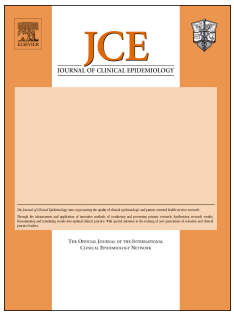

A scoping review establishes need for consensus guidance on reporting health equity in observational studies

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A scoping review establishes need for consensus guidance on reporting health equity in observational studies

Xiaoqin Wang 1*, Omar Dewidar 2, Anita Rizvi 3, Jimmy Huang 2, Payaam Desai 2, Rebecca Doyle 2, Elizabeth Ghogomu 2, Tamara Rader 4, Stuart G Nicholls 5, Alba Antequera 6, Alison Krentel 2,7, Beverley Shea 2,7, Billie-Jo Hardy 8,9, Catherine Chamberlain 10, Charles S. Wiysonge 11-13, Cindy Feng 14, Clara Juando-Prats 8,9, Daeria O. Lawson 15, Ekwaro A. Obuku 16-18, Elizabeth Kristjansson 3, Erik von Elm 19, Harry Wang 2,20, Holly Ellingwood 21, Hugh Sharma Waddington 22,23, Jacqueline Ramke 24,25, Janet Elizabeth Jull 26, Janet Hatcher-Roberts 2,7, Janice Tufte 27, Julian Little 7, Lawrence Mbuagbaw 28-32, Laura Weeks 33, Loveline Lum Niba 34, Luis Gabriel Cuervo 35, Luke Wolfenden 36, Mwenya Kasonde 37, Marc T Avey 38, Melissa K. Sharp 39, Michael Johnson Mahande 40, Miriam Nkangu 7, Olivia Magwood 2,41, Peter Craig 42, Peter Tugwell 2,7, 43, Sarah Funnell 44,45, SG Noorduyn 15, Tamara Kredo 12, Tanya Horsley 46, Taryn Young 11, Tomas Pantoja 47, Zulfiqar Bhutta 48,49, Andrea Martel 50, Vivian A Welch 2,7

1. Michael G. DeGroote Institute for Pain Research and Care, McMaster University, Hamilton, ON L8S 4L8, Canada
2. Bruyère Research Institute, Ottawa, ON K1R 6M1, Canada
3. School of Psychology, University of Ottawa, Faculty of Social Sciences, Ottawa, ON K1N 6N5, Canada
4. Freelance health research librarian, (no affiliation), Ottawa, Canada
5. Clinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, ON K1H 8L6, Canada
6. International Health Department. ISGlobal, Hospital Clínic - Universitat de Barcelona, 585, 08007 Barcelona, Spain.
7. School of Epidemiology and Public Health, University of Ottawa, Ottawa, ON K1N 6N5, Canada
8. Dalla Lana School of Public Health, University of Toronto, Toronto, ON M5S, Canada
9. Li Ka Shing Knowledge Institute, Unity Health Toronto, Toronto, ON M5B 1T8, Canada
10. Indigenous Health Equity Unit, Melbourne School of Population and Global Health, The University of Melbourne, Parkville VIC 3010, Victoria, Australia
11. Centre for Evidence-based Health Care, Department of Global Health, Stellenbosch University, Cape Town 7505, South Africa
12. Cochrane South Africa, South African Medical Research Council, Cape Town, South Africa
13. HIV and other Infectious Diseases Research Unit, South African Medical Research Council, Durban 4091, South Africa
14. Department of Community Health and Epidemiology, Faculty of Medicine, Dalhousie University, Halifax, NS B3H 4R2, Canada
15. Department of Health Research Methods, Evidence, and Impact, McMaster University, Hamilton, ON L8S 4L8, Canada
16. Africa Centre for Systematic Reviews & Knowledge Translation, College of Health Sciences, Makerere University, Kampala 7062, Uganda
17. Department of Global Health Security, Infectious Diseases Institute, College of Health Sciences, Makerere University, Kampala 7062, Uganda
18. Faculty of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, University of London, London WC1E 6BT, United Kingdom

