygiene or WASH infrastructure to populations as authorities felt this would discourage people from returning home.

Coordination, information management, capacity and sustainability

Generally, participants viewed coordination platforms (like the national and sub-national WASH clusters) positively and felt that this had led to the gradual improvement of programmatic quality and the alignment of humanitarian responses. Specifically, people thought that the cluster system played a key role in mapping what actors were doing and where, minimising duplication, resolving common challenges, mobilising resources, and promoting regular communication between organisations involved in hygiene promotion. Factors that contributed to the success of coordination platforms included the involvement of government authorities, an agreed hygiene or WASH plan for organisations to align their work to, and the skills of the person leading the coordination mechanism.

Coordination challenges related to harmonisation, participation, and sustainability. Some participants explained that coordination platforms encouraged an over-reliance on standardised hygiene approaches. While these individuals saw value in the harmonisation of hygiene messages and activities across organisations, lengthy central approval processes often delayed action and curtailed innovation and contextual adaptation within programmes. Other participants explained that coordination was often limited by the fact that some response actors did not regularly participate, share their programmatic information or contribute to joint decision-making. Larger INGOs were often seen to "*do whatever they want*" because of their financing and programmatic influence.

Some participants felt that the establishment of WASH clusters had the potential to contribute to response programmes which were built upon prior collective learning. However, mechanisms to support knowledge management between actors were often lacking and hampered by high levels of staff turn-over. This commonly resulted in a short-term institutional memory loss.

> *"Like the WASH cluster has been active since 2014 so they must have some collective experience…but it's quite vague on where to find this."* (INGO in Iraq)

Some participants explained that larger INGOs were in a stronger position to support sector learning since there are often staff at a headquarters level responsible for knowledge management and sharing lessons learned from previous projects.

Participants highlighted that there was often a skills gap around hygiene programming. Some people explained that this may be because the WASH sector has historically been dominated by engineers whose training and interest in doing 'soft' hygiene promotion programming is likely to be limited:

> *"I think that we have very many well qualified WASH staff but the vast majority of them are qualified as engineers and I think trying to get them to understand about hygiene is complicated, they don't really see it as important. This is why hygiene had been side-lined for so long."* (INGO in Iraq).

The majority of hygiene promotion staff currently develop their skills on the job. However, many organisations reported that humanitarian crises are not an ideal learning environment, and that meaningful capacity building is not possible due to the short duration of programmes. Several participants suggested that the skills required for hygiene promotion are hard to teach and that hygiene promotion requires people with a certain type of personality to make programmes successful:

"I think hygiene promotion needs creativity because when you design a session, you need some people with charisma or kind of leadership. Those are real skills, but it is not something you can learn from the book. If you find those people, yeah, it's very important to keep them." (INGO in Iraq)

Others explained that there are few training programmes for hygiene promoters and no recognised qualifications or pathway into the sector.

"It's a funny bizarre sector, people dip in and dip out and come from all different backgrounds and some people invest in themselves to get into the sector and some people just kind of swing by and then move on to something else… If you want hygiene promotors who really understand the purpose of the job then there needs to be some sort of investment in the sector in the human resources side….we need to improve the overall professionalization of hygiene so that people treat it as a career." (INGO in Iraq)

Representatives from NNGOs were more likely to report skills gaps. This was because they were often tasked with conducting the bulk of hygiene promotion activities when working in partnership with larger INGOs but often felt ill equipped to carry this out:

"We tell them that we will need like an expert to advise us and do what is required. Because it's like we are not academic people, we didn't study hygiene promotion and it requires a good deal of experience... Instead, they leave the behaviour part to us as the local NGOs and that is why a lot of NGOs are just transferring messages tent to tent. But people have trauma and it's not correct to just put some promotors in a camp and get them to say wash your hands - no!" (NNGO in Iraq)

In thinking about sustainability, participants explained that hygiene programming in crises had to be thought of in phases and that sustainable solutions were not feasible to consider in the acute stage of the response. However, many recognised that sustained or sufficient funding beyond the acute phase of the crisis was rare, meaning that, practically, few sustainable actions could be considered. The sustainability of hygiene programming emerged as a greater concern in DRC given that short-term hygiene promotion initiatives had been going on for 25 years since the first cholera outbreak in 1994:

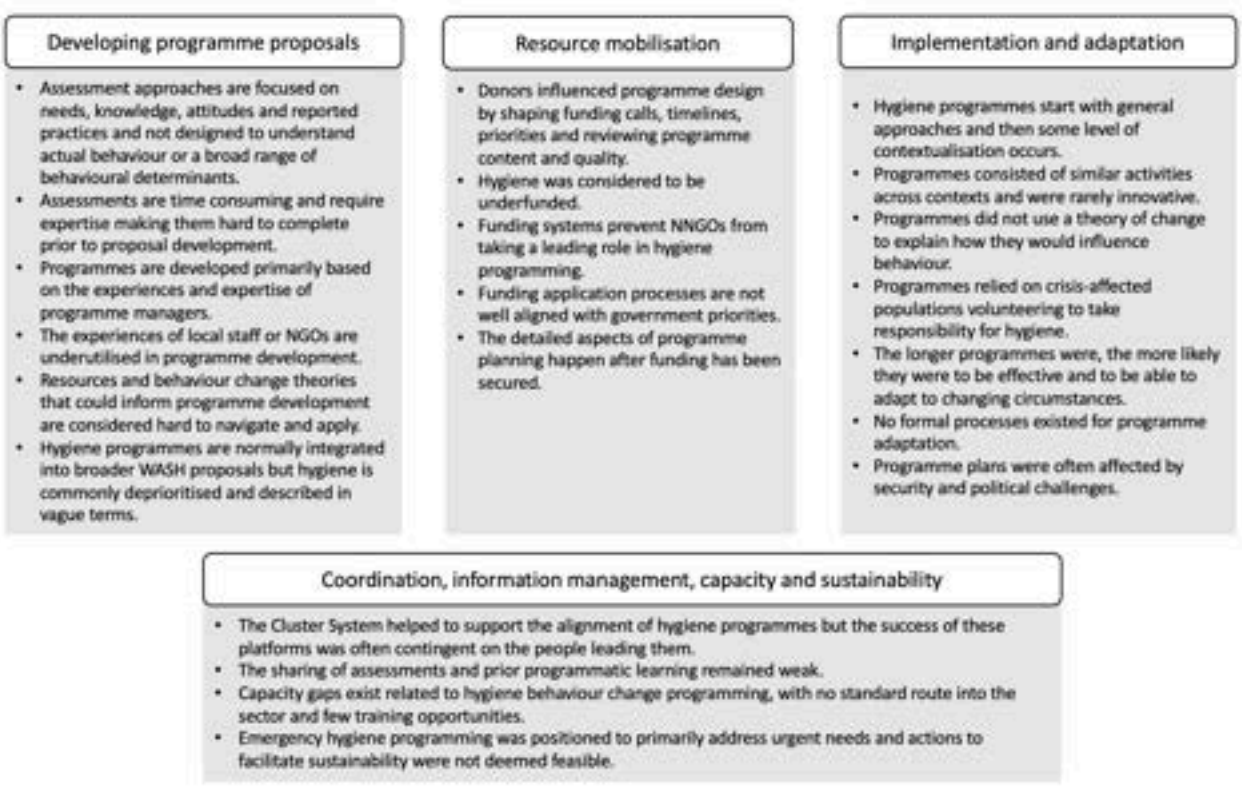
> *"The particularity of our country is that we are in a situation where emergencies do not end… it is well known that every year during the dry season there are always problems of cholera…and yet each time that there are cases the humanitarian community mobilizes… It should be a chain, so we start from the emergency, and then there follows a transition for early recovery, and then we could go now for development, but our context does not allow it… then the biggest problem is that there are perhaps structural causes that should not normally be part of the humanitarian mandate but should be regulated by the authorities." (UN Agency, DRC)*

Several organisations in DRC explained that they had set up emergency and development teams within their structures to better bridge this divide. One organisation mentioned that they had focused on building durable handwashing infrastructure in the hope that this would have lasting benefits beyond the programme. In both Iraq and DRC most participants expressed a desire to align their work more closely with government or other sustainable community structures. This remained a priority even though many people described how challenging this was or that intensive efforts to do this to date had had limited success. Some actors had greater success when building relationships with district level government representatives rather than provincial or national as they were more aware of localised concerns.

Discussion

Participants in our study were self-reflective about the work of their organisations and openly critiqued common approaches to hygiene promotion and behaviour change in the WASH sector. It was clear from our interviews that humanitarian participants cared about the populations they served and aspired to implement hygiene programmes that were consistent with sector guidelines, engaged communities in participatory programming, strengthened local capacities and community ownership, and operated in collaboration with government and other response partners. Many were also aware of more 'ideal' or systematic processes of programme design but in practice, struggled to apply these processes or behavioural theories to crisis-affected settings. This led to frustration among humanitarian staff and programmes that were perceived to have a limited impact on behaviour. Figure 1 provides a summary of the research findings across each of the stages of programme design and delivery. These findings are generally consistent with prior work on this topic by Vujcic et al [4] and Czerniewska and White [5].

Figure 3: Research findings mapped across the phases of programme design and delivery



The importance of the pre-implementation design phase of programming

While many aspects of systematic programme design processes are compromised in humanitarian settings, our work identified that the pre-implementation, design-focused phase of programming (which may range from a matter of days to about a month) is the period which has the potential to most substantially shape the content and quality of programming. Our findings suggest that this programme design phase and the process of proposal development could be strengthened by the following types of initiatives:

- Developing rapid assessment tools which explore a broad array of hygiene behavioural determinants and then developing staff capacities to utilise these tools so that they can inform programming.

- Developing processes which make it easier for humanitarians to analyse behavioural assessment data (particularly qualitative data) and translate these into contextualised program design strategies.
- Effectively communicating behavioural theory or evidence-based hygiene promotion approaches to humanitarians in such a way that this information can be accessed, navigated, adapted, and applied in crises.
- Developing processes which facilitate the involvement of multiple actors in proposal development and promote equal and transparent partnerships between donors, UN agencies, INGOs, and NNGOs.
- Establishing funding mechanisms which encourage phased, adaptive, and sustainable programming.
- Research and applied tools which allow humanitarians to better estimate the realistic costs of effective hygiene programming.
- Capacity mapping and strengthening related to hygiene behaviour change.

Consistency of findings across study settings

Despite DRC and Iraq experiencing different types of crises, and being different geographical and cultural contexts, the constraints humanitarians faced when designing programmes, and the way they made decisions within these settings, were remarkably similar. The challenges reported may reflect the broader constraints of working within the humanitarian system and may therefore be true of other response initiatives, including other aspects of humanitarian WASH programming or other behavioural interventions in crisis-affected settings [422]. The similarities between processes and decision-making in both contexts may also explain why the nature of hygiene programming in both locations was similar - with a heavy focus on health education and the distribution of hygiene products and infrastructure. Knowledge about handwashing and the creation of an enabling environment are likely to be key to facilitating behaviour change but these components alone are likely to be insufficient [11, 189]. Across both countries there were commonalities in the discourse

and framings chosen by participants which serve to perpetuate certain types of action. Implicitly, hygiene programming (alongside other aspects of WASH programming) was constructed by those within the sector as an inherently good public health interventions that could be implemented without detailed engagement with broader socio-political realities, and with minimal concern for unintended consequences of programmatic decisions on crisis-affected populations or the state.

Decision-making and the power dynamics that affect programming

The majority of decision-making related to programme design occurred at the micro-level and was influenced by the internal hierarchies of humanitarian organisations. Specifically, nationally-based, foreign WASH coordinators appear to be the dominant force in shaping hygiene related programmatic decisions. Programme proposals are developed with little input from other local or regional stakeholders. Many of these individuals in our study recognised that their approaches to hygiene programme decision-making were biased and were not as evidence-based or contextualised as they would have liked, but felt that more consultative or analytical decision-making was not feasible in crises. As such the majority of hygiene-related programmatic decisions are currently being made using a 'naturalistic approach' which draws on the 'embodied tacit knowledge' of these senior WASH staff [436, 437]. An over-reliance on individual tacit knowledge has been acknowledged as a widespread challenge in the humanitarian sector due to high levels of staff turn-over, a tendency to approach every crisis as unique, and weak accountability mechanisms associated with fragmented humanitarian power structures [437-439]. Tacit knowledge may be held by both individuals and organisations, but when programmes are designed primarily by senior WASH staff opportunities for organisational or sector-wide learning and change are likely to be missed.

'Meso-level' and 'macro-level' factors also shaped the nature of hygiene programming in these crisis-affected settings and perpetuated this culture of self-reliance among senior WASH staff while also narrowing the scope of how 'expertise' is valued and constructed within the sector. For example, cultural norms within the sector meant that when senior staff identified gaps in their

expertise, they were more likely to google solutions or look 'up the hierarchy' towards senior organisational experts, rather than exploring opportunities to fill knowledge gaps through research among crisis-affected populations or through the engagement of national staff in the programme design process. These 'ways of knowing' prioritise the diffusion of technical expertise from powerholders in the 'Global North' and allow inequitable power dynamics between foreign and national staff and between INGOs and NNGOs to persist [440-442].

Our findings also indicated that NNGOs were well positioned to undertake rapid assessments, shape hygiene proposal development, and implement programmes. However, inherent biases within the humanitarian environment such as the lack of sustained funding, the demands of funding calls, and the assumption that capacity strengthening is beyond the scope of humanitarian programming, prevented NNGOs from maximising their potential. Furthermore, relationships between humanitarian actors, and the power dynamics between individual organisations and their donors, created barriers for NNGOs to secure funding (e.g. donors didn't trust the financial and programmatic capacity of NNGOs) or to negotiate for more flexible, contextualised and sustained programming. While some of these challenges have been identified in other sectors [443, 444], our findings suggest that the hygiene sector needs substantial reform to realise the Grand Bargain Commitments which aim to improve the effectiveness and efficiency of humanitarian aid through localisation and investment in capacity strengthening at national levels [426]. The findings of our research indicate that effective reform must pay attention to inter and intra-organisational dynamics, decision-making and knowledge creation because these micro-organisational processes affect macro-level outcomes and determine or limit the roles of national actors in programme design processes [442].

