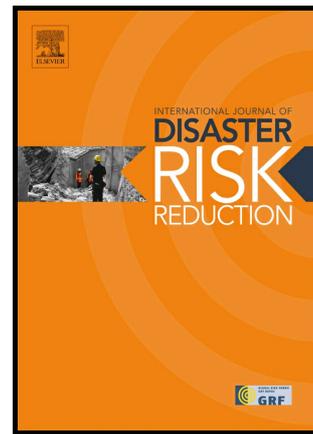


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Water, sanitation and hygiene (WASH) and disaster recovery for community resilience: a mixed methods study from Odisha, India

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Abstract

This paper addresses challenges in water, sanitation and hygiene (WASH) during recovery by documenting relief and recovery efforts by Oxfam to improve WASH behaviour changes after 2013 Cyclone Phailin and floods in Odisha. Findings are based on a mixed-methods study in three districts: Qualitative data were collected in Puri and Balasore from 50 interviews including household members and key informants such as health workers, and government officials. 43 focus group discussions with female and male community members were conducted as part of the response programme. A cross-sectional survey at baseline and end line ($n_1=374$; $n_2 = 366$) households were undertaken in Puri and Ganjam districts once in January followed by end line in August 2014 by Oxfam. The quantitative data was analysed using descriptive statistics and the qualitative data was interpreted using an inductive Framework approach. Agency interventions focussed on communal water supply, and shared sanitation facilities. Although households readily adopted safer water-related practices, there were no changes in open defecation prevalent in these districts. This study suggests that if WASH recovery programmes are to be instrumental in improving community health, sanitation and resilience, they need to emphasise on health education, addressing social norms, attitudes and preferences for open defecation through community participation and interconnected approach.

Keywords:

Disaster resilience; community participation; disaster recovery; Water, sanitation and hygiene

1. Introduction

There is a gap in existing literature on what works in WASH during recovery and what mechanisms improve community health and resilience. This paper asks, *“How can changes in water and sanitation facilities and hygiene practices during recovery promote community resilience?”* This question is explored using a case study, documenting recovery processes after 2013 Cyclone Phailin in Odisha. This research, originally published as a doctoral thesis was part of a consultancy undertaken for Oxfam India during their Odisha Cyclone Response Program (2013-14). The data was collected using mixed methods such as surveys, participatory learning and action (PLA) tools, observations.

2. Literature review

The paper explores the largely under-researched area of WASH implementation during recovery as an evidence-building exercise for theoretical development and practical application. Disaster recovery is a process that encapsulates all activities, processes and planning that follow any disaster, including short-term activities to restore vital support systems and longer-term activities to return to normal life (Dynes & Quarantelli, 1989; Mileti, 1999; Nigg, 1995; Rathfon, 2010). It is necessary to inspect how decisions about restoration and reconstruction are made and by whom, and most importantly how they impact the community (Nigg 1995). This is closely tied to the notion of change, and how post-disaster changes occur in societies (Mileti, 1999; Rubin, 2009; Chang, et al., 2011). The idea that disasters represent an opportunity for change and renewal is not new: recovery from 1923, Great Kanto earthquake aimed to maximise this ‘window of opportunity’ to trigger wider social reform processes (Fan, 2013).

However, little guidance is available on how to maximise this window of opportunity to effect changes, and how to measure these changes as an outcome of resilience. Resilience thinking offers insight into behaviour of complex systems and the importance of such system attributes, as diversity, ability to self-organise, system memory, hierarchical structure feedback systems and non-

linear processes (Carpenter, et al. 2001; Gunderson & Holling, 2001). The traditional view of resilience as 'bounce back' has been critiqued as it did not lead towards transformational gains (Dodman et al., 2013). The formulation of resilience as the 'bounce-forward' ability of communities from disasters is closely related to the idea of transformational nature of disasters (Manyena, et al., 2011; Pelling, 2011). From the ecological perspective, resilience is the capacity to withstand change for some time but also, past a certain point, to transform while continuing or regaining the ability to provide essential functions, services, amenities, or qualities (Walker & Salt, 2006; Moser, 2008). Manyena et al (2011) elaborate that '..the "bounce forward" notion encapsulates social engineering, if not community agency, in change processes within the context of new realities brought about by a disaster.' (p.419).