19. Cochrane Switzerland, Unisanté Lausanne, Lausanne CH-1010, Switzerland
20. University of Ottawa Faculty of Medicine, Ottawa, ON K1N 6N5, Canada
21. Department of Psychology, Department of Law, Carleton University, Ottawa, ON K1S 5B6, Canada
22. Environmental Health Group, Department of Disease Control, London School of Hygiene & Tropical Medicine, London WC1E 7HT, UK
23. London International Development Centre, London, ON N5V 4T3, Canada
24. International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London WC1E 7HT, UK
25. School of Optometry and Vision Science, University of Auckland, Auckland 1010, New Zealand
26. School of Rehabilitation Therapy, Queen's University, Kingston, ON K7L 3N6, Canada
27. Cochrane Consumer, Seattle, Washington, United States
28. Department of Anesthesia, McMaster University, Hamilton, ON L8S 4L8, Canada
29. Department of Pediatrics, McMaster University, Hamilton, ON L8S 4L8, Canada
30. Biostatistics Unit, Father Sean O'Sullivan Research Centre, St Joseph's Healthcare, Hamilton, ON L8N 4A6, Canada
31. Centre for Development of Best Practices in Health (CDBPH), Yaoundé Central Hospital, VGC6+C52 , Yaoundé, Cameroon
32. Division of Epidemiology and Biostatistics, Department of Global Health, Stellenbosch University, Cape Town 7602, South Africa
33. CADTH, Ottawa, Ontario, Canada.
34. Department of Public Health, Faculty of Health Sciences, The University of Bamenda, Bamenda, Cameroon.
35. Pan American Health Organization (PAHO/WHO), Washington, DC 20037, United States
36. School of medicine and Public Health, The University of Newcastle, Callaghan NSW 2308, Australia.
37. Liverpool School of Tropical Medicine, Liverpool L3 5QA, UK
38. Canadian Council on Animal Care, Ottawa, ON K2P 2R3, Canada
39. Department of General Practice, RCSI University of Medicine and Health Sciences, Dublin, D02 YN77, Ireland
40. Department of Epidemiology & Biostatistics, Kilimanjaro Christian Medical University College, Kilimanjaro, M8HH+MQ4, Tanzania
41. Interdisciplinary School of Health Sciences, University of Ottawa, Ottawa, ON K1N 6N5, Canada
42. MRC/CSO Social and Public Health Science Unit, University of Glasgow, Glasgow G12 8QQ, UK
43. Department of Medicine, University of Ottawa, Ottawa, ON K1N 6N5, Canada
44. Department of Family Medicine, Queen’s University, Kingston, ON K7L 3N6, Canada
45. Department of Family Medicine, Faculty of Medicine, University of Ottawa, Ottawa, ON K1N 6N5, Canada
46. Royal College of Physicians and Surgeons of Canada, Ottawa, ON K1S 5N8, Canada
47. Department of Family Medicine, Pontificia Universidad Católica de Chile, Santiago 8331150, Chile
48. Centre for Global Child Health, The Hospital for Sick Children, Toronto, ON M5G 1X8, Canada
49. Institute for Global Health and Development, The Aga Khan University, Karachi 74000, Pakistan
50. University of Toronto, Toronto, ON M5S, Canada

*Corresponding author: Xiaoqin Wang. E-mail: wangx431@mcmaster.ca; Tel: +1 3658886870.
Address: Michael G. DeGroote Institute for Pain Research and Care, McMaster University; 1280 Main Street West, Hamilton, ON, Canada, L8S 1A8

Abstract

Objective

To evaluate the support from the available guidance on reporting of health equity in research for our candidate items and to identify additional items for the STROBE (Strengthening Reporting of Observational studies in Epidemiology)-Equity extension.

Study design and setting

We conducted a scoping review by searching Embase, MEDLINE, CINAHL, Cochrane Methodology Register, LILACS, and Caribbean Centre on Health Sciences Information up to January 2022. We also searched reference lists and grey literature for additional resources. We included guidance and assessments (hereafter termed "resources") related to conduct and/or reporting for any type of health research with or about people experiencing health inequity.