Limitations

Our findings represent the opinions and experiences of humanitarians in just two specific settings and therefore may not be transferrable to all types of crises or across other diverse geographies.

Certain relevant voices were also not fully represented in this research. For example, government actors involved in humanitarian response were contacted to be part of this research in both countries, but only one individual in DRC was able to participate. Given varying engagement in coordination mechanisms, future similar research should consider having a separate process for identifying government stakeholders. Our work could have also been strengthened by including the voices of WASH donors, given their evident influence on hygiene programme design. Understanding the quality, acceptability and effectiveness of hygiene programmes in emergencies should also foreground the views of crisis-affected populations. While not reported here, we conducted complementary in-depth qualitative research with affected populations in both settings [445, 446]. Finally, 75% of our participants were male across the two countries and while this reflected the demographics of the sector, the voices and opinions of female WASH staff are under-represented in this work and merits further exploration.

As mentioned, the first author (SW) who is an academic of British origin, led the interview process in both countries and conducted the analysis. Her 'outsider' status [447] may have affected the way that participants responded to questions and the way results were interpreted given that she was external to both the humanitarian sector and the research locations. This positioning may have also allowed the participants to be more open with their responses [448]. To mitigate the potential biases that this may have brought, research notes were taken daily and preliminary research findings were shared with humanitarian actors at global and national levels.

Conclusion

We found that WASH programme staff faced sector-specific challenges as well as more general constraints associated with operating within the humanitarian system. Consequently, the programme design and decision-making processes adopted by humanitarians in our study were similar across the two settings studied and led to similar types of hygiene promotion activities being delivered. Hygiene behaviour change requires an understanding of the contextual determinants of

behaviour, the use of theory and evidence to inform locally relevant hygiene promotion activities, regular adaptation and intentional efforts to support sustainability. However, the humanitarian imperative to act rapidly [294, 449, 450] undermines the ability for any of these steps to be carried out effectively. Thus, while hygiene programmes in stable settings are increasingly making use of evidence and theory and designing contextualised programmes which are responsive to local circumstances, the humanitarian sector have been struggling to replicate these developments. Improving hygiene programming in crisis-affected settings will require a re-imagining of standard programme design processes so that they can be utilised within the constraints of the humanitarian system. Improved practice will also require a heightened awareness of the habits and norms that have emerged among humanitarians in order to deal with system constraints and time pressures. These unquestioned patterns of behaviour and the standard discourse around programme design may have detrimental effects on programme quality and cause unintended consequences to crisis-affected populations.

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Declarations

Ethics approval and consent to participate

Participants were informed about the study and that their opinions would be anonymised at an individual and organisational level. Written consent was provided by each participant. Ethics permission for the study was provided by the London School of Hygiene and Tropical Medicine (Protocol 13545), the University of Kinshasa's Public Health School (Approval no: 038/2017) and Hawler Medical University.

Consent for publication

Written consent was given for publishing the anonymised study results in a peer reviewed journal.

Availability of Data and Materials

The datasets generated during the current study are not publicly available because even with redaction some deductive disclosure is likely. The dataset is available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors contributions

SW conceptualized the study, secured funding for the study, collected the data and led the analysis and drafted the manuscript. TH was involved in securing funding for the study, supported the logistics of the research, provided validation of the results and revised and edited the manuscript. ACM was involved in data collection and translation, the preliminary analysis, the validation of results, and revising and editing the manuscript. RD and JP provided supervision and reviewed and edited the manuscript.

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Chapter 8: Discussion of findings

8.1 Overview of chapter

In this chapter I draw together the work presented in this thesis, summarise key reflections and findings and discuss their implications. The chapter begins with a discussion of factors that influenced that data collection and interpretation. These factors include the ethical challenges of conducting research in crises, my positionality and that of my research team, and limitations and biases affecting the work. I then summarise the main findings and discuss their methodological and theoretical implications as well as their use in current research and practice and potential future applications.

8.2 Reflections on the ethics of qualitative research in humanitarian crises

As acknowledged in the introductory chapter of this thesis, research with vulnerable populations in crisis-affected contexts is likely to exacerbate the ethical challenges of conducting research [46-51]. In this section I reflect on ethical challenges that arose during the field-based research described chapters 4 to 7 and identify opportunities to strengthen future research practice in humanitarian contexts.

8.2.1 Managing participant discomfort and distress

Literature on humanitarian ethics discusses the potential for all research methods to be distressing, triggering or upsetting in ways not always anticipated by the research team [451, 452]. However, relatively little is written about how to identify distress during research and how to handle it effectively. From the outset we were aware that some of the methods and topics covered when conducting the research in Iraq and DRC had the potential to cause participant distress. In the absence of other available tools to support the management of distress among participants in humanitarian settings, we developed a 'distress planning tool' (see Annex 7). This tool was designed to guide conversations among the research team and encourage each individual to consider what distress may 'look like' (e.g. what body language or verbal cues should they be aware of), how they think they should act in the moment distress is observed (e.g. verbal or physical reactions, pausing or stopping the research process, etc), and what additional support can be provided after the research

if needed (referral to psychological services, protection services, etc). A secondary part of the process also considered what would happen if one of the researchers felt distressed by their experiences during the research. For this part the research team were asked to think about how they might assess their own wellbeing (e.g. what symptoms should they look out for), how they would handle their distress in the moment/s it arose during research (e.g. leaving the space, pausing the research process, etc), and how they would handle this distress in the longer-term (e.g. seeking support from others or their organisation, seeking psychological counselling, etc).

During our research we encountered participants who cried, who gave short responses to certain questions or became reluctant to answer, and participants who seemed to be distracted or who started asking questions about how much longer the process would be. Distress arose more commonly in Iraq than in DRC, most likely due to the nature of the recent conflict in Iraq. Whilst the 'distress planning' conversations were hugely beneficial for preparing us for these situations, we realised each situation necessitated a different response based on individual participant preferences. For example, prior to the research we had assumed that if a participant cried this was a clear signal of distress and that the research method should be immediately stopped. However, on every occasion where this happened the participant insisted that they wanted the process to continue and explained that talking about their upsetting experiences was helpful. Taking the lead from the participant, we sometimes paused the recording and just allowed the participant to share what they wanted to share. In other cases, we proceeded with the method after a short break. On a personal level I found these research related decisions easier to make than decisions about how I should respond physically or verbally when someone seemed upset. It often felt that these situations necessitated a break from the 'neutral researcher identity' I had assumed and towards a more human response. For example, on some occasions placing my hand on the participant's hand seemed natural and comforting, in other instances this would have been entirely inappropriate and silent listening was all I felt I could do. I was also aware that during moments of participant distress my research assistants were often much better placed to comfort people, given that they could speak to the participant without the barrier of translation and understood the historical context surrounding the atrocities many participants had been through. In Iraq we were fortunate to be able to refer all participants on to a mental health helpline and an NGO providing counselling in the camps. However, such services were lacking in the DRC and so we documented the types of concerns we observed and shared these with humanitarian agencies to take subsequent action.

There is clearly a need for research practitioners, and humanitarian staff, to have more open dialogues about distress arising from their work and interactions with communities. The distress

planning tool was one way of starting these conversations. The tool has now been adopted by several other organisations and I have used it in subsequent research in humanitarian crises.

8.2.2 Photography

Much has been written about the visual representation of the 'suffering' of crisis-affected populations [453-457]. The ethical debates on this subject have tended to focus on photographs which have been used by media or humanitarian agencies to portray certain narratives of crises. In contrast, relatively little has been written about the ethics associated with the use of photography as part of research in humanitarian settings.

During research in Iraq and DRC we encountered different participant expectations and attitudes towards photography which appeared to be shaped by cultural norms, recent history, and prior exposure to photography during crises (including that done by media or humanitarian agencies). For example, in Iraq many women felt that it was culturally unacceptable to be photographed. Men in Iraq were also sometimes hesitant about photography because they were concerned that photos may somehow link them with Da'ish or aspects of the conflict that they didn't want to be associated with. However, in Iraq and in DRC a large number of participants welcomed the idea of photography and were keen to ensure they were identifiable within photos because they wanted their voices and testimonies to be on record. In DRC, in particular, this raised an additional issue as participants assumed, based on their past experiences with the aid sector, that if they were photographed, they may be more likely to benefit from humanitarian programmes.

From the outset, all participants in this research had the option to decide whether or not photography could be used during data collection. If they agreed to photography, they were also given options about how the images could be used within the research and to share the findings. However, to address the ethical concerns that arose within our research we added three components to our information and consent process. The first was that we asked people whether they would prefer for photos to not feature their face. Many people in Iraq, for example, were happy to be photographed from the neck down or from the rear so they were not identifiable. The second was that we went through all the photos with the participant at the end of the data collection and checked whether they were ok with us using these or whether they would prefer any or all of the images to be deleted. This process was similar to the process recommended by Murray and Nash [458]. This was important because if participants have not taken part in similar research before, it may have been hard for them to envisage what their participation would be like based only on the information and consent process. Checking photos at the end allowed participants to confirm

consent with a much richer understanding. The third adaptation was that we started using aids to explain how the photographs may be used. This included having examples available of where photographs had been used as part of research summaries online, on teaching slides or in research reports. This was particularly useful in DRC where participants were commonly less media literate and would have otherwise found it challenging to understand what they were agreeing to. While none of these ethical adaptations were requested by the ethics review boards that this research was approved by, we feel they increased understanding, reduced harm and preserved participant dignity [459] and therefore should be recommended for similar research.

8.2.3 The ethics of research scope

Research priorities in humanitarian settings are rarely informed by the opinions of crisis-affected populations, although there is now a trend towards this [12]. Often it is assumed that undertaking research because there is an evidence gap or because it is identified as a need by humanitarian actors is sufficient. However, one unanticipated ethical issue that arose during our research related to the scope and topic of the research itself. While handwashing behaviour was a key public health priority for the humanitarian sector, and has historically been under-researched, it was not problematised or seen as a priority concern among the populations in either of the countries where I worked. This was initially noted when we were conducting the Barrier Analysis in Iraq, which only asks questions about handwashing. Frequently people gave short answers to these questions and then found ways to share their views on other topics that they felt were more pressing. It was often a difficult battle for the research assistants to bring participants back to focusing on handwashing. Even when conducting the qualitative methods, which were intentionally broader, people often wanted to share more about their experiences or other priorities. Added to this, most research participants in both sites had no prior experience with researchers but had experience with journalists or with humanitarian staff conducting needs assessments. In both cases, crisis-affected populations knew that these interactions were often pivotal in raising awareness about their predicament and drawing attention to their most pressing needs which could then ideally be addressed by humanitarian agencies. Even though our information and consent process made clear the intention of our research, it was understandable that participants tried to use our discussions as a way to flag broader issues. On several occasions, at the end of the interviews, participants asked to me to promise to share their story. While I hope the papers in this thesis reflect their situation and the factors that drive handwashing behaviour, I can't help but think that this relatively narrow version of their stories does not fulfil their broader requests for me to bear witness to their circumstances and advocate on their behalf. These reflections do not necessarily indicate that

researchers working in humanitarian contexts should act differently, but rather that they are aware of how misalignments of priorities and focus may create different expectations.

8.2.4 Aligning research timelines with humanitarian timelines

While many humanitarian agencies are willing to collaborate with research institutions during humanitarian crises, a common frustration is that research ethics approvals, research activities and methods, and the analysis of findings rarely align in such a way that findings can influence practice in the setting where data is collected [48, 49, 460].

I was mindful of this going into the research and since my work aimed to improve humanitarian WASH programme design, I felt it was important that preliminary findings were shared shortly after data collection so they could potentially inform programmatic adaptations. This was done by holding three half-day research dissemination events and inviting key stakeholders working for local NGOs, international NGOs, UN agencies, donors, regional government, and community leaders. The first dissemination meeting took place in Dohuk in the Kurdistan Region of Iraq and was attended by 71 representatives from 31 different humanitarian agencies. The second took place in Goma in the Eastern part of DRC and was attended by 45 participants from 26 different agencies. The final workshop was held in Kinshassa in DRC and had 43 participants attending from 26 different agencies. My research team and I presented the key findings and provided some practical suggestions for how they could be incorporated into programming. The agenda also included a section on the research methods whereby stations were set up around the room and attendees were able to see demonstrations of the methods and interact with the tools. This was done with the aim of encouraging people to diversify the way that behaviour was assessed in the future. A written report summarising the findings were shared after the meetings in English, Arabic or French.

This rapid sharing of results was facilitated by a process of iterative and collaborative meaning-making which was conducted throughout the data collection period [461, 462]. At a practical level this involved the research team meeting at the end of each day to reflect and discuss what had been learned that day and how that contributed to our emerging understanding of behavioural determinants. This process valued the contextually rich, embodied knowledge of my research team and allowed for discussions on positionality and reflexivity [462]. These discussions were documented through field notes [463] and then visually mapped as time went on. This process made it feasible to share preliminary findings with limited risks of misrepresenting the data prior to the in-depth qualitative analysis. Such approaches could be usefully replicated in other humanitarian settings to improve the timeliness and actionability of research.