Community agency and social engineering have been used to show that changes manifest by incorporating the dynamic interplay of persistence, adaptability and transformability across multiple scales and timeframes (Gunderson & Holling, 2001; Walker et al., 2004). Institutions, leadership, social capital and social learning fall under the scope of resilience (Olsson et al., 2006). Manyena (2009) discusses two approaches to social change: the radical or conservative and non-interventionist approaches. In the former, communities act as change agents and are empowered to transform institutional and legislative policies, while in the latter the practitioners' capacities are strengthened for working within the status quo (Manyena 2009 p.238). Birkland & Waterman (2008) described changes that were formal or informal in nature, they could be proactive, could also be slow or rapid, linear or non-linear, planned or unplanned and may manifest in many aspects across society. Changes are closely linked with the ideas of transformability and spatiality, and are often determined by intervention or human action through technology and knowledge. Such interventions have the potential to increase, improve or diminish resilience. The evidence on how to maximise the window of opportunity and spearhead changes is inadequate. Provision of safe water, safe excreta disposal, and basic hygiene measures such as hand washing with soap are effective interventions both within emergency settings as well as in longer-term development, but innovation and further

research are needed to make WASH response more effective (Brown et al., 2012). The current evidence base on WASH interventions in relation to health outcomes in humanitarian crises is extremely limited (Blanchet et al., 2013). Improving handwashing practices, increasing access to income and strengthening health and sanitation infrastructure are some of the strongest underlying determinants of child stunting in rural indigenous communities in Eastern India (Saxton et al., 2016).

This paper uses systems thinking as an organising framework to identify and study interconnectedness between actors at various scales involved in recovery and WASH. Systems thinking serves multiple objectives while assessing recovery planning: helps understand temporal and spatial aspects of recovery, and focuses on the linkages and interactions between elements and impacts of disaster shocks on these sub-components (Sword-Daniels 2014). Systems view of post-disaster changes emphasises event, action and response by different units and longer-term analyses helps in not just identifying changes and what triggers them but also how these can be sustained. Building on Simonović's (2011) approach on systems thinking, this study analyses temporal dynamics during recovery, particularly in hygiene behaviour and WASH practices. The sub-systems comprise of water and sanitation facilities, individual and household hygiene practices, governance mechanisms, community recovery practices and agency interventions. These are specific to the context of 2013 cyclone Phailin and subsequent floods and erosion in Odisha.

3. Contextual Background

3.1 Study Setting: Socioeconomic profile

Figure 1 shows Puri, Balasore and Ganjam the coastal districts in Odisha where the response programme was undertaken in 2013-14. Puri and Ganjam lie on the outskirts of Chilka lake, brackish water lagoon, covering an area of 1000 sq. kms. The vast majority of population in these districts are rural, where agriculture is the major occupation and rice is the main crop. Men and youth in Odisha migrate for work to Kerala, Karnataka and Tamil Nadu – Puri has a 27% household

migration rate (Sharma et al 2014). Odisha villages are characterised by a complex interplay of caste, class and gender mediated by the circumstances emerging in multiple disasters (Ray-Bennett 2009 p.18). The majority of coastal and island population are engaged in fishing or allied activities and belong to the Noliya community who had migrated from Andhra Pradesh (Mohanty et al., n.d).