Results

We included thirty-four resources, which supported one or more candidate items or contributed to new items about health equity reporting in observational research. Each candidate item was supported by a median of six (range: 1 - 15) resources. In addition, 12 resources suggested 13 new items, such as "report the background of investigators".

Conclusions

Existing resources for reporting health equity in observational studies aligned with our interim checklist of candidate items. We also identified additional items that will be considered in the development of a consensus- and evidence-based guideline for reporting health equity in observational studies.

Keywords: health equity; observational studies; reporting guideline; scoping review; STROBE_Equity

Running title: Consensus guidance on reporting health equity in observational studies is needed

Word count: 199

What is new?

Key findings

- All candidate items proposed to extend STROBE (Strengthening Reporting of Observational studies in Epidemiology) for equity were supported by at least one resource.

  We identified 13 additional items related to defining health equity terms; these described the role of racism and discrimination, composition and training of the researcher(s), considering relevant factors in the study methods, and data sharing specific to and across equity factors.

What adds to what is known?

- Through the current resources, we confirmed the support of the interim checklist of items and identified new items for reporting health equity in observational studies. This adds an important tool for observational studies, including those underpinning public health, and health systems and services research.

What is the implication and what should change now?

- Researchers designing observational studies could refer to the items from this review when designing and reporting their studies.
- These items will be used for the consensus process to develop a research reporting guideline on health equity to extend STROBE.

1. Introduction

Health inequities are defined as “differences which are unnecessary and avoidable, unfair and unjust” [1]. Health inequities exist across numerous dimensions such as income, education, geographical setting, age, ethnicity and gender; these factors are well documented in influencing health outcomes [2-4]. These health disparities have persisted despite global efforts to reduce them by organizations such as the World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) [5-8]. Addressing the health needs of populations experiencing inequities requires conducting research merging scientific standards and their sociocultural contexts.

Observational studies predominate in health-related research[9] and are well-suited to answer research questions of health inequity such as access, implementation, treatment adherence, and public health interventions[10-12]. We defined observational studies as those relevant to the STROBE reporting guideline, including case-control, cohort and cross-sectional studies[13]. Compared with some randomized controlled trials (RCTs), observational studies have inherently stronger external validity because they provide insight about healthcare delivery to all patients in routine practice, the health impacts of policy and practice interventions, and of potentially harmful exposures, including among those populations at risk of disadvantage due to inequities[14, 15]. Evidence suggests that strong observational studies such as discontinuity designs, produce estimates which are statistically identical to RCTs[16]. During the COVID-19 pandemic, observational studies highlighted the inequities in the direct and indirect consequences of SARS-CoV-2 infection and attempts to control it[17-19], thus playing a critical role in informing public health responses[20-22]. In addition, in cases where conducting a RCT would be unethical, observational studies become the most reliable source of evidence[23].

Despite the predominance of observational studies in health research, many such studies do not adequately report information such as clear eligibility criteria, reliability and validity of measurements, and details on data gaps[24-28]. The reporting guideline for observational studies (STROBE, Strengthening Reporting of Observational Studies in Epidemiology) [15] released in 2007, has been widely used by journals and authors of observational research [29] and has been cited 29,276 times according to Google Scholar as of November 28, 2022[30]. Nonetheless, the reporting of intervention effects across health equity determinants in observational studies is far from ideal. For example, researchers consistently found a lack of integration and reporting of sex and gender in observational studies[31-33]. This gap may be partly because STROBE lacks items tailored for health equity; for example, in describing equity seeking populations, evaluating outcomes across PROGRESS (i.e., place of residence, race/ethnicity/culture/language, gender/sex, religion, education, socioeconomic status, social capital) factors, appraising applicability. As such, it is necessary to develop, endorse, and implement reporting guidelines to improve the reporting of health equity in observational studies [34-36].