8.3 Reflections on researcher positionality and placement and its implications for the interpretation of findings

Crisis-affected contexts are also likely to amplify the consequences - good and bad - of researcher positionality [464-467]. In the introductory chapter I reflected on my own positionality and how I was situated in relation to the research topic. Here I reflect on how my positionality, and that of my research teams, appeared to affect the research in practice.

8.3.1 The placement of my identity as linked to other foreigners and humanitarians

Researcher 'placement' by participants can have a substantial effect on the motivations for research participation and the way that people respond to questions [468]. However, it is often hard to access perceptions about the way participants view researchers. Therefore, my understanding is constructed from interactions with non-participants within the research site, comments and questions from participants (particularly during the information and consent stage as this was when we introduced ourselves and the research), and reflective discussions between the research team.

As we walked through the research site in Eastern DRC it was common for children to yell out one of two labels to get my attention. The first, unsurprisingly, was 'Muzungu' the Swahili word for foreigner. The other term, which I had not expected, was 'MONUSCO' - the French acronym for the United Nations Organization Stabilization Mission in the Democratic Republic of the Congo or 'Blue Helmets' as they are sometimes known. MONUSCO did have a heavy presence in the area, and like us they moved around the area in large white vehicles. However, MONUSO staff are often armed and are generally not seen favourably by local populations due to the inadequacy of what they have achieved in the region and recent cases of sexual exploitation and abuse [469-471]. While it was understandable that these young people who were not directly involved in my research, would link my identity with the other 'source of foreigners' in the region, this highlighted to me the stark contrast between these perceived identities and the 'type of foreigner' I wanted to be seen as.

Secondly while working in villages and camps in Iraq and DRC all members of our research team had to wear vests with ACF logos printed boldly on both sides. This was a non-negotiable requirement, a measure of 'soft-security' given the positive reputation ACF had in both regions. However, these oversize, khaki vests are the tell-tale uniform of the 'humanitarian aid worker', something we were not. In both countries, our 'humanitarian branding' seemed to affect our research. When we asked for consent from participants, we clearly explained our role and that their choice about whether to participate would not affect their access to aid from ACF or other organisations. We also explained

that there would be no direct benefit to them if they took part. However, we only had two people decline to participate out of 265 people across both research sites. This low rate of decline left our research team wondering whether the verbal explanation of the research was at odds with the message we were symbolically conveying through our dress. Research has shown that generally people do participate in research for altruistic reasons but that some people, particularly those who are already vulnerable, may find it hard to say no despite understanding the voluntary nature of participation [472-474]. Our contested placement was also made apparent at the end of interviews when occasionally participants would, without solicitation, provide feedback on humanitarian interventions, request support for their specific needs or ask us to advocate on their behalf. Their feedback was noted and shared with relevant actors who could take appropriate action. An alternative explanation for these requests of support may be that the accountability mechanisms in both countries were relatively weak [475, 476] and as such populations capitalised on this opportunity to be heard.

Within the research team we regularly discussed how participant placement of our research team may affect participant responses. In DRC one of the research assistants explained that if another research team had conducted the same research in this site, they probably would have arrived at similar results. He explained that this was because local populations were savvy – aware of how the humanitarian system operated and familiar with data collection. As such they knew how to craft their narratives in such a way that would be of greatest benefit to them. He explained that these were the calculations you have to make when you live in poverty. This sentiment highlights that this research may have been subject to forms of sponsor bias whereby participants respond in a certain way because of their awareness of the NGO or donor affiliated with the study [477]. It also suggests that the research is likely to have been affected by some degree of social desirability bias whereby participants managed the impressions they created about their realities. Participants may have done this solely based on what they thought we wanted from the research, but may have considered that the strategic re-telling of certain narratives may serve to benefit them and their families in the longer term [478, 479].

The line between being viewed as a researcher rather than a humanitarian was perhaps most ambiguous while conducting interviews with humanitarians within the WASH sector. This was because in both Iraq and DRC a large proportion of humanitarian staff were international, so I was not obviously a ‘foreigner’ in this space. My positioning was complicated by the fact that throughout the five months of data collection I was living in a guesthouse for ACF staff (although none of my housemates were research participants) and spending my free time with humanitarians. My

attendance as an observer, during regular WASH Cluster meetings also may have changed the way people viewed me. These informal interactions which took place within the relatively small humanitarian social and professional scenes, may have made research participants feel that I was more like them - that although different, I was 'almost' a humanitarian, and in many cases also a friend. As documented in other studies, researchers often operate in 'the space inbetween' cultural worlds, and this may explain the frankness with which humanitarian participants spoke about decision-making and hygiene programming during interviews [480-482]. The informal social and professional interactions I had with humanitarians also provided a broader understanding of the nature of work within the sector which undoubtedly affected my interpretation of findings.

8.3.2 On being the outsider

In both locations, my 'outsider status' was always going to be immediately noticeable when working in communities due to my physical appearance. Previous qualitative research has acknowledged that there can be both benefits and limitations of this outsider positioning [448, 483]. For example, outsiders may be viewed as neutral actors who are unaligned to local socio-political divisions. They may also be forgiven for being curious about things they are unfamiliar with, allowing them to ask taboo questions [484-486]. Given my prior experiences with researching hygiene behaviour I was also more able to objectively identify which aspects of behaviour seemed unique to the contexts and which aspects were consistent with behavioural patterns that I had experienced in other settings or that were documented in the literature.

To explore the potential effect of my outsider positioning on the research I regularly discussed this with the research team during daily reflection sessions and captured the opinions of the research staff in my research notes. One of the research team in Iraq explained that my presence may have added greater legitimacy to the research. She explained that people would think that the research must be important because I have travelled all the way from the UK to conduct it. Similarly in DRC my research team thought that the 'Muzungu-affect' may have changed the way communities perceived and responded to us. A white person walking through the community and spending time in households caused such a stir that this may have increased participation in the research. The team in Iraq felt that my outsider status gave us the ability to ask questions that were more culturally sensitive, or which would seem silly for a local person to ask. However, they also expected that I may struggle to fully grasp the responses of some participants because meaning-making was so embedded in language, nuances and culture.

Where appropriate (and based on the guidance of my local colleagues) I attempted to minimise the boundaries between my outsider status and the local culture. For example, in some of the camps and villages in Iraq I wore a hijab during the data collection. This was intended to be a gesture of respect and humility rather than an attempt to blend in. Participants often smirked when they first noticed me in the hijab, but ultimately this was appreciated. For example, one village leader initially said it was unnecessary for me to wear a hijab, but then added that it was a nice gesture as it demonstrated that I embrace their culture. Small gestures like these seem to have helped create a bridge between our cultural worlds.

I also led the analysis and interpretation of findings, and it is here that my outsider positioning may have been more limiting, perhaps prejudicing me towards certain conclusions and missing linguistic and cultural nuances within the data [487, 488]. To minimise the extent of this bias, the research assistants reviewed coding matrices and validated patterns I was finding.

8.3.3 Degrees of difference among 'insider' members of the research team

I went into my research intending to hire 'local' research assistants – 'insiders' who would share key aspects of culture and identity with our research population. However, there are a range of reasons why hiring 'locals' can create challenges when conducting research in humanitarian crises. Firstly, crisis-affected populations are often not allowed to work and in some settings are not able to leave their camp (as was the case in one of my research settings in Iraq). Secondly IDPs or refugees with good language skills are in high demand among NGOs, who arguably need these individuals much more than researchers do since they are responsible for delivering lifesaving aid and care.

In Iraq, at the time of my research there was also a government policy which mandated that NGOs could only employ Kurdish staff, a decision made in light of rising unemployment and economic fragility in the Kurdish Region of Iraq. While this was a clear example of racial discrimination, it was widely accepted by NGOs given that their ability to operate in the area was contingent on this. When recruiting research assistants, I was therefore subject to these regulations even though I knew that, like all of the aid sector, our research would be focused on working with Arab and Yazidi populations. In some ways my Kurdish research assistants were very similar to our populations. For example, their physical appearance was similar, and they shared the same religion as the Arab population we worked with and the same mother tongue as the Yazidis. Many aspects of social interactions and expressions of politeness were also similar between Kurds, Arabs and Yazidis, but their histories and broader socio-cultural worlds were different.

The fact that members of my research team were not 'true insiders' affected the research in several ways. For example, during regular reflection sessions, the research team often expressed empathy for the difficult experiences Yazidi or Arab research participants had been through under Da'ish. This was because as Kurds they had known persecution and as children had both lived as refugees in Turkey. At points when this empathy was expressed during data collection, it was generally valued by participants. However, at the end of one of our initial interviews my research assistant put her hand on the hand of the older lady who we were interviewing. The research assistant said: *'It will get better, I was displaced once just like you, but time can heal'*. While the older woman did seem to appreciate the gesture, she simply said: *"our experiences are not the same"*.

Additionally, there were barriers for the research team to overcome historical tensions and common stereotypes about the ethnic groups we were working with. For example, Kurdish people and Arabs have a long history of conflict. While the offensive against Da'ish had united them against a common enemy, these decades of conflict, and the cultural assumptions that underpinned them, have not necessarily gone away. Working among Yazidi populations proved equally challenging. Yazidis are a tight-knit community and because of this their culture and religion are commonly misunderstood by Arabs and Kurds. During routine reflections the research team explained that one common belief among Kurdish people is that the more religious a Yazidi person is, the less they are likely to bathe. This results in a common stereotype whereby Kurds believe that Yazidi people are generally more dirty and unhygienic [489, 490]. This rumour has no basis of truth in modern Yazidi culture and whether it has any historical validity is also questionable. Yazidi people know that the Kurdish population view them this way. Therefore, it is likely that pre-existing cultural stereotypes may have affected the way that participants responded to hygiene-related questions and their views of hygiene programming in the camp (as this was also delivered by Kurdish NGO staff). This is likely to have occurred despite the research team trying their best to operate in a non-judgmental way. For example, both of my research assistants mentioned that after they had spent a few days in the Yazidi camp, they had gone home and had conversations with their friends and family about this false belief and had explained that in fact the Yazidis they had been working were extremely hygienic.

In DRC also my team were not 'true insiders'. My research team had all been affected by crises at multiple points in their lives, they had the same religious beliefs and they spoke the same major languages (Swahili and French) as our target population. But they had spent most of their lives in the Eastern capital city of Goma. They were more highly educated, well dressed and had held prior jobs with NGOs, meaning that they had an 'inside view' of the way the humanitarian system worked. The

latter was an advantage when trying to locate the findings from the humanitarian interviews within the broader historical context of aid in the region. However, all of these factors meant that they didn't see the crisis-affected population as being the same as them. This was evident in our reflections at the end of the day. For example, the research assistants often commented, with surprise, on the resilience of the participants and their determination to be neat despite the conditions in which they lived. In both countries the 'semi-insider' status held by my research team created risks for interpreting findings, as has been documented in other qualitative research [491]. Specifically, there was a risk that research assistants would rely on aspects of their socio-cultural familiarity and consequently draw assumptions about less familiar practices based on their own biases, experiences, or beliefs.

Throughout the research I tried to integrate our differing outsider/semi-insider positions through regular reflective sessions and by ensuring all perspectives fed into the process of meaning-making. There is some evidence that research teams comprised of both insiders and outsiders are more able to generate rich findings that are grounded in deep contextual understanding, while also being connected to broader theory and evidence [486, 492].

8.4 Limitations and biases

In addition to the specific limitations described in each of the research papers, and biases that may have existed due to positionality and placement, this section describes some of the overarching factors that may have affected the quality of the research and my interpretation of results.

8.4.1 Validity of findings

The measures taken to improve the validity of this research are described in Table 8.5.1 against the criteria for qualitative research set out by Noble and Smith [493]. This also highlights areas where the quality of this research could have been strengthened. For example, preliminary results were shared with community leaders, camp management representatives and humanitarian WASH sector actors through workshops in both countries. Their feedback helped strengthen and guide the main analysis. However, the results were not shared directly with the crisis-affected populations who participated in this study. While participant validation of research findings, or 'member-checks', are commonly recommended within qualitative research, the process is rarely conducted or described in the literature [494-496]. Questions have also been raised about the ability of member checks to enhance the validity of findings and the ethics of implementing this process in practice [494, 495, 497]. The approach is likely to be most useful if individual case studies are being featured as part of

the research [495]. Given this research focused on general patterns of behaviour and how this could be used to improve programming, we hoped that our process of 'peer-debriefing' with key gatekeepers and humanitarian actors would be sufficient [498].

Double-coding can also enhance the validity of results [496], however the scale and nature of this research (i.e. that it was part of a PhD thesis) meant that double-coding throughout was not possible. For the literature review, 25% of the data was double-coded, with the remainder single-coded given the high inter-rater agreement identified. For the qualitative research, other members of the research team played an active role in meaning-making during the data collection process. At the analysis stage, 20% of the coding matrices were shared with other members of the research team to reach agreement on the interpretation of findings. This proportion was based on feasibility and time availability among other members of the team. All research team members then provided feedback on the final write-up.

During the field-based work we tried to use methods which had been applied previously in other contexts. This provided a greater degree of certainty that the methods were valid ways of measuring the determinants they intended to measure. However, in some cases previously existing methods needed to be substantially adapted to suit my research question and study context. In other cases, the methods that did exist had questionable validity and reliability and so new tools were piloted during this research. An example of this was the assessment of motives. Motives have not been measured consistently across the literature and prior tools had tended to assess general motivations rather than motives related to the target behaviour [9, 80, 499-501]. The tools used to explore motives in Iraq and DRC had not been used before (see section 8.6.2 for more detail on this) and so the validity of both approaches remains uncertain and would benefit from further testing in other settings.