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Odisha Study Map

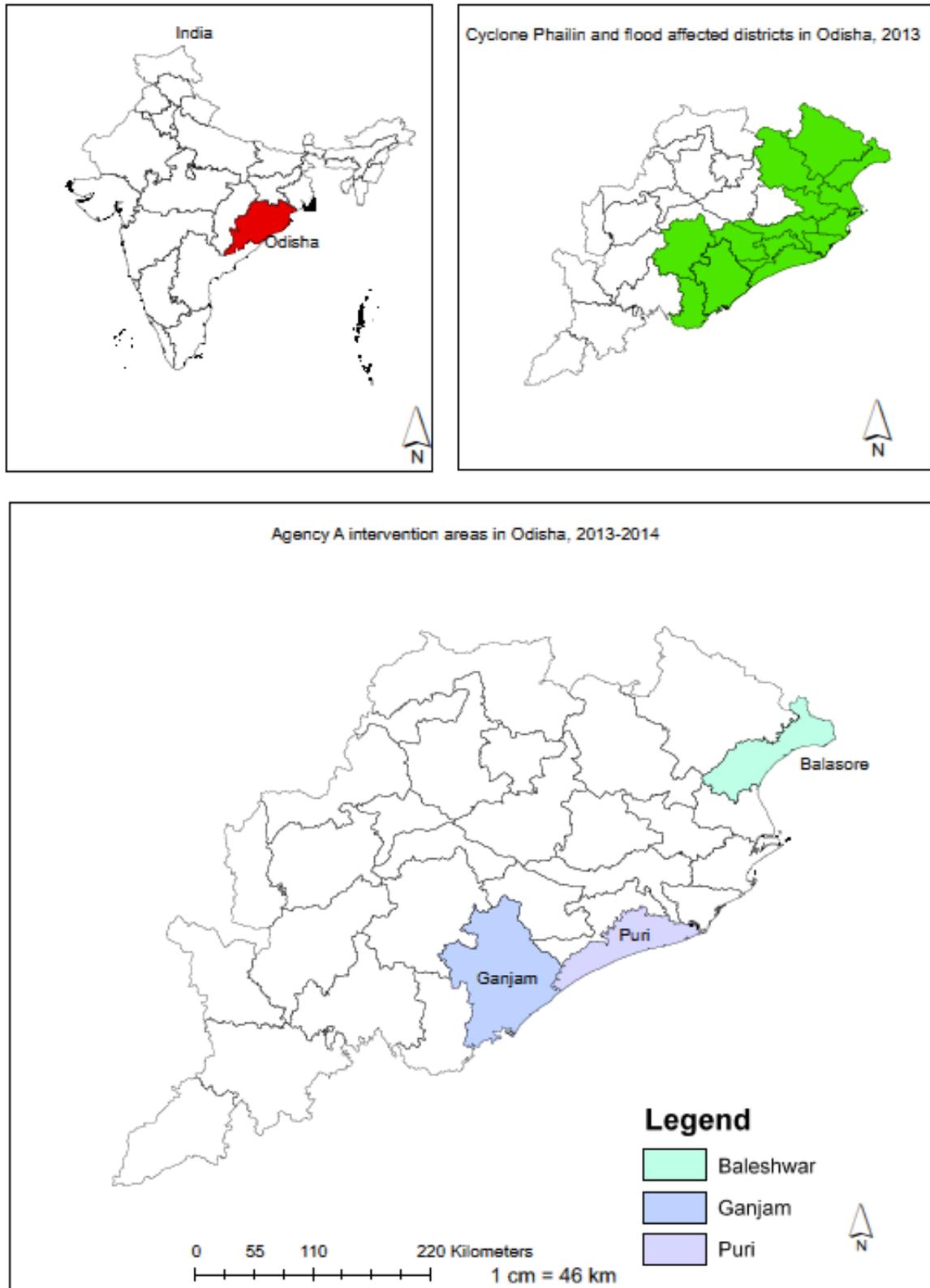


Figure 1: Map indicating Oxfam intervention areas in 2013-14, Puri, Ganjam and Balasore

3.2 Pre-disaster WASH background in Odisha

Odisha is among the lowest performing states in terms of latrine coverage (Ghosh & Cairncross, 2013). It has the lowest level of household toilet access in India: at an 84.7 per cent open defecation rate (MHA, 2011 cited in Mommen and More, 2013). Between 1993 and 2011, toilet coverage in Odisha increased from 1.4 per cent to 14 per cent – an annual increase of around 0.7 per cent (Mommen & More, 2013). Routray et al., 2015 examined defecation patterns of different groups of people in rural areas of Puri, Odisha to identify causes and determinants of latrine non-use, with a special focus on government-subsidized latrine owners, and shortcomings in household sanitation infrastructure built with government subsidies in 2011.

Odisha's performance with respect to provision of safe drinking water has been satisfactory with 75 % of households having access to an improved drinking water source (i.e., community taps and tubewells) in 2011. Primary data indicated pre-disaster context in WASH was very sub-standard in Odisha. Rural households depended on ground water sources for daily consumption. In Balasore, people relied on river and ponds as only 10% of the population had access to tube wells. The coastal population relied on artesian wells, which work without a pump solely relying on enough pressure in the aquifer to bring water to the surface. There were few raised water sources in Puri, which were constructed by the Orissa State Branch (OSB) of the Indian Red Cross Society (IRCS) under the flood rehabilitation project (IFRC, 2002). In 2001, Spanish Red Cross constructed raised wells after 1999 super cyclone. More than a decade later the condition of these sources was dismal; poor maintenance had resulted in cracks to the structures. There was no cover for open water sources like wells for preventing dust and debris from falling into the water source.

Open defecation was rampant: only 15 per cent of households in Odisha had access to improved sanitation. 58% of the survey respondents defecated in open fields, 25% near open water sources and only 7% used latrines. Women practiced open defecation in the dark or after sunset, or before sunrise, to avoid being seen by others.

3.3 Cyclone Phailin and its impact

Odisha faces multiple disasters such as floods, cyclones and droughts, and faces poverty, unemployment, and low per capita income (Ray-Bennett 2009a). One of the worst disasters to hit India, called the Supercyclone occurred in 1999 where many lives were lost. Since then, Government of Odisha had constituted the Odisha State Disaster Management Authority (OSDMA), and had gained enormous success in managing and coordinating flood and cyclone preparedness measures.

Cyclone Phailin, categorised as Very Severe Cyclonic Storm, made its landfall in Ganjam, Odisha on 12th October 2013 affecting Ganjam, Puri and Khorda districts; while subsequent floods hit Balasore and Mayurbhanj in the following days due to low pressure and continuous rainfall (IMD, 2013). The cyclone killed 44 people, damaged 256,633 homes and affected 13.2 million people (World Bank, 2013). The floods affected 1.2 crore people in 16000 villages and 2015 gram panchayats. Accurate weather forecasting, effective planning, and the dedication showed by the administrative machinery ensured almost 'zero casualty' during the cyclone (Dash, 2013). The government, humanitarian and community agencies mobilised evacuation, early search and rescue teams and coordination efforts immediately. International donors – UK AID, ECHO, World Bank (WB) and Asian Development Bank (ADB) provided financial support in response to the disaster. UK AID provided £2m through its Rapid Response Facility (RRF) for responding to the immediate humanitarian needs for implementation from 1st November 2013 for 12 weeks (UK AID 2013). The European Commission provided €3 million to aid cyclone-affected populations (ECHO 2013).