Finally, it would have been possible to conduct additional sub-analysis of the data from the qualitative case studies in order to identity other similarities and differences between participants. For example, additional useful sub-analyses could have focused on differences between more rural and urban regions of the study site in DRC, or on gender differences in both countries. These sub-analyses were not pursued because they were outside the scope of the research objectives. Gender was factored into the sampling and design of the research and some pertinent patterns related to gender were described in the case study papers. It is also hoped that by making the data from these studies available on a public repository [502, 503] others could conduct such sub-analyses in the future.

Table 8.4.1: Measures taken to improve the validity and reliability of the research according to the criteria developed by Noble and Smith [493]

Criteria for validity and reliability in qualitative research	Application to research in this thesis
Accounting for personal biases which may have influenced findings	• Positionality described • Positionality actively reflected on throughout the data collection
Acknowledging biases in sampling	• Purposive selection of research sites and participants described • Limitations associated with sampling described.
Ongoing critical reflection of methods to ensure sufficient depth and relevance of data collection and analysis	• Previously tested methods used where possible • Methods piloted and adapted to local contexts • Daily note-taking during data collection about the strengths and weaknesses of methods
Meticulous record keeping, demonstrating a clear decision trail and ensuring that interpretations of data are consistent and transparent	• All interview or FGD data was recorded, transcribed and translated. • Translations and transcripts cross-checked between researchers. • Observational data was entered into excel spreadsheets and quality checked. • Visual, photographic, or video-based data was summarised and coded. • Notes were taken on a daily basis including summaries of daily research team meetings • All data was eventually fully anonymised and made public.
Establishing a comparison case/seeking out similarities and differences across accounts to ensure different perspectives are represented	• Sites within each country were selected to represent different experiences and different types of exposure to crises. • A description of the characteristics of the sample populations are included. • Common patterns and outlier perspectives are summarised in the analysis. • Sub-analysis based on other participant socio-demographic variables were beyond the scope of this research.
Including rich and thick verbatim descriptions of participants' accounts to support findings	• Quotes included to epitomise key themes and show the diversity of perspectives.
Demonstrating clarity in terms of thought processes during data analysis and subsequent interpretations	• Determinant definitions defined *a priori* for using the BCD framework • Phases on humanitarian programming defined a priori according to the Humanitarian Programme Cycle • Standardised process used for analysing the Barrier Analysis Survey. • All researchers involved in reviewing coding matrices and reviewing the final write up.

	• Double coding used for 25% of the literature review data with a high rate of agreement identified.
Engaging with other researchers to reduce research bias	• All members of the research team present during data collection • Daily meetings held to reflect on findings • Partnerships formed with local universities where possible.
Respondent validation: includes inviting participants to comment on the interview transcript and whether the final themes and concepts created adequately reflect the phenomena being investigated	• Not done directly with participants • Summaries of findings shared with local leaders, camp managers and other humanitarians for validation.
Data triangulation whereby different methods and perspectives help produce a more comprehensive set of findings	• A mix of methods were used triangulation was used where methods explored similar concepts.

8.4.2 Transferability

The transferability of this research was considered during the study design. This was particularly important given that the case studies were not just designed to generate rich insights about the study sites but also to generate 'working hypotheses' [269] about the general patterns of behavioural determinants in crisis-affected contexts. To enhance the transferability of findings the same data collection methods were replicated in two intentionally different types of crises. As described in chapter 2, the selection of these sites was made purposively based on typical characteristics of humanitarian crises and the factors that may affect hygiene behaviour. 'Thick descriptions' of the research sites, which can aid with transferability, [269, 291] were also included in the papers in chapters 5 and 6. Data was also purposively collected from different sites within both countries, such that it encompassed informal and formal camps, and urban and rural villages. The research also included populations with different types of exposure to crises (e.g. recent displacement verses longer term, and direct verses indirect experiences of cholera) and described the ways these different characteristics influenced behaviour. This research is insufficient to account for the full diversity of experiences in crises or to build a complete picture of the determinants of handwashing behaviour in these settings. However, when understood together with previous work on hygiene in these settings [9, 204, 500, 501], it contributes to a richer understanding.

Another factor that complicates the transferability of these findings is that, although the research was done over several months, the studies still representant a 'snapshot in time' within settings that are in constant flux. In contexts like humanitarian crises, which are characterized by this kind of

rapid change, Kacen and Chaitain suggest that ‘it can be difficult to know if an event under study is a "one time" and very local event or if it reflects something more stable in that context or something more universal within human experience’ [504]. Therefore in trying to unpack the transferability of these findings, the focus should not solely be on the specific interactions between behavioural determinants and handwashing in these specific settings, but rather the theoretical, methodological, and practical implications of the findings [504].

8.4.3 The social desirability of handwashing behaviour

Handwashing is recognised to be a socially desirable behaviour. This means people tend to over-report their own behaviour, perceive handwashing to be an injunctive norm and tend to increase their handwashing behaviour in the presence of others [284, 505-509]. As described in the integrative review, this often creates challenges for the measurement of handwashing behaviour and its determinants. To mitigate the effect of social desirability we used unstructured observation during the qualitative research. Observation is recognised as being a more reliable method than self-report for assessing handwashing behaviour [29, 510, 511]. Observation participants were not informed that the study specifically focused on handwashing and so this limited behavioural reactivity and Hawthorne bias that can sometimes be associated with this method [512]. Social desirability bias is also likely to have affected people’s responses and their reflections on their behaviour during other methods. The effects of social desirability can be reduced by asking questions in different ways and using different types of framing [506, 508]. This was considered in the development of the methods.

8.5 Summary of main findings

Having laid out some of the limitations of my research, I now reiterate the relevance of the topic and the key findings of my research.

This thesis presents a set of exploratory research studies which aim to identify opportunities to improve the design of rapid, evidence-based handwashing behaviour change programmes in humanitarian crises and outbreaks. This topic is recognised to be a major operational challenge [4, 7, 12] among humanitarian practitioners because handwashing has the greatest potential to reduce diarrhoeal and respiratory infections, both of which are leading causes of morbidity and mortality during crises [63, 65, 101, 170, 171, 408].

While hygiene promotion has been historically underfunded across all settings [181], a substantial amount of time, capacity and financial resources are channelled into hygiene promotion during emergencies. However, current approaches to hygiene programming, which include the distribution of hygiene kits, the construction of handwashing facilities and hygiene education, are challenging to implement and have limited or short-lived effectiveness [4, 5, 9, 11, 189, 513-515]. Evidence about what works to change hygiene behaviour in stable settings [63, 189] is not easily transferrable to crisis-affected contexts for a number of reasons. Firstly, there is a lack of understanding of the determinants of hygiene behaviour during crises and outbreaks [4, 7]. Secondly, theory-driven processes for hygiene programme design are generally considered to result in more relevant, contextualised programmes which in turn are more likely to result in behavioural change [81, 252, 257, 376]. However, these approaches have all been designed with stable settings in mind [15, 38, 234], and the short time frames and constraints of the humanitarian system make them largely infeasible in these settings.

Starting from a point of imperfect knowledge, I used a multidisciplinary pragmatic approach to develop a deeper understanding of available literature and to inform the research methods. I used existing behaviour change and humanitarian frameworks to structure my exploration of the determinants of hygiene behaviour and hygiene programme design. The subsequent sections describe my findings across the four objectives of this thesis.

Objective 1: To identify, define and categorise the determinants of handwashing behaviour in stable settings, crises and outbreaks and to appraise the quality of this evidence.

To understand the determinants that may influence hygiene behaviour in crises, and how these may differ from factors affecting handwashing behaviour in stable settings, I conducted reviews of the literature. A selective review of literature from cultural anthropology and behavioural science was conducted around factors likely to affect behaviour in crises (chapter 2). This was followed by a systematic review of the determinants of handwashing behaviour in domestic environments (chapter 3), with data sub-analysed according to the availability of evidence in stable settings, humanitarian crisis and outbreaks.

Based on the anthropological and behaviour science literature there were indications that heightened risk perceptions and experiences of trauma and scarcity during crises may have an effect on hygiene behaviour. Crises may also result in changes to routines, leading to disruptions to habitual behaviours such as handwashing. Across the key concepts explored, the literature provided some indications of interventions that may support local coping mechanisms and behavioural

adoption. However, this review was limited by the fact that none of the reviewed literature was specifically focused on hygiene during crises or outbreaks and therefore there is a need for applied research to test these hypotheses.

The systematic literature review identified weaknesses and inconsistencies in the way the determinants of hygiene behaviour were defined and measured. Despite the limitations of the included studies, we were able to identify 50 meta-associations between determinants and handwashing behaviour. These were generally those that were easier to observe and report on such as cognitive factors, socio-demographic characteristics and access to infrastructure. In contrast the quantity and quality of information about the effect of norms, motives, routines, the physical environment and contextual behavioural determinants, were lacking. The review confirmed existing evidence that knowledge about handwashing may have little effect on behaviour [80, 189]. It also found that there is consistent and strong evidence for the positive effect of conveniently located desirable handwashing facilities with soap and water [139]. The review was unable to draw conclusions about whether the determinants of behaviour may differ in crisis or outbreaks due to the limited availability of evidence in these settings, the poor quality of the available studies, and the tendency for these studies to only consider a narrow sub-set of cognitive determinants such as knowledge, risk and fear.

These reviews synthesised available evidence about the determinants of hygiene behaviour, identifying evidence gaps and identifying ways to improve future research on this topic. They highlighted the need for more research on the determinants of handwashing behaviour in crises and outbreaks and that future applied research should use well defined determinant frameworks and valid and reliable methods to holistically map determinants.

Objective 2: To assess the usefulness of current tools for understanding handwashing determinants in humanitarian settings.

Chapter 3 of this thesis presents a Barrier Analysis survey conducted in displacement camps in the Kurdistan Region of Iraq. Reviews of the grey literature and reported practice indicated that while there were many tools available for conducting rapid needs assessments during crises, there were relatively few standardised methods for assessing behavioural determinants [4, 5]. Barrier Analysis Surveys are part of the Designing for Behaviour Change approach, and although these were not designed for use in crises, they have been used in crisis-affected settings and for assessing handwashing behaviour [516]. This standardised approach was therefore applied within the same

research sites as the in-depth qualitative research presented in Chapter 4, allowing for comparability of the process and results.

The Barrier Analysis was able to be conducted in a week by two staff, making it relatively feasible to conduct in camp-based displacement settings. The approach is likely to appeal to humanitarians because it requires a small sample size, encourages qualitative data to be summarised quantitatively and recommends using 'statistically significant' differences between 'doer' and 'non-doer' behaviour to identify the most important determinants for a hygiene programme to address. Unlike other tools it also considered a relatively broad range of determinants including cognitive factors and determinants related to social, physical and contextual environments. However, some of these elements were also limiting factors when applied to a routine behaviour such as handwashing, and in relatively homogenous camp-like settings where there was a high exposure to hygiene promotion activities. Despite there being substantial differences between the two camps, our results identified relatively few statistical differences between doers and non-doers or between the settings. In the first of the two camps, 'non-doers' found it harder to remember to wash their hands and were more likely to wash their hands when they were visibly dirty. They also perceived their vulnerability to diarrhoea to be low and that it was unlikely to cause serious illness. Doers in this camp were more likely to be aware of 'policies' to support handwashing within the camp. In the second camp 'non-doers' were again found to have lower perceived vulnerability to diarrhoea.

According to the standard analysis process for Barrier Analysis Surveys, this would have indicated that there were minimal changes needed to improve handwashing behaviour in these contexts. The focus on 'statistically significant' findings overlooked broader patterns within the qualitative data. This meant that some novel insights about hygiene behaviour in displacement settings could have been missed. For example, the qualitative data indicated that the trauma experienced by populations affected their handwashing behaviour and that displaced populations are more likely to identify behavioural barriers that relate to the external environment and factors beyond their control.

The approach, and some of the specific questions within the survey, were found to be too narrow to fully account for cultural and contextual factors or the impact of the crisis on behaviour. The research also highlighted issues with relying on self-reported or proxy behavioural indicators, and raised questions about the recommended statistical tests and how to interpret contradictory results that may arise. Despite the feasibility of applying Barrier Analysis Surveys to crisis-affected settings, it's narrow pre-defined set of questions and the recommendation to only focus on statistically

significant findings prevented a holistic understanding of the factors that influenced behaviour in these settings. The approach was also less acceptable to crisis-affected populations given that the questions do not acknowledge, or provide opportunity for participants to express, how their handwashing behaviour relates to other priorities, aspects of their lives, or experiences of the crisis. These factors combine to suggest that current standardised tools such as the Barrier Analysis Survey may only provide a partial understanding of behaviour and may therefore be less useful in programme design. Future use of the approach could benefit from being complemented by other qualitative research methods.

Objective 3: To explore the determinants of handwashing behaviour in different types of humanitarian settings.

To address the gaps identified in the literature and the limitations of current approaches for understanding behavioural determinants in crises, two in-depth qualitative case studies were conducted – one in a conflict affected setting (Iraq) and one in a complex emergency experiencing a cholera outbreak (DRC).

Observed behaviour in the two settings challenged my assumptions that handwashing is likely to increase during outbreaks (due to fear of disease) but decrease in large-scale displacement camps (as it becomes more difficult to practice). However, in the two displacement camps in Iraq, new 'hyper-hygienic' norms formed, driven by a heightened perceived risk of disease and a desire to create order, comfort and cleanliness within challenging living environments. In contrast, handwashing behaviour was low in the Iraqi villages that people had returned to after the conflict. This was because damage to infrastructure made practice difficult and a sense of familiarity and safety after returning home decreased risk perception. In DRC participants reported increasing their handwashing but in practice this was not observed because people faced a range of competing priorities, lacked the products, infrastructure and physical spaces to enable behaviour, and viewed cholera as a familiar health threat.

Taken together the findings presented in chapters 4 and 5 suggest that the determinants of handwashing behaviour in crises and outbreaks are not fundamentally different to those in stable settings. However, the relative importance of certain determinants is likely to vary during each crisis or outbreak. The characteristics that appear to affect the variation of behavioural determinants include the type of crisis; the phase of the crisis or outbreak (e.g. acute verses protracted crises or epidemic verses endemic disease threats); the physical and social context; and the broader consequences of the crisis or outbreak on the lives of the affected population. Each of these four

characteristics has a bearing on the determinants that seem to be most influential in driving hygiene behaviour during crises and outbreaks. These include risk perceptions and emic constructions of disease; the prioritisation of time and resources; daily routines; and factors within the behavioural settings where handwashing takes place (such as access to handwashing facilities, water and soap). Some of the other behavioural determinants identified by the BCD framework, such as motives, knowledge, intentions, beliefs, norms, characteristics, and capabilities are still relevant in crisis-affected contexts but appear to play a similar role as in stable settings. For example, hygiene knowledge was high across all the research settings, but this did not appear to drive practice, as was identified in the literature review in chapter 3. Believing that others in your community practice handwashing had a positive association on behaviour in stable settings and appears to operate the same way in crises and outbreaks. In stable settings the literature review found that women and girls were more likely to wash their hands and that children, older people and people with disabilities are more likely to face handwashing barriers and this held true in crises and outbreaks as well. Disgust and the desire to clean hands when visibly dirty, has been found to be a strong motive for handwashing in stable settings and it also proved to be a strong motivator in these studies. The reward of hands feeling soft and nice after handwashing (comfort) also appeared to be a common motivator across all contexts. Figure 8.2 visually depicts the relative importance of handwashing determinants in crises and outbreaks and the effects of the influence of setting characteristics on these determinants.

Figure 8.2: Illustration of the relative importance of handwashing behavioural determinants in crises and outbreaks and how these are affected by the characteristics of the humanitarian setting.

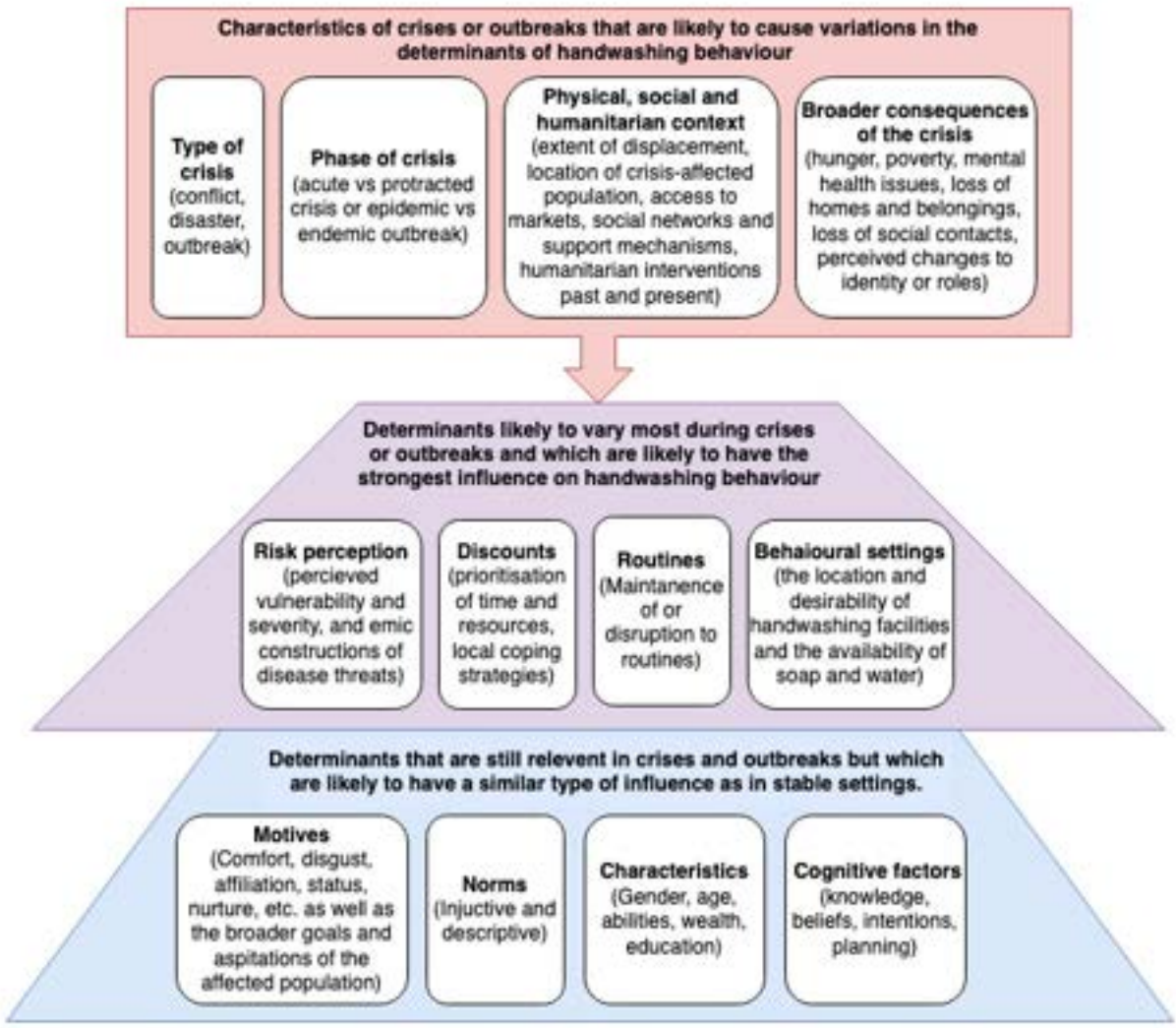

Figure 3 also illustrates that hygiene programmes cannot be designed in isolation or thought of as narrow, neutral interventions detached from the broader consequences and experiences of crises. In particular, the research presented in chapters 3, 4 and 5 highlighted the strong influence of mental health, hunger and poverty on hygiene behaviour and its determinants. Across the two settings, handwashing practices (or the lack there of) were closely linked to the coping strategies adopted by populations to deal with their challenging circumstances. For example, in camp settings in Iraq, handwashing behaviour became part of a set of ordinary but restorative behaviours which enabled participants to assert some degree of control over their microenvironment and attain a moment of comfort amid otherwise uncertain, unhygienic and difficult circumstances. Handwashing also

became a 'social indicator' in these camps – a visible way of demonstrating good values and enabling people to gain acceptance within their new social environments. In contrast in DRC, households without direct exposure to cholera often deprioritised handwashing so that they could deal with a scarcity of resources and focus their attention on other more salient threats to their mortality such as hunger and poverty. Households with recent personal experiences of cholera were more cognisant of the health and socio-economic impacts of the disease and accordingly were often driven to take demonstrative action around handwashing (such as building handwashing facilities) as a way of mitigating the disease threat and shifting this from their focal attention.

Objective 4: To investigate how humanitarian organisations currently design and implement hygiene behaviour change programmes.

An improved understanding of the determinants of handwashing behaviour during crises and outbreaks is insufficient to lead to improved programming in these contexts. Rather, the work undertaken in relation to the last objective aimed to understand decision-making processes affecting hygiene programme design and identify opportunities for improvement.

The grey literature review presented in chapter 2 was novel in that it focused specifically on documents that were used to inform programme design. Accordingly, no general search for documents was undertaken but rather humanitarians within the Global WASH Cluster shared the documents which guide their organisational practices. Unlike resources designed with stable settings in mind, the humanitarian-oriented literature did not mention behavioural theory. It focused primarily on hygiene education and other practical aspects of implementation such as the training of hygiene promoters and the selection of delivery channels. There was limited discussion of how standard humanitarian interventions (such as the provision of hygiene facilities or kits) could contribute to behaviour change. Most documents were also long, making them hard to navigate and use in crisis-affected contexts. Overall, the review found there were few resources which were designed specifically for humanitarians, and which provided a holistic overview of how to assess hygiene behaviour and its determinants and use this to design and deliver programmes. The absence of such resources may prevent capacity strengthening around hygiene and ultimately lead to programmes that are driven by a reliance on past experience and practical concerns, rather than behavioural theory and the local context.

In chapter 5, I presented findings from interviews with humanitarians in Iraq and DRC. The methods were based on similar prior research [4, 5]. However, my study placed a stronger focus on the pre-implementation phase of hygiene programme design, interviewed a greater diversity of

humanitarian actors, and conducted the research across two very different types of humanitarian responses to allow experiences to be compared. Findings were analysed against the Humanitarian Programme Cycle and theories about different types of decision-making.

Despite the differences between the two research contexts, the constraints humanitarians faced when designing hygiene programmes, and the way they made decisions, were remarkably similar. Participants recognised that hygiene programme design processes were sub-optimal but struggled to implement the more ideal principles and processes that they aspired to. Major barriers to improved practice were time pressures; financial constraints; limited capacities; the infeasibility of assessment tools; unequal partnerships between donors, UN Agencies, INGOs and NGOs; and poor sector learning processes. Given these constraints, most programmatic decisions were based on the intuitions and past experiences of managerial staff and details about hygiene programming were left intentionally vague in proposals. This resulted in the delivery of hygiene programmes that were relatively standard across contexts.

Research related to this objective found that hygiene programme design was affected by both sector-specific challenges and more general constraints associated with the humanitarian system. The lack of feasible processes to guide hygiene programming in humanitarian crises was a major barrier to practice.

8.6 Methodological implications of the thesis for future research

In this section I describe the novel aspects of the methods I used in this thesis and factors to consider for future research.

8.6.1 Novel approaches to reviewing relevant literature

The systematic literature review which combined standard integrative review techniques with additional new measures to appraise the way determinants were defined and measured, was a subjective but useful approach. It highlighted methodological limitations within this body of literature but was still able to generate areas of consensus which could inform future research and practice. The methodology I developed for this review has since been replicated by others to understand the determinants of child faeces disposal behaviour (yet unpublished) and World Vision are planning on using the same approach to explore the determinants of other WASH-related behaviours.

However, given that this review was published before the COVID-19 pandemic, there is now a wealth of new peer-reviewed articles about hygiene and its determinants [517]. Repeating this review, or even focusing specifically on the COVID-19 related literature, could help to strengthen our understanding of handwashing during outbreaks.

8.6.2 Reflections on the use of participatory methods

The majority of the participatory methods used in FGDs and interviews in DRC and Iraq generated useful data about the determinants of interest while allowing aspects of the broader context to be explored. I was initially concerned that some of the concepts explored by the participatory methods would be a bit abstract or difficult to grasp for some individuals, particularly those with limited formal education or literacy. However, this did not arise as a major barrier. In fact, the use of visuals or 'in the moment diagrams' to capture points as the participants expressed them seemed to be an effective way of overcoming literacy and language barriers.

However, the use of participatory methods did create challenges and may have limited the work in certain ways. For example, the breadth of the determinants defined by the BCD framework led me to utilise a total of 16 different participatory activities within interviews and FGDs. This required additional time to train and practice the tools with the research team and meant that a relatively small number of determinants were explored with each individual or within any one interview or FGD. Of course, the latter challenge may have still existed if a more traditional talk-based approach to exploring these determinants had been used. To prevent the small sample sizes per activity from hampering the reliability of findings about any particular determinant, we kept a running tally of the use of each activity and on a daily basis discussed what we were learning and whether a point of saturation had been reached [518]. We were also able to reach a point of saturation relatively quickly in our research settings because there was a high degree of homogeneity in the way people lived, leading to more similarities in experiences and behaviour across participants. Where possible we also triangulated findings across methods. The use of so many participatory activities also created challenges for the data analysis process as visual outputs had to first be summarised in a written form so that it could be comparable to other transcribed data.

While using multiple participatory methods was generally useful for an exploratory study like this one it is not likely that such an approach could be feasibly replicated to inform programming in other emergencies. In table 8.6.2 below I reflect on some of the strengths and weaknesses of each of the participatory tools. In section 8.8 I go on to explain how some of this learning helped to refine the methods so that they are more suited to future use in emergencies.

Given that the methods I used within these case studies were participatory there could have been opportunities to align my work more closely with Participatory Action Research (PAR) approaches [519]. This could have helped me to further challenge traditional researcher-participant relationships and engage participants in all phases of the research. My work was aligned with PAR approaches in that it laid out a systematic and iterate learning process and focused on reflexivity throughout [520]. Like most PAR work this this research was also strongly motivated by a desire to bring about transformative change,[521]. In my case the transformative change I hoped to realise as was within the humanitarian sector. However, a lot of this work has been undertaken outside of the scope of the manuscripts presented in this PhD (see a more detailed description in section 8.8).

Table 8.6.2: Reflections on each of the participatory activities used within focus group discussions or interviews.