3.4 Oxfam's variegated response in Odisha

Immediately after the cyclone and floods, Oxfam responded to emergency needs in Puri, Balasore and Ganjam. Oxfam deployed contingency stocks, mobilised water filters and chlorine tablets, and deployed assessment teams and human resources immediately. WASH support was provided in two phases after the cyclone and floods – immediate emergency water provision and treatment, followed by rehabilitation of water sources and provision of shared sanitation facilities during the

early recovery programme. Oxfam had a variegated response in Odisha: in Balasore they responded for three months only, supported by UK AID funds, while in Puri and Ganjam the programme continued for 12 months funded with both UK AID and ECHO support (Table 1).

Table 1: Oxfam's variegated response in the three districts

District	Donor	Programme duration
Puri	UK AID, ECHO	12 months
Balasore	UK AID	3 months
Ganjam	UK AID, ECHO	12 months

Based on emergency needs assessment, Oxfam proposed the following WASH interventions in Puri and Ganjam:

1. Rehabilitation of existing water sources with aprons and soakpits (100 nos);
2. Raising open wells and well cover and retrofitting (30 nos);
3. Installation of handpumps (Popular-VI), aprons and privacy screen (50 nos);
4. Installation of latrines and bathing complex (100 nos);
5. Distribution of toolkits for repair and maintenance (20 nos), and training (4 nos); and
6. Water testing and chlorination of handpumps and open wells (200 nos).

Besides funding, the variegated response depended on which villages were prioritised as per their needs and urgency, and whether they were affected by cyclones, floods and erosion. Cyclone-affected villages were prioritised over floods and erosion affected villages.

4. Methodology

To answer the question: *"How can changes in water and sanitation facilities and hygiene practices during recovery promote community resilience?"*, this research uses mixed methods to document post-disaster changes in WASH.

4.1 Quantitative methods

Oxfam conducted two cross-sectional household surveys in Puri and Ganjam districts in January and August 2014 to inform the programme objectives. Information on households composition, assets practices related water, sanitation and hygiene were gathered in this survey.

From the baseline survey Table no. 2 summarises the results: 374 households (*191 in Ganjam and 183 in Puri: 7% of the total population in 39 villages*) were randomly selected based on target population of 7340 households (*2,939 in Ganjam; 4401 in Puri*). While the end line comprised of 366 households (*181 in Ganjam and 185 in Puri*). It is estimated that around 90% of the survey respondents were the same in the baseline as they were in the end line. Field volunteers were trained on using the survey modules, and also involved in the piloting of the tools prior to the data collection. Information from the survey was also supplemented and verified wherever possible by jotting down observations of the non-verbal responses and attitudes of the survey respondents.

4.2 Qualitative methods

The author of his paper collected qualitative data from Puri and Balasore districts depending on their accessibility and feasibility during the response programme. Data were collected using focus group discussions, interviews, and participatory learning and action tools such as transect walks, (FGDs), mapping and change analyses, and priority ranking exercises with community members. FGDs were facilitated by Oxfam staff (including the author) in *Odia* (local language). 40 key informant interviews and 10 unstructured household interviews were conducted to gather additional information and various perspectives on disaster recovery objectives and planning (See Table no. 3). The household interviews were unstructured and not recorded, as it was found to be intrusive in a post-disaster setting.

The households were purposively sampled to collect information about community lives post-disaster, WASH practices and recovery experiences. Personal information of all interviewees was recorded in a password-protected Excel sheet; names were codified to maintain the anonymity of

the interviewee. Besides interviews and participatory learning and action techniques, the study also includes observations and photographs during field visits. 35 meetings with stakeholders were observed during the course of the intervention, including staff meetings, training and community mobilization and relief committee meetings. Observations were documented to assess participation (e.g. how many people, gender, caste), group dynamics (e.g. who spoke, who was silent, where people sat), and discussion content (e.g. issues discussed, decisions and actions taken).

4.3 Data Analysis

The survey data were entered in Microsoft-Excel and examined for completeness and accuracy using range checks, frequencies and analysed using descriptive statistics. All the qualitative data was recorded and transcribed using mindmaps. Initial analysis of the data was guided by thematic network analysis with the help of qualitative data analysis software Nvivo 12. The analysis was based on the Framework approach (Gale et al., 2013). Three levels of thematic codes were developed and applied to the data. Initially contextual analysis was carried out after listing a priori themes based on the geographical location (coastal, island, mainland or riverine villages) and nature of disaster (floods, cyclone or erosion). Following this, a set of emerging themes from the transcripts were coded in Nvivo congruent with the research questions. Finally, a third layer of themes was developed, based on synthesis and cross-comparison of data from different data sources to make a comprehensive analysis with survey results. In order to triangulate findings from the quantitative survey and qualitative discussions, the results are presented together.

4.3 Ethical approval

The study followed official (and necessary) procedures as per the Ethical guidelines at the University College London and complying with the Data Protection Act 1998 II. All data collection was conducted following informed consent recorded on paper (signed by all participants) after explaining the purpose of the study. Verbal consent was taken from a few participants who were apprehensive

about giving anything in writing, though they agreed to participate in the study. Confidentiality of all participants was assured during the data analysis and quotes are provided here with pseudonyms.

5. Results

5.1 Respondent characteristics

Both the cross-sectional surveys were carried out only in Puri and Ganjam. The end line survey samples ($n_1=374$) were matched for respondent characteristics with baseline ($n_2 = 366$).

Table 2 provides the characteristics of the respondents in these surveys..

Table 2: Respondent characteristics of baseline and end line survey

	Baseline Survey respondents	End line Survey respondents
<i>n</i>	374	366
Ganjam	191	181
Puri	183	185
Male respondents, %	40	39
Female respondents, %	60	61

40 interviews were conducted with key informants across Odisha. In depth interviews were conducted at the household level in Puri and Balasore. The respondent details are summarised in Table 3.

Table 3: Respondent characteristics of key informant and household interviews

Key Informant Interviews	
<i>n</i>	40
State Government Officials, %	5
District Authority Officials, %	5
Block Authority Officials, %	2.5
Gram Panchayat Members, %	12.5
Non-Governmental Staff, %	7.5
International NGOs, %	17.5
School staff and teachers, %	25
Oxfam staff, %	25
In-Depth Interviews	
Household interviews, <i>n</i>	10
Female, <i>n</i>	7

The thematic results are presented focusing on changes in WASH practices, community response to such interventions and unpacking other recovery objectives.

5.2 WASH practices: contextual changes and response to interventions

i) Changes in water sources and treatment practices

The end line data indicate there was a 5.6% increase in households that reported depending on tube well or handpumps for drinking water, while 7.4 % additional households reported owning their own handpumps, and 7.3 % increase in those depending on communal water sources. 2.1% respondents indicated depending on newly installed handpumps by Oxfam in the end line.

Sources of drinking water	Baseline	End line
Well, %	18	12.4
Tube well/Handpump, %	77	82.6
Public Piped Water Scheme, %	4	4.7
Individually owned, %	29	36.4
Communal sources, %	10	17.3
Government or Panchayat provisioned, %	58	35.4
Oxfam provisioned, %	0	2.1

There was a general trend to consume safer water, from household or communally owned water sources instead of open water sources such as rivers, ponds and lakes. The dependence on handpumps provided by government was decreasing since they were damaged during the storm surge; there were also reports of deteriorating water quality due to inundation. Training community members for repair and rehabilitation of communal water sources was undertaken, usually from 4-5 neighbouring households for operation and maintenance of water facilities. For increasing resilience of communities from future floods and inundation, Oxfam constructed handpumps on raised

platforms with ramps for access and proper drainage. Some of these were installed in Gopinathpur, Sanpatna and Arakhakuda in Puri in Feb-Mar 2014. The platforms were built using concrete aprons and drainage. An expert engineer, who advised Oxfam on their WASH response commented on the water sources in Puri as follows:

“Many people rely on drinking water taken from open wells or partially open wells. The very nature of these types of water supply means they are susceptible to contamination either from the well becoming inundated during a flood or from debris being blown into the well during a storm. Often the apron around open wells is not totally effective, increasing the risk of water in the well becoming polluted when there is standing water around the wellhead. The result is that the water quality in poorly maintained open wells deteriorates due to a cyclone.” (KII, 7)

However, these were communal water sources and did not cater to the large populations living in the village and consuming water from untreated sources. Access and distance were some of the issues that female community members mentioned were hampering their regular usage, while others who did use the facilities usually lived in the vicinity.

ii) Community response to sanitation interventions

The survey data shows that there were comparatively fewer changes in relation to sanitation. There was a decrease in unsafe defecation practices: 6% reduction in households that practiced open defecation near the water sources, and 10% reduction in those defecating on roadside.

Place for defecation	Baseline	End line
Latrine, %	7	9
Open field, %	58	72
Near waterbodies, %	25	19
Roadside, %	10	0

Majority of the population defecated outside their village in the fields or bushes; women often went early in the morning before sunrise to avoid being seen by others. Empty spaces near open water bodies were commonly preferred for open defecation. The ready access to water for washing clothes, bathing were added advantages for defecating near the water bodies as many households did not have a functional handpump after the disaster. These factors continued to influence practices during recovery phase. From observations during field visits it emerged that very few villages were keen to build and use latrines. Community members continued to practice open defecation despite awareness of the risks.