Method	Description	General reflections
Problem free-listing and categorisation	Conducted within FGDs. Ask participants to list the things they worry about most in their day to day lives since the crisis. Each worry is written down on a separate small piece of paper. Participants list as many things as come to mind. If not mentioned ask if the following things are challenges for them: 'I often feel dirty and am not always able to wash my hands', 'It is hard to keep my home clean', 'I worry about the bathroom being dirty'. Explain that you would like them to sort these problems and their own problems into categories and give each category a name. Note where the hygiene related challenges are classified. The title of this category will be used for the individual free listing and ranking of problems	• Strong facilitators needed to guide the process and to ask probing questions of participants. • Can be difficult to decide how long the initial brainstorming phase should go on for (as it is potentially endless) • Can be useful to guide participants to list challenges that they think are common to the majority of people in the setting (rather than highly personal issues) • Works best if everyone in the group has a similar level of literacy. • Discussions during the process of categorisation and the naming of categories are particularly insightful. • Could have been useful to replicate this method with marginalised sub-groups of the population who may have had specific needs.
Risk scaling	Conducted within FGDs. Participants are asked about the health issues that they are most concerned about. If diarrhoea is not mentioned this is brought up and participants are asked about their concern about diarrhoea in relation to other health concerns. Participants are then asked to define diarrhoea in terms of symptoms and causes so that this definition is clear for the rest of the session. Participants are introduced to a colour-coded, 5-point Likert scale which ranges from very likely to very unlikely. They are asked questions about their perceived vulnerability and susceptibility to diarrhoea and their perceived relative risk in comparison to other people and as a result of their current predicament. Individually participants select their perceived risk on the scale and then discuss differences.	• At the beginning of the session, it's important that everyone in the group has a similar understanding of the disease. In DRC and Iraq people classified diarrhoea according to different severities. • The colour coding and visual scale was useful in helping participants to understand the task. • The Likert-scale approach was still something some participants initially struggled to understand. It therefore requires quite thorough explanation of the parameters before each question. • Some participants were hesitant about making predictions about their future or the future of others for cultural reasons. • It's important to allow time for participants to discuss and debate their answers (particularly where these differ) and this often requires good facilitation.
Soap attributes	Conducted within FGDs. Participants are introduced to a set of 10 locally available soaps. These included laundry soap, scented body soap, liquid soap, and soap typically distributed by organisations. Participants are asked what criteria they use when selecting which soap to buy. They are then asked to rank the soap against these different criterion (e.g. cost,	• It's important to source soaps that are available in the local setting. • This activity worked well with people of different literacy levels and the visual props made it easy for people to participate actively.

Method	Description	General reflections
	smell, duration of use, likability, perceived, most common, most typically used prior to the crisis).	• The activity led to a vibrant discussion and the participants seemed to enjoy themselves. However, the patterns in soap preferences were quite similar across groups and settings. • It's important to remind participants that the questions are oriented to soap use for handwashing rather than soap use related to other household tasks. However, it could be useful to explore how different soap products are preferred for these other tasks.
Designing the ideal handwashing facility	Conducted within FGDs. Participants are introduced to a set of images of handwashing facilities from around the world. They are asked to go through each and write down the characteristics that they like or dislike about each. They are asked to review the characteristics at the end and select the three 'must have' features of an ideal handwashing facility.	• The images of handwashing facilities acted as a useful prompt for the discussion, however outcomes may be substantially influenced by the examples selected. Even with the images it was often still necessary to talk through the features of each design given that some designs were not available locally. • It's important to take time to frame how the data from this method will be used, particularly if there is no immediate plan to distribute or improve handwashing facilities.
Motives	Conducted within FGDs. Participants are introduced to a set of character cards where each of the characters are defined by one characteristic which is linked to a motive e.g. a person who values having lots of friends (affiliation), a person who is hungry (hunger), a person who is respected because of their education or wisdom (status), a person who wants to feel comfortable (comfort) etc. Participants are asked to rank the characters in terms of who is most likely to always remember to wash their hands with soap. As they rearrange the cards in a ranked order they are encouraged to discuss and debate why certain people are more likely to practice handwashing.	• This activity prompted lively discussion and participants were able to identify with the characters and discuss their likely behaviour. • It was however important to spend time introducing each character, explaining the image depicted on the card and checking participant comprehension. • Once the initial ranking part of the activity was complete, it was useful to also explore which characters the participants identified with and who they aspired to be like.
Description of a cholera case	Conducted within FGDs. A simple line drawing of a person was presented to the participants. Participants were told that this character had recently had cholera and were asked to add characteristics and descriptive information to this character reflecting their likely appearance, behaviour, social interactions and values.	• This generated useful insights about how people view others who get cholera, highlighting common community perceptions or stereotypes. However, in discussing these assumptions its challenging to not simply perpetuate them. Therefore, this activity could be usefully complemented by a session which is designed to challenge misperceptions or share real experiences.
Routine Scripting	Conducted within individual interviews. Ask the participant what they did yesterday from the moment they got up in the morning right through to	• Handwashing is not likely to be mentioned as a discreet event during routine scripting, therefore understanding handwashing practices

Method	Description	General reflections
	when they go to bed at night. Ask them to describe their routine step-by-step. Draw/write each activity on a separate piece of card. Lay the cards out in order. Explore parts of their routine that are of interest to handwashing and which parts of their day have changed since the crisis. Ask the participant what the best, worst, most boring and most rewarding moments of their day are.	always required some probing and therefore the data collected is likely to be influenced by social desirability bias. • The method can be a useful complement to observation (given that observation is likely to happen for a shorter period of the day). • The method generates data which is highly specific to the individual and the day and it can be challenging to look beyond this detail to identify common patterns in routines. It was also challenging to know how to use this detailed data to inform programme design.
Personal Histories	Conducted within individual interviews. Participants are given a blank piece of paper and asked to draw a picture of themselves before the crisis on the left-hand side and a picture of themselves currently on the right-hand side. Draw a line between the two images to represent the journey the individuals went on between these time points. Ask the participant to help you draw on some of the key milestones that happened in their lives during this time (whatever they are comfortable with sharing). Ask them to describe how they felt during these key time points and how their routines and behaviours changed. At the end ask about whether their handwashing behaviour changed.	• Given that this activity focused on the broader experiences of an outbreak or a crisis, it was particularly useful to have gone through the process of 'distress planning' so that we could appropriately respond to the issues being discussed and the potential emotions of participants. Generally, we found that people were appreciative of the opportunity to discuss their experiences. • The drawing aspect of this activity worked well. It helped structure the conversation and made participants feel comfortable in opening up about their experiences. • Given that this is an adapted form of narrative interviewing it requires skill in facilitation and knowing how and when to probe on particular points. • While this method generates a relatively small amount of data on handwashing practices the broader contextual experiences that are highlighted are valuable for humanitarian staff to keep in mind when designing programmes to ensure that programmes are relevant and acknowledge other priorities and concerns.
Free-listing and ranking problems	Conducted within individual interviews. This activity uses the emergent category from the FGD discussion (in this case 'hygiene problems'). Introduce the category to the participant and ask them to free-list any hygiene related problems they are currently facing. Draw/write each on a separate piece of card. Once all problems are listed ask the participant to rank them in order of priority. If not mentioned ask if handwashing with soap is a problem and get them to insert this into the ranked order.	• This was a relatively straightforward method to undertake and worked with participants with limited literacy so long as basic drawings were also added to the cards. • A challenge with this activity was at the point of analysis. This was because people expressed concerns in slightly different ways. Therefore, to understand common patterns in salience and prioritisation I had do make some subjective judgments about the similarity of certain concepts expressed. An alternative would have

Method	Description	General reflections
		perhaps been to do an open-ended brainstorming of challenges among a sub-group of participants and then based on this, arrive at a common set of challenges which are then ranked.
Handwashing Demonstrations	Conducted within individual interviews. The researcher asks the participants to show them how they normally wash their hands. With permission the researcher videos the handwashing process. The researcher should pay attention to the behavioural setting, things that enable or create barriers to the behaviour and moments of uncertainty or hesitation that indicate that this may not be part of normal routines.	• This activity was rapid to conduct making it feasible for use in other crisis-affected contexts. • The activity primarily allows for the analysis of the physical setting (as opposed to all elements of the behavioural setting). • It is important that the demonstration happens in a naturalistic context, e.g. by going with the participants to the toilet and encouraging them to show you how they would wash hands after toilet use. • It is also important that users of this activity understand that participants are likely to be demonstrating their 'ideal handwashing practice' and that handwashing may therefore be more likely to involve soap and involve handwashing that is more thorough or of a longer duration than usual. Despite this bias it is still a useful approach for understanding how the environment enables or constrains behaviour.
Social Network Diagrams	Conducted within individual interviews. Explain that you would like to understand more about social relationships in this place and in the place where they came from (prior to the crisis). Draw three concentric circles on a piece of A3 paper. The inner circle is for people who the participant meets daily. The middle circle is for people they meet weekly. The outer circle is for people the meet monthly or less frequently. Divide all the circles into sections, one for acquaintances, one for friends and one for family. Map the participant's relationships prior to the crisis and ask how they are different now. Discuss what has changed, and which individuals are likely to influence their behaviour the most.	• As discussed in chapter 1, this method was stopped in Iraq due to it causing some distress when used with two participants. As such I think it should be used with caution in general, but particularly in contexts where it is known that a large proportion of the population have recently been separated or lost family or friends. • When conducting the activity, it's important to emphasise that we want to focus on a person's relationship to the participant rather than their names to keep the process anonymous. • As with the routine scripting activity, this method generates a lot of hyper-specific individual data, and it can be challenging to then look for the more general patterns across this data. A subsequent phase of colour coding and re-mapping of the raw data was needed to draw more general conclusions.
100 people	Conducted within individual interviews. Participants are asked to imagine a sample of 100 people in their community (this is represented through 100 counters) and then asked to make predictions about their beliefs and	• Participants were able to grasp the concepts within this activity easily, irrespective of levels of literacy. For those who were more literate the

Method	Description	General reflections
	behaviour. Questions include how many people would tell us (the researchers) that they wash their hands, how many do they think actually wash their hands, how many would judge them negatively if they saw a person not washing their hands with soap, how many believe handwashing is the right thing to do and how many would say handwashing is easy. Twenty counters are then selected and the participant is asked to imagine that these are their closest family and friends. The questions above are repeated for this group.	counters were actually not so necessary, but these became more useful for those with lower literacy levels. • Some participants felt they weren't able to confidently predict or discuss the behaviour of others. So it was sometimes useful to reassure participants that they were being asked to make guesses based on what they have observed but that they didn't need to worry about whether these were fully accurate. • There was a lot of similarity in the understanding of norms across the two research sites and between participants.
Identity questionnaire	Conducted within individual interviews. Participants are asked about their characteristics (e.g., abilities, possessions, career), personal identity (e.g., values, beliefs, feelings), social identity, (e.g., how they think others perceive them) collective identity (e.g. religion, nationality, culture) and the relational identity (e.g. their roles as friend, parent). They use a three-point colour coded Likert scale to describe how important each item was to their sense of self.	• Given the complexity of the concepts in the questionnaire that this method is based on, it was surprisingly well understood by participants. • While this method builds a picture of the factors that influence identify, it doesn't really tell you much about how these aspects of identity are linked to the behaviour of interest. • There was also a risk that we were trying to explore too many parameters with this activity. This was because participants are first asked to describe how a particular factor influences their identity and then how this has changed or been affected by the crisis.
How would do you feel?	Conducted within individual interviews. Introduce participants to a set of picture cards and a response sheet. The picture cards show different scenarios including people washing/not washing their hands with soap after the toilet, after cleaning a child or before food preparation. Three cards represent other behaviours (e.g., not greeting a neighbour) so to minimise bias. Each scenario is explained, and participants can select how they would feel if they witnessed this scenario. There are 18 possible answers each related to the BCD human motives [15]. Participants select yes or no to indicate whether the response is appropriate for each scenario.	• It worked well to have visual aids that were context adapted and reflected scenarios in the local setting. • This activity was only done with people with some level of literacy as they were asked to complete the worksheet themselves, thus findings may be less representative. • While this method was useful in identifying patterns related to motives, it was poor at understanding why participants held these opinions. Therefore, this activity was dropped after use in Iraq and the Motives FGD activity was used in DRC. It is possible that this activity could be strengthened by facilitating discussion around participant choices at the end or instead it could be used as a useful tool for evaluating programmes that use motives.
Water prioritisation	Conducted within individual interviews. Ask the participant to show you the containers they use for water collection. Ask how much water they collect per day. If for example, they say 5 containers, use 5 plastic cups to	• This activity could only really be used with people who did not have access to piped water. This is because when people use piped water,

Method	Description	General reflections
	represent this for the activity. Using the cups, get the participant to demonstrate how much water is normally used for different household activities. Note whether handwashing is mentioned as a use of water. Ask the participants whether they ever collect more water than normal. When does this happen? Add cups as necessary and again ask how they divide up the water for different purposes when they have more available. Ask the participant whether they ever collect less water than normal. When does this happen? Remove cups as necessary and again ask how they divide up the water for different purposes when they have less available.	they typically have a less detailed understanding of how much water they use per day. • The use of the cups to represent jerry cans worked well and participants were able to talk through usages patterns and discuss how they would adjust usage in different scenarios. • There was quite a lot of similarity between participants in terms of how water was prioritised.
Trials of Improved Practices	Conducted over the course of several individual interviews. Participant households were interviewed three times over the course of two weeks. During the first visit households were given soap and informed about the critical times for handwashing. They were then asked to encourage all family members to wash their hands at these times over the next two weeks.	• This method was not used in Iraq because the research team felt it may be unethical to get people to try to think about how they could change their behaviour when they had so little control over their access to resources. • In DRC this activity worked well, with all participants developing novel ideas for improving their behaviour. • It's important that during interviews the facilitator does not accidentally lead the participant towards a particular conclusion or solution. • Several participants mentioned that money was a barrier to changing their behaviour. In the future it could be interesting to see if cash provision could be ethically incorporated into an activity like this and what impact this would have. Particularly given that cash is becoming a more common part of humanitarian programming.

8.6.3 Strengthening methods for assessing hygiene behavioural determinants

The systematic literature review presented in chapter 3 highlighted the inconsistent methods for measuring the determinants of handwashing behaviour. The subsequent research in Iraq tried to address this challenge by comparing a standardised survey for assessing determinants, with a mix of qualitative methods. While limitations of both approaches were identified, the qualitative methods appeared to be more acceptable to populations and generated a more holistic understanding of behaviour. It is common for formative research to use a mix of methods, however, a novel aspect of the research in Iraq and DRC was that methods were selected to assess each of the determinants pre-defined by the BCD determinant checklist. This approach helped to maintain this holistic focus on all exploring all possible determinants.