Keeping in mind the traditionally preferred means of open defecation, Oxfam came up with the strategy of building shared latrines, in order to generate demand for individual household toilets. Accordingly, six shared family latrines were constructed in February 2014 in Gopinathpur, Puri early on in the campaign. This was combined with rigorous hygiene promotion campaigns to encourage and motivate households to use toilets, and maintain these latrines. The latrines were constructed after selecting the sites through community consultations, understanding the inundation levels and social norms related to sharing. Detailed records and procedures had to be maintained for number of households using latrines, male and female, and children. No-Objection Certificates (NOC) were taken and community resolutions were passed on agreement on the user groups and hand over of cleaning materials – harpic (disinfectant), *jhadoo* (brooms) and buckets for storing water for anal-cleansing. The programme staff undertook consultation with user groups and regular monitoring visits to inspect the facilities, to understand household use of latrines and challenges faced by members. The latrines were provided with fences, and new handpumps near the latrines (for anal-cleansing and flushing), and hand washing stations to encourage use of latrines.

Despite all these measures, people were found to prefer open defecation due to cultural attitudes, despite awareness generation of the benefits of using latrines.

Mrs O2 (27, F) stated,

"..using the communal latrine is easy, because it is behind our home, and shared by our neighbours. But it is inconvenient to clean and maintain it because after use nobody cleans, I am responsible for bringing water and flushing and cleaning the toilet." (IDI 2, Gopinathpur, Puri, 28/01/14)

Meanwhile Mrs. O3 (38, F), mother of 4 children confessed,

"Honestly, I continue to defecate behind the bushes, once it gets dark. The central location of the toilet makes me uncomfortable because people can find out and its very uncomfortable, I suggest my children to use in the dark with the solar light, but I prefer going in the open because I am used to it." (IDI 2, Gopinathpur, Puri, 28/01/14)

Meanwhile households in Gombhoria in Balasore continued using self-built latrines as they lacked agency support for recovery. The latrines were built with locally salvaged materials, and temporary pits, and were used during the night by women and children. The men preferred open defecation and suggested this was to prevent faster filling up of the small pit. The damaged facilities were used without proper repairs or restoration due to lack of adequate funds, or financial support by agencies. It was observed that the structures were risky, and accident-prone for children and the elderly or disabled.

Ms O4 (14F), was living in a temporary shelter made of plastic sheets after the floods. Due to erosion, her family had lost their land, farms and handpumps. She says:

"We use toilets for doing our business in school and I prefer that. Latrine is better than going in the open. If I go out in the open people see me and I don't feel safe sometimes. Nobody will find out if I go to latrine in my own home."(IDI 4, Chadanamkhana, Balasore 03/03/14)

The above comment indicates motivation by adolescent girls to build and use household toilets. Adolescent girls and adult women found latrines useful during menstruation, especially to clean their menstrual rags, since there was always movement of people at ponds and public water

supply points which would make them ashamed to be seen cleaning them (See Krishnan & Twigg, 2016). The latrine's proximity to the house and availability of a water supply point at or next to the house were thus key reasons that attracted women and adolescents to use their latrine.

iii) Response to hygiene promotion and menstrual hygiene interventions

The survey data showed increase in knowledge about, and methods of handwashing practices. It is difficult to validate the survey results because they could not be consistently triangulated through observations. These results could be influenced by social desirability biases of the respondents.

Handwashing before eating	Baseline	End line
With soap, %	76	80
Only water, %	23	18
Ash, %	1	1
Soil, %	0	1
Handwashing after defecation		
With soap, %	74	89
Only water, %	6	2
Ash, %	0	1
Soil, %	20	8

Compared to the baseline more people were washing their hands with soap at these two critical times. For using soap before eating there was a 5.2% increase, and for using soap after defecation there was a 20.3% increase. Use of soil or ash after defecation had reduced from 20% to just 8%.

Oxfam had focused on generating awareness and disseminated hygiene messages on proper solid waste management, water quality, sanitation, and hygiene practices. Oxfam staff undertook mass campaigns, village cleanliness drives, solid waste management, printing and displaying IEC materials,

and capacity building. The key hygiene messages were related to hand washing, water handling, food handling, menstrual hygiene, solid waste management and use of sanitation practices.

These initiatives were demand-driven and responsive to community needs. For instance, on 4th November 2013, there was an outbreak of diarrhoeal diseases in Arakhakuda, Puri. Oxfam immediately set up Oral Rehydration Salt (ORS) booths, held demonstrations how to prepare ORS and prevent children from falling sick through consumption of safe water by installing water treatment systems in local schools.