It was clear from the literature review, and the applied research in Iraq and DRC, that methodological innovations are still needed to assess some types of determinants more accurately. Below I outline some determinant types where valid and reliable methods are lacking, and which could benefit from being the focus of future research:

<u>Reactive behaviour</u>

In the research in Iraq and DRC reactive or habitual behaviour was primarily assessed through observation and demonstrations of handwashing. A limitation of both of these approaches is a reliance on the observer's assumptions about what a participant might be acting in response to (e.g. assuming that handwashing is triggered by the presence of visual dirt on hands and that handwashing might be a semi-automated response). This is not a challenge that can merely be overcome by asking the participant about their motivations at these moments because conscious reasoning is not involved in habitual behaviours. A more reliable approach would be to conduct repeated observations in the same households over time, to build a more robust dataset and identify repeated instances of reactive behaviour. However, such an approach would be time and human resource intensive and would likely be infeasible to inform programming in humanitarian settings. Other than experimental lab-based studies, I did not find any other methods which could be used to explore reactive behaviour in naturalistic settings.

<u>Roles and Identity</u>

In Iraq and DRC I used an adapted version of Aspects of Identity Questionnaire [522] to understand not just what influenced a person's identity but how this had changed because of the conflict or outbreak. A limitation of this approach was that it was hard to make linkages between the aspects of identity discussed and the target behaviour (even though handwashing was specifically asked about). The BCD formative research guide suggests that vignettes or narrative stories can be a useful way to explore roles [16], however these methods require the researcher to develop hypotheses *a priori* about which aspects of a person's identify may have a bearing on behaviour and can therefore also be quite limiting.

Motives

For most of the determinant categories, I chose to use methods that had been developed and tested by others. However, having tried to assess motives in my own prior work on behaviour change I recognised the limitations of the methods recommended by the BCD approach and used in other studies [16, 80, 500, 501]. As with the challenge identified above for roles and identity, most of these prior methods for assessing motives were designed to explore the relative importance of different motives rather than identify which motives were most important in driving handwashing behaviour. The 'How would you feel?' method that I used in Iraq was developed based on approaches for assessing motive changes in randomised control trials of complex interventions [257], whereby participants were asked to give a binary yes/no response in relation to a statement which linked a motive to the target behaviour. The limitation of applying this approach to exploratory research was that it didn't generate enough information about why people responded in particular ways. Therefore, in consultation with several other behavioural scientists, a separate method was developed for use in DRC . This new approach was both easier for participants to engage with and generated much richer behaviour specific results. However, as noted in paper 3, my results in both Iraq and DRC were inconsistent with findings about motives in other humanitarian contexts [9, 500, 501]. While this could have been as a consequence of methodological differences, it indicates the importance of future research to verify these alternative methods for assessing motives.

A secondary limitation of all current methods for exploring motives, is that they are reliant on an individual to make assumptions or hypotheses about what is driving their behaviour. While motives guide our goal-oriented behaviour and ensure that behavioural decisions help us to survive and thrive, the mechanisms that influence them (such as the reward system) operate at a semi or sometimes fully sub-conscious level [15, 250] and therefore cannot be fully understood through talk-

based methods [30, 523]. Future research could look to assess how some of these talk-based methods compare to data generated through experimental studies or research using functional magnetic resonance imaging (fMRI) of the brain.

Improving our understanding and measurement of behavioural determinants will require the continued use of exploratory qualitative methods, but these must also be complemented by quantitative methods and experimental studies designed to quantify associations and test emergent hypotheses.

8.7 Theoretical implications of the thesis for future research

8.7.1 The focus on behavioural determinants as a domain of research

A large proportion of behavioural science literature focuses on the relationship between behavioural interventions and their mechanisms of action (Behavioural Change Techniques [524]) and behavioural or health outcomes. Within the WASH sector alone, this is evidenced by the number of reviews that focus on this part of the behavioural pathway [3, 63, 412, 414, 515, 525-527]. Behavioural determinants have been less systematically studied to date. Furthermore, formative research findings describing the determinants of behaviour are often contextually bound and practice oriented. As noted in the systematic literature review, they are also often published in grey-literature documents only.

It is hoped that this PhD thesis will contribute to further establishing behavioural determinants as a unique and worthwhile domain of future research. For this to be carried forward, substantial additional work is required to build consensus across behavioural theories and develop an agreed and clearly defined list of determinants that can guide future research. As described above, there is also a need to pilot and validate methods for measuring determinants in a reliable way across contexts. This is particularly the case for determinants which cannot be directly observed and where self-report is likely to be unreliable. While the work presented in this thesis focused on exploring associations between determinants and behavioural outcomes, future research should consider strengthening our understanding of the interlinkages between determinants. My research also adopted a 'public health view' of determinants, that is to say that it focused on identifying common patterns that enabled or prevented health behaviours within a particular population. Future research would benefit from paying greater attention to individual-level variations in the determinants of behaviour and the factors that affect this.

8.7.2 The application of BCD to the study of behavioural determinants in crises

BCD was the primary behavioural theory used throughout this research. It was the first time the approach has been used to explore behaviour and determinants within humanitarian contexts. The theory was selected because it includes a list of behavioural determinants that are clearly defined, a theory to explain how these determinants relate to each other, and a step-by-step process for designing a behaviour change intervention.

Overall, the BCD list of determinants provided a useful approach for mapping the systematic review findings, exploring the determinants of behaviour in crisis-affected settings and framing the stages of intervention design and delivery in the final paper involving interviews with humanitarians. As part of the systematic review process, I took the general BCD determinant definitions and adapted these to be relevant to my behaviour of interest – handwashing. As I undertook the systematic review and the subsequent qualitative work in Iraq and DRC, I was able to refine these definitions in a way that I feel would be useful for subsequent applications of BCD to handwashing behaviour. Table 8.7.2 shows the final definitions of BCD determinants as derived from this research. Amendments include a simplification of some of the determinant category labels, additions or reductions to of some determinant categories, and clarifications of the determinant definitions. One aspect that made the original list of BCD determinants challenging to apply was that, as explained in the systematic review, the breadth or specificity of each determinant category varied widely. This revised list addresses this issue with the aim of making these definitions more feasible to apply and assess within future research. It is hoped the more precise definitions of each determinant may reduce some of the subjectivity around these concepts, enabling work which uses BCD to be more comparable to other frameworks. This revised list of BCD determinants could also be used as a guide for developing adapted definitions for other behaviours of interest.

Table 8.7.2: Revised BCD definitions for handwashing as derived from this research (Key changes are indicated in italics).

Behavioural determinants defined by the BCD framework		**Definitions of each determinant adapted to handwashing**
Cognitive factors	*Knowledge and planning*	The extent to which knowledge *of how when and why handwashing behaviour should be practiced* affects handwashing intentions and plans, and eventually performance of the behaviour.

Behavioural determinants defined by the BCD framework		Definitions of each determinant adapted to handwashing
	Beliefs	*The extent to which local constructions of disease (including causality and transmission), or cultural and religious beliefs affect people's actions.*
	Risk perception	*The subjective judgements that people make about their vulnerability to disease or about disease severity, and how this may influence their handwashing behaviour.*
	Motivations	The goal-related drivers of behaviour. Motives *associated with increasing or decreasing handwashing rates* can include: • Disgust (the desire to avoid cues that may indicate sources of infection), • Affiliation (the desire to fit in with others and one's social group) • Nurture (the desire to care for your child) • *Comfort (the desire to be comfortable, orderly, clean or refreshed*) • *Attract (the desire to make yourself attractive to others)* • *Status (the desire to improve your social standing including through things like education or wealth)* • *Hunger (the desire to eat or drink)* • *Hoard (the desire to get and keep things and use them wisely)* • *Fear (The desire to avoid threats including major disease threats)*
	Automatic reactions	The extent to which handwashing can be automatically triggered based on *cues*, past experience, repetition and *rewards.*
	Discounts and trade-offs	The perceived time, effort, *desirability,* cost and benefits of washing hands as compared to other courses of action. *The extent to which other competing concerns may affect the prioritisation of handwashing*
Individual characteristics	Characteristics	Socio-demographic characteristics that may affect handwashing including gender, wealth, age, education, employment, *household size,* personality characteristics, *and mental and physical health*.
	Capabilities	Whether an individual has the skills required to wash their hands with soap. Whether an individual perceives themselves to be able and willing to actually wash their hands at the times required.
Behaviour settings	Stage	The design and set up of the specific physical spaces where handwashing behaviour takes place.
	Infrastructure	The *design, durability and accessibility* of infrastructure associated with handwashing such as water supply systems, sanitation or kitchen facilities and handwashing facilities.
	Props	The value, characteristics, usability, ownership and accessibility of soap and other *products or* objects used for handwashing.
	Roles	The ways in which an individual's role, identity *(self-perceived or as perceived by others)* or responsibilities influence their handwashing practices.

Behavioural determinants defined by the BCD framework		Definitions of each determinant adapted to handwashing
	Routine	The sequence of behaviours regularly performed *before, after,* or in association with handwashing. *The extent that daily routines, or changes to routines enable or prevent handwashing.*
	Norms	The extent to which an individual's handwashing practice is influenced by their perception of normative setting-specific rules. This includes an individual's perception of whether handwashing is commonly practiced in their community (descriptive norm); whether handwashing is part of their role and their normal behaviour (personal norm); whether handwashing is socially approved of (injunctive norm); and whether handwashing is practiced by their 'valued others' (subjective norm).
Broader Environment	Physical environment	The extent to which factors in the natural or built environment including climate, *season,* geography, cleanliness or dirtiness can affect handwashing practices.
	Biological Environment	The extent to which an individual's interaction within their biological environment such as exposure to disease vectors, can affect their handwashing practices.
	Social Environment	The extent to which the structure of an individual's social environment, including how they interact with it and perceive themselves within it, can influence handwashing practices. *This includes access to social support systems and awareness of social sanctions or rewards associated with certain behaviours.*
	Political and historical context	The historical and cultural events, *including past handwashing promotion initiatives and exposure to humanitarian and development aid,* that have shaped current perceptions and practices of handwashing. The extent to which handwashing-related policies or local and national leadership on handwashing issues, shape handwashing perceptions and practices at the individual level.

Having reflected on my use of the BCD framework within my research, I feel that the framework could be strengthened by more explicitly acknowledging and guiding researchers to explore individual-level variabilities in behaviour that stem from a person's socio-demographic characteristics and aspects of their identity. To an extent this is implied when researchers explore aspects of the 'body' (re-labelled 'individual characteristics' in the table above). However, what is often missing is how to account for the impact of this on all of the other determinants. Adding guidance for BCD users on how to effectively disaggregate data (based on characteristics like gender, disability, socio-economic status, education, displacement status, geographical location etc.) or make tailored programmatic recommendations for marginalised sub-groups within the population would be valuable. This is particularly important given that, as in my research, the use of BCD

normally involves multiple qualitative methods done at a small scale, therefore the more data is disaggregated the weaker the findings are likely to become.

Another way that this research contributed to developing BCD was by specifically identifying methods that could be used to explore each determinant in turn. Prior applications of BCD have typically used a mix of participatory research methods [80, 528-531] but there is currently no BCD guidance on how to select methods, and these prior studies have not always described how method selection related to each of the determinants being explored. Being more systematic about method selection has the benefit of being able to draw more wholistic findings about behaviour and its determinants in a particular context.

While BCD was useful for informing the exploratory type of work undertaken within this thesis, the application of BCD to subsequent research studies in humanitarian settings may be limited. This is because, as highlighted by the humanitarian interviews I conducted, this kind of in-depth learning, over multiple months, is rarely feasible within the constraints of humanitarian response work. Therefore, there is a need to identify ways of using behavioural theories or frameworks in a more abridged fashion within these settings. In section 8.8 I describe some of the ways I have contributed to the development of alternative and more feasible determinant assessment tools for humanitarian settings.

On reflection I also feel that the use of BCD as a guiding framework and analytical tool within this research, supported my initial medicalised view that handwashing is worthy of study because of its importance to public health. It thus caused me to interpret findings and posit solutions that were primarily behavioural and public health oriented. However as mentioned in section 8.2.3, handwashing was not problematised by crisis-affected populations themselves. Therefore, I feel that if I had used an alternative theory or adopted a more general ethnographical framing for this research, this may have actually resulted in different interpretations of my results. For example, I may have been more likely to question the initial centrality of handwashing behaviour and instead orient my findings towards addressing broader humanitarian needs or the humanitarian system as a whole.

8.7.3 The use of a multidisciplinary pragmatic approach to form 'provisional truths'

This thesis was grounded in a pragmatic epistemology which encouraged me to draw on a range of disciplines to arrive at provisional truths about behavioural determinants. By drawing on cultural anthropology I was able to locate my findings with broader understandings of human experience

during crises, including the way crisis-affected populations constructed their realities and priorities. The use of behavioural science in this thesis, specifically Behaviour Centred Design, provided a framework for unpacking the complexity of behavioural determinants in order to identify actionable areas which could facilitate programmatic change. By drawing on anthropological and behavioural science literature, this research was more able to address the critiques levelled at both disciplines and leverage their commonalities and strengths.

8.8 Applied use of the findings to date

The exploratory research described in this thesis was accompanied by a package of applied research projects to strengthen hygiene programming in humanitarian crises and outbreaks. Below I summarise how the learning from this thesis has already influenced this broader work and shaped practice.

8.8.1 Improving the assessment of determinants and hygiene programme design in crises and outbreaks

The grey literature review and the interviews with humanitarian WASH practitioners identified that there were few feasible tools to support the assessment of handwashing behaviour and its determinants in crises. Processes for translating findings about determinants into hygiene programme activities were also lacking. The applied work that accompanied this research aimed to address these challenges. This was primarily undertaken as part of the Wash'Em project which is funded by the USAID's Bureau for Humanitarian Assistance (BHA) and is a collaboration between LSHTM, ACF and the Centre for Affordable Water and Sanitation Technology (CAWST) [532]. I am the Principal Investigator on this project which concludes at the end of 2022.

Given the identified limitations of the Barrier Analysis Survey, a key challenge for developing appropriate tools for exploring behavioural determinants in humanitarian settings was to find a way of making the tools easy and rapid to use, while also still allowing the tools to reflect the complexity of behavioural determinants and the richness of community perspectives. The strategy I adopted to overcome this challenge was to focus the Wash'Em Rapid Assessment Tools on the behavioural determinants that were likely to vary most in a crisis or outbreak and which would therefore be most useful to assess prior to designing a behaviour change programme. Assessing all behavioural determinants was considered infeasible within most humanitarian time constraints. However, this choice was not done with the intention of ignoring other determinants, but rather I assumed that

there would be some transferability of the existing evidence about these more 'predictable' determinants from work done in stable settings.

By using the literature review and the findings from Iraq and DRC I was able to develop a clearer hypothesis about which determinants of handwashing behaviour are likely to vary most in a crisis and which are therefore most important to assess prior to designing a behaviour change programme. I revised the qualitative research methods which were used to explore determinants in Iraq and DRC to make them more structured and easier for others to replicate. Following consultations with ACF and other humanitarian organisations, I also considered other factors that humanitarians would need to understand if they were going to design and deliver effective behaviour change programmes that were acceptable to local populations. Through this process I developed five Wash'Em Rapid Assessment Tools to qualitatively explore behavioural settings (Handwashing Demonstrations), risk perceptions and disease understandings (Disease Perception), motives and aspirations (Motives), broader experiences of crises (Personal Histories) and ways of selecting delivery channels and engaging with communities (Touchpoints). The methods require humanitarians to undertake small-scale formative research with crisis-affected populations through interviews, focus group discussions and demonstrations. The tools include an analysis guide to help users identify the most common patterns emerging in their sample and provide an interpretation of what their findings mean for handwashing behaviour and behaviour change programming. Step-by-step method guides were developed in both written and video forms and in a range of languages (these are available online at this link: https://app.washem.info/en/rapid-assessments). With the support of a range of humanitarian organisations, these tools were piloted in 25 humanitarian crises or outbreaks and were iteratively improved based on user feedback.

The second challenge was to support innovative and contextualised hygiene programme design within the constraints of the humanitarian system. Based on the findings from the grey literature review and the interviews with humanitarians, it was clear that processes to support hygiene programme design in crises should avoid having long manuals and should be feasible to implement rapidly. The Wash'Em project partners collaborated to develop a software-based decision-making tool to translate findings from the five Rapid Assessment Tools into programmatic recommendations. CAWST led on the coding and user experience of this software, ACF helped to ensure the product was humanitarian friendly, and I used evidence and behavioural theory to write the rules that that would govern the 'engine' of the software which shaped how programme recommendations were made. A software-based tool had the benefit of being engaging, interactive, and able to 'walk' users through the process of programme design so that it would seem less

daunting. The digital nature of the tool meant that it was easy to update, and humanitarians didn't have to rely on having hard copy documents to hand. Finally, the software allowed us to 'hide' some of the complexity of behavioural science, allowing users to engage with evidence and theoretical principles based on their level of interest and the extent that these principles were relevant to their context and programming.

The final product was the Wash'Em Programme Designer (available at this website: https://app.washem.info/en/designer/) [533]. Once logged in to the software, users are prompted to answer multiple choice questions to describe the context where they are working (e.g. the nature of the crisis or outbreak, characteristics of the population, etc.), the constraints for programme design (e.g. budget, timelines, safety issues, etc.) and a summary of the findings from the five Rapid Assessment Tools. At the end of this process the software generates programme recommendations. The programme recommendations come from a database of 80 theory-driven and evidence-based handwashing behaviour change activities. Algorithms within the software recommend 5 to 9 activities based on the responses entered and what is therefore likely to be effective in each context. This means that two Wash'Em programmes will almost never be the same. Each activity has a 'recipe card' which outlines materials needed, the time it takes, the cost, and a detailed step-by-step process for implementing it. The full Wash'Em process (the final Rapid Assessment Tools and the Programme Designer) was launched in March 2020 and within the first year the process had been used in over 100 humanitarian crises, and by about 60 organisations. This has included extensive use in Iraq and DRC by humanitarian actors involved in the initial PhD research. Wash'Em is now part of the behavioural strategies of many humanitarian NGOs and is recommended by donor agencies such as USAID and by the Global WASH Cluster. Wash'Em typically takes 1-2 days to learn, 1-2 days to collect data and 1 day to summarise the data and generate recommendations. Research on Wash'Em is ongoing. For example, we are currently conducting process evaluations of Wash'Em in Zimbabwe, Yemen and Madagascar and are doing rolling interviews with users to understand their experiences. To understand more about variations in hygiene determinants across crises and contexts we are also in the process of analysing the data that is entered into the software.

8.8.2 Improving handwashing facilities and products that could contribute to behaviour change

The literature review and the subsequent research in Iraq and DRC identified that one of the greatest opportunities to improve handwashing behaviour in crises and outbreaks is to make it easier and more convenient to practice. To address this challenge, I have also been the principal investigator on three projects to develop and evaluate novel products to improve handwashing in

these settings. These projects have been through collaborations with the private sector, product designers and humanitarian actors.

The first two projects relate a finding which was identified through the literature review and supported by the research in Iraq and DRC - the need to scale up the availability of handwashing facilities that are more durable and desirable. The first project was an evidence-informed and consultative process to co-design a handwashing facility that could be locally produced and which was suitable for densely populated camp-like settings. The literature review in chapter 3 was used to refine the design brief, along with feedback from participants in DRC and Iraq about their ideal handwashing facilities. This was strengthened through consultations with humanitarians and refugee populations in Uganda. A process and impact evaluation of the emerging prototype, called Jengu [534] is underway in displacement camps in Kenya and Uganda. I have also been involved in evaluating the Oxfam Handwashing Stand [535] which was rolled out at scale within camp and community settings in Bangladesh, Ethiopia and DRC during the COVID-19 pandemic. Our work, yet unpublished, assessed the feasibility and acceptability of the handwashing facility in comparison to other standard handwashing technologies.

The third project responds to the challenge of water and soap often being scarce in crises. Available evidence indicates that even when hygiene products are distributed, they are rarely prioritised for handwashing [11, 204]. The research presented in chapter 5 also highlighted how challenging handwashing can be when people are outside the home. Given there are an increasing number of displaced people who are 'on the move' [536], access to static handwashing facilities alone may not address the needs of this group adequately. The Supertowel was designed to be an alternative to handwashing with soap for use in particularly challenging circumstances. It is a micro-fibre towel with an anti-microbial treatment. When dipped in water it is capable of removing pathogens from hands and killing them. To date our research has demonstrated the product's efficacy in removing common pathogens from hands [537, 538] and its feasibility and acceptability in humanitarian crises [203]. The feasibility study, undertaken in a refugee camp in Ethiopia replicated three of the qualitative methods used in Iraq and DRC. Work on the Supertowel is ongoing, including research to assess its efficacy against viruses and to understand its effect on behaviour over time.

It is hoped that these research projects, together with other innovations and global initiatives [195, 196, 206] can improve the range of handwashing products and infrastructure available in crises and create an enabling environment which facilitates regular practice.

8.8.3 *Exploring the association between mental health and hygiene*

While this PhD research did not intend to explore the relationship between mental health and handwashing behaviour, the findings from the qualitative research in Iraq and DRC appeared to indicate that mental health may be an important factor affecting behaviour in crisis settings. I subsequently supported a LSHTM masters student to conduct a literature review to see if there was further evidence from crisis-affected settings to support this finding. Her dissertation [539] found 13 published studies that described this association and 4 grey literature documents. The vast majority of these studies had been published after 2019 and were conducted during outbreaks (e.g. COVID-19, Ebola). The review found some evidence that people with higher rates of anxiety were more likely to practice handwashing with soap, while those with higher rates of depression were less likely to wash their hands. The results related to post-traumatic stress disorder were limited and inconsistent. This research has been presented to others within the humanitarian sector and action plans have been developed with certain organisations to collect more data on mental health and hygiene behaviour and pilot programmes which could bring the mental health and WASH sectors closer together to address this issue.

8.9 Potential future implications of the findings for practitioners

By looking across the findings from the research included in this PhD thesis, it is possible to identify several general principles which could inform future hygiene programming in humanitarian crises. These are described below.

8.9.1 *Re-framing and prioritising hygiene in humanitarian crises*

As explained in the introduction of this thesis, encouraging crisis-affected populations to wash their hands with soap is critical for interrupting disease transmission in all types of humanitarian situations. However, the research presented in chapter 7 highlighted that hygiene programming is seen by humanitarians as less important than water and sanitation interventions and is typically underfunded and poorly planned. Interviews with humanitarians also indicated that many people felt that behaviour change programming was beyond the remit of their role or beyond their capabilities. Improving the quality of hygiene programming must begin with humanitarian organisations and donors recognising its value to public health and adapting funding and programming accordingly.

Secondly the research in Iraq and DRC highlighted that handwashing promotion should not be seen as a narrow public health intervention but be re-framed to acknowledge that behaviour occurs in response to diverse contextual determinants. Adequately addressing all of these factors to facilitate handwashing behaviour is beyond the scope of the WASH sector alone. Failure to view handwashing holistically will likely result in programmes which are ineffective or offensive to crisis-affected populations. These findings should prompt humanitarian organisations to operate in a more inter-sectoral way and look for opportunities for hygiene programming to be delivered as part of broader livelihoods, nutrition or psychosocial initiatives.

8.9.2 Going beyond education

The findings of this PhD research are consistent with broader evidence indicating that health education alone is likely to be insufficient to create sustainable changes to handwashing behaviour [189]. Our findings highlighted several opportunities which humanitarian organisations can capitalise on to improve behaviour. For example, under the Sphere Standards [271] humanitarians are responsible for providing handwashing infrastructure and hygiene products to crisis-affected populations. There are opportunities to create handwashing infrastructure and provide handwashing products which cue, enable and reward handwashing behaviour. This opportunity is currently being overlooked because of the tendency for the sector to differentiate between hygiene 'hardware' and 'software' and assume that it is only the latter component that facilitates behaviour change. In protracted crises where affected populations have greater responsibility for purchasing products and maintaining handwashing facilities there are opportunities for humanitarian organisations to encourage the personalisation of infrastructure or product diversity to suit personal preferences. This would allow the dignity and agency of crisis-affected populations to be enhanced, and ensure behaviours remain desirable and therefore more sustainable.

8.9.3 Strengthening capacities and the humanitarian architecture to support improved programming

In chapter 7 I highlighted a range of ways that hygiene programming could be strengthened in humanitarian crises. Many of the challenges identified were sector-wide and could be addressed through revised donor processes, capacity strengthening and improved coordination. The power and influence of donors puts them in a unique position to influence the quality of programme design. This may include encouraging humanitarian actors to use behavioural theory, conduct assessments of behavioural determinants, and develop a theory of change to guide their activities. However, to facilitate these actions within crises it is likely that donors will have to pivot towards thinking about

hygiene programmes as being phased. For example, grants could be designed to initially support rapid response actions (such as the provision of hygiene kits to meet immediate needs) and then build in time for more in-depth contextual assessments of behaviour to be undertaken so to inform the rest of the hygiene programme. The research in chapter 7 also highlighted that staff working on hygiene programmes have diverse backgrounds and that there are no standard qualifications for working within the sector. Therefore, there is an opportunity to invest in capacity strengthening around hygiene and behaviour change and move towards standardised training modules that could contribute to improving programming quality. Lastly coordination platforms, like the national WASH clusters, were highlighted as playing a vital role in facilitating a harmonised response to crises. However, there are opportunities for coordination mechanisms to build stronger knowledge bases around contextual learning and promote sharing of programmatic successes and failures.

8.9.3 Collaboration between researchers and practitioners

This research was made possible through strong collaborations with humanitarian organisations (in this case ACF and the global and national WASH clusters). While ACF played a key role in facilitating safe access to the research sites and supporting the logistics associated with the research, their much more valuable contribution was to guide this research from the outset and ensure that it remained relevant and addressed key humanitarian research priorities. ACF's involvement throughout also helped to ensure that the findings from this research could be taken up into practice through a range of avenues. By having myself and the research assistants embedded within ACF in Iraq and DRC we were also more able to contribute to building research capacities and experience within the organisation. Prior research has demonstrated that effective partnerships between humanitarian actors and academic institutions contributes to much richer learning and research outputs [540-542], and these findings are certainly supported by this research.

Conclusion

This thesis aimed to deepen understandings of the determinants of handwashing behaviour, and in particular explore how these may be affected by different types of crises and displacement circumstances. It also explored the way determinants are measured and the way behaviour is understood and utilised in humanitarian programme design. It did so with the aim of addressing known research gaps and improving the way that hygiene programmes are designed, implemented and received in humanitarian contexts.

The work presented has methodological and theoretical implications for future research on behavioural determinants, indicating that definitions and effective modes of measurement are still lacking. While this research has already informed a body of subsequent studies to develop and evaluate potential innovations within the humanitarian hygiene sector, this work also emphasises the need for determinants to be seen a more prominent domain of behavioural research. The reflections on ethics and researcher positionality add to an increasing body of research on how academics can continue to generate evidence in these complex humanitarian settings while avoiding harm to populations. Importantly this research has already been able to shape humanitarian practice and to develop practical principles that could improve hygiene programming in the future.

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