5.3 Recovery priorities and mechanisms for change

During the FGDs in Puri and Balasore, respondents were encouraged to list their priorities for recovery. Their priorities depended on the damages incurred, the type of disaster, geographical location and socio-economic conditions. Based on the typology of the villages, Table 4 presents the priorities listed in the coastal villages along Chilka lake and island villages within Chilka and the two riverine villages in Balasore – Chadanamkhana and Gombhoria. The fishing villages along the coast and islands within Chilka lake Puri had lost their *kucha* houses and livelihood assets such as fishing nets and boats due to the cyclone. They prioritised rebuilding their houses, and restoring livelihood assets so that the earned income can be invested in other recovery priorities

Table 4: Community priorities in study villages in Puri and Balasore

	Coastal	Island	Mainland	Chadanamkhana	Gombhoria
Priority #1	Food security	Repair boats and fishing nets	Livelihoods support	Shelter	Housing
Priority #2	Income generation – repair boats and fishing nets	Drinking water supply	Drinking water facilities	Livelihood support	Latrine facilities
Priority #3	Housing	Housing	Latrine facilities	Land	Drinking water
Priority #4	Drinking water	Health	Menstrual	Stone pitching to	Livelihood

	supply	support – health disability access	prevent erosion	support
Priority #5	Latrine facilities	Latrine facilities	Latrine facilities	Health support

Latrine and menstrual hygiene emerged as priorities in mainland villages of Puri, especially as women and adolescent girls in these areas lived in densely populated settlements. They were habituated to using latrines in high schools or when they visited urban centers in Puri town. They preferred latrines for safety and privacy reasons as well. If they had to tend to their menstrual hygiene needs, they could do it only while defecating or bathing, hence the bathing cubicles installed by Oxfam in Puri were highly appreciated by the communities.

When WASH did not emerge as a key priority in FGDs and interviews, the respondents were further probed to illustrate the reasons for non-adoption or non-use of latrines. Traditional practices and preferences for open defecation, and cost of rebuilding latrines while other unmet needs required investments were often cited as major reasons for not prioritising WASH during recovery. Those who were provided with family latrines in Puri had complained that the location of the structures were not built appropriate, the temporary structure constructed of a door, and walls made of tarpaulin sheets which meant it was very hot during the day when temperatures were 38-42 degrees outside. Respondents were concerned with the central location of the latrine, which meant others could see them when they went to use the latrine. Availability of water near the latrine was also a major deterrent, people were washers (used water for anal cleansing and post defecation ritual bathing). When this came up as a community complaint in Gopinathpur, Puri Oxfam installed a handpump for the sole purpose of anal-cleansing and maintaining the latrine. This led to the subsequent decision to install handpumps where feasible, and required.

In most cases, FGD respondents prioritised shelter and livelihoods over WASH objectives. The cyclone impacts varied across the villages: in coastal villages Sanpatna and Arakhakuda, *kucha* (non-concrete) houses were completely destroyed, and *pakka* (concrete) houses suffered structural damages. The fishing households in coastal and island villages had also suffered damages to their fishing boats and nets. In these villages, the markets were difficult to access, so the availability of food for the household members was limited. These households prioritised food and income support to restart their fishing. For the fishing households living in *kucha* houses the priority was shelter and other basic facilities. In the mainland villages in Puri, cyclone had affected the crops and farmlands were rendered salinised. The farming groups prioritised seed support, and irrigation facilities to ensure that their loss in farming income can be regained. On the other hand, in Chadanamkhana, which was affected by riverine erosion households were displaced due to loss of land for homesteads and farming. In this village the community participants prioritised land tenure security and flood and erosion protection works (stone pitching or spurring to prevent erosion).

6. Discussion

This study used a mixed methods approach to explore and develop an in-depth understanding of different factors responsible for low adoption of safe WASH practices latrines in rural areas in Odisha, India, after Cyclone Phailin. These factors, notably included preferences for open defecation and low adoption of family latrines provided by Oxfam. In flood-affected villages in Balasore, where no latrines were provided by Oxfam, households were motivated to build and use latrines with salvaged materials and were self-funded. While in cyclone-affected areas in Puri and Ganjam, where Oxfam constructed family latrines, evidence shows that many people were reluctant to adopt latrines and instead continued open defecation. A clear preference for open defecation in rural areas, particularly by male members of the households has been documented in similar studies in Odisha, in non-disaster contexts (Clasen et al., 2015) and Madhya Pradesh (Patil et al., 2015).

Systems thinking approach during analysis allows to draw upon interconnectedness between various domains within WASH, and other sectors in recovery. Despite minimal reduction in open defecation rates, respondents who were keen on using toilets mentioned safety, privacy, economic means, availability of financial support or external agencies encouraging them to adopt and build latrines. Provision of cleaning materials, handpumps in the vicinity for anal-cleansing, and hygiene awareness were facilitating factors. Latrine design, and location of the latrine structure were also encouraging factors. In the households where latrine was constructed – either by Oxfam or respondents themselves – there were differences in who used the latrines. The burden of cleaning and maintaining toilets was also largely on women, who also had to fetch water from a distance and keep water buckets filled for anal cleansing purposes for the next user. Men and elderly members continued to defecate in the open, while women, adolescents and young children were encouraged to use the latrines in the day. Those who did not prefer latrines, or adopt latrine usage cited habit as an important factor, this can be attributed to traditional beliefs and customs related to open defecation. Lower income families were also constrained by their inability to install individual latrines. Although at the time of writing this article, in 2018, there has been tremendous policy push and incentivisation by the government to construct household latrines; size of the latrine units, substandard quality of construction, and social norms related to open defecation continue to influence defecation practices.

While Oxfam was operational across all three districts, their involvement and priorities varied as per the nature of disasters and funding available. The priorities were determined and assessed during the immediate aftermath of the disasters by agency officials. Although community priorities reflected the longer-term recovery needs, external agencies were involved in initial provision of food and non-food items, emergency shelter provision, and installation of water supply. In a truly participatory approach, communities act as change agents and are empowered to transform institutional and legislative policies, while in the approaches witnessed in the case of Odisha after

the cyclone, the capacities of the communities are enhanced to work within the status quo (Manyena 2009 p.238).

There were differences in the community priorities and recovery support provided by agencies. An opportunity to address humanitarian and recovery needs, holistically in the villages affected by floods and erosion in Balasore was missed. Although Oxfam prioritised the cyclone-affected Puri and Ganjam districts for WASH recovery support, it was limited in its scale and duration to have any impact on health outcomes. They also ignored longer-term needs such as protection and resettlement across Puri, Ganjam and Balasore.

As humanitarian efforts are catered to select few members of the community, targeting and identification of beneficiaries are undertaken through community consultations. The equity perspective of sanitation is clearly articulated in the SDGs given that poor sanitation hits the poor the hardest, especially the children living in the poorest households (Cronin et al., 2017). There are equity implications, on women and poor households, who have limited means and support to meet the range of needs during recovery. It's not clear what intentional efforts were taken by Oxfam to systematically include socially and geographically marginalised groups in decision-making, which could exacerbate social inequities. There are programmatic implications from this study, which encourage humanitarian actors to not only include a holistic approach to recovery using systems thinking, but also to ensure participatory, equitable and just approaches to programme design and implementation.

This study had its strengths and limitations. There were conceptual challenges in measuring resilience, as the author is of the belief that resilience is a process, and not an outcome which can be measured (Manyena et al., 2011). The quantitative survey had methodological limitations, as it was designed by an agency for measuring change (e.g. small sample sizes, the use of self-reported

behavioural recall had its associated biases, difficulty in blinding study participants, etc.), which limited the ability to determine associative, let alone causal, relationships. The qualitative data collection was also undertaken as an Oxfam staff, which could have influenced responses to increase social desirability or expressing programme-related concerns. In FGDs, group dynamics could have influenced responses as participation was not uniform and some members were more vocal than others. Lastly, major limitations of this study were related to time and resource constraints, as the study focused exclusively on community recovery in WASH and Oxfam's response; it did not explore impacts on health outcomes, or gather perspectives from government officials, which could have strengthened the study's inferences.

7. Conclusion

This study benefits as the author was part of the humanitarian system, witnessing first-hand how limited resources are mobilised to cater to the urgent needs of the most vulnerable populations. It highlights an understudied, and underfunded area of disaster recovery, and puts the spotlight on WASH behaviour change. Its handy for the lessons it draws for humanitarian practitioners who are involved in such relief and response programmes, and contributes to the growing body of studies that measure resilience by advocating for a systems thinking approach.

Disaster recovery offers an opportunity for community participation in planning and effecting changes in WASH circumstances post-disasters. This paper draws attention to inherent weaknesses and gaps in WASH recovery programmes undertaken in Odisha, after multiple disasters in 2013-14. Humanitarian agencies have to address several factors – socioeconomic characteristics, nature of disasters, motivation and cultural norms – that determine changes in WASH behaviour. Recovery programmes should be holistic in their approach to meet community priorities through participatory approaches, and address various related to water supply, menstrual hygiene needs, private and secure locations alongwith competing objectives to rebuild homes, strengthen livelihood

opportunities and align them with disaster preparedness and mitigation measures. There are equity concerns which should be addressed in a recovery phase through participatory approaches instead of top-down consultative processes currently being practised. There is need for stronger policy efforts to link post-disaster recovery needs in WASH with developmental objectives and address cultural attitudes in sanitation particularly, and WASH in general. In the absence of concentrated efforts in improving access to WASH facilities, the pre-development challenges remain and the window of opportunity provided after a disaster is lost.

Declaration of interest

The author declares there are no conflicting interests in publishing this research

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