In response to this gap, we established a global, multi-disciplinary team that includes academics, policymakers, participants with lived experience, practitioners, advisors and regular peer reviewers to journals, funder, and other knowledge users[37] across a range of disciplines including Indigenous health, knowledge translation, equity, social science, epidemiology, biostatistics, and other health sciences. We aim to develop the STROBE_Equity extension to encourage transparent, concise and comprehensive reporting of health equity in observational studies [38]. As described in a previous study[17], the team formulated an interim checklist of 36 candidate items by

reviewing existing checklists related to equity such as the CONSORT (Consolidated Standards of Reporting Trials)-Equity, the SAGER (Sex and Gender Equity in Research) reporting guidelines and the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)-Equity, and convened a citizen panel (HE, JT, RG) with lived experience of health inequities to seek their feedback. The interim checklist could be found in the **Supplemental Table B1** [17].

This scoping review aims to describe the extent to which the available guidance on reporting of health equity in research supports our candidate items (interim guidance) and to identify new items that could be used for the STROBE-Equity extension guideline.

2. Methods and analysis

2.1 Protocol and registration

We set up a governance structure of an executive team of four principal investigators (PIs) (VW, LM, JJ, SF) and a lead for each of three steering committees (Indigenous, Knowledge user and Patient/Public) and a Technical Oversight committee to ensure all the team members participated in an integrated knowledge translation process to develop the protocol of this review. The steering committees and Technical Oversight committee are consulted for input on design and delivery of all the relevant studies under the STROBE_equity project, and for feedback on the research results. The executive team meets monthly with a research coordinator and leaders of the studies to consult on study methods and issues arising during the conduct. The executive team, the Technical Oversight Committee and the steering committees meets quarterly by video conference for project updating and consultation as needed [39]. Following the JBI method [40], we conducted this study

in adherence with a peer reviewed protocol published in BMJ Open [41] and reported according to the PRISMA reporting guideline for Scoping Reviews[42].

2.2 Eligibility criteria

We included the following types of resources: 1) guidance related to conduct or reporting for any type of research on, with or about people experiencing health inequity; 2) methodology reviews assessing reporting of equity-related issues of research; 3) summary reports of recommendations on reporting for equity issues in research; and 4) relevant guidance from ethics boards, funders and journal policies on the conduct or reporting of research related to health equity. We excluded resources without recommendation (a statement explaining why specific information is important or recommending reporting specific information in research of health) related to health equity reporting. There was no restriction on language of the publication. As described in the protocol, we decided to conduct two scoping reviews (one for Indigenous and one for 'global' stream) based on the available data and consultation with Indigenous researchers [39, 41]. Here we only included resources that considered non-indigenous populations; resources tailored for research with Indigenous Peoples were designated to the scoping review led by Miranda Lesperance, Sarah Funnell and Andrea Martel to avoid double use. The results of the two scoping reviews will be used together to inform the global and Indigenous STROBE-equity reporting guideline [39]. Indigenous Peoples was defined as "… distinct social and cultural groups that share collective ancestral ties to the lands and natural resources where they live, occupy or from which they have been displaced."[43]

Although there are unique aspects on reporting health equity information in observational studies, we did not restrict the focus to observational studies since guidance for other types of studies, such as randomized clinical trials (RCTs), could also provide important and relevant information that is shared by observational studies. For example, even though the CONSORT equity reporting guideline is focused on RCTs, it has some items that are relevant for observational studies [17, 36].

2.3 Search strategy

We searched for both peer and non-peer reviewed published guidance on the reporting and conduct of health equity-related research. The search was conducted in MEDLINE via OVID, LILACS via BIREME–PAHO–WHO Latin American and Caribbean Centre on Health Sciences Information (http://lilacs.bvsalud.org/en/), the Cochrane Methodology Register (Wiley), Embase via OVID, and CINAHL via EbscoHost in January 2022. A full search strategy was developed in MEDLINE using the following concepts: (1) health equity (using PROGRESS-Plus [44] characteristics); (2) reporting, analysis and design of research; and (3) guidelines or guidance articles. We assessed relevance of the search results through testing with a set of 11 target articles and modified the search until all these were identified. Searches were limited to records published in 2005 and later considering that: 1) we are interested in recent guidance and conceptualizations of health equity in research; and 2) the establishment of the Commission on Social Determinants of Health by the WHO was in 2005. No language limit or study design limit was applied. Search strategies are presented in **Supplementary Table B2**. Searches were designed and conducted by a librarian (TR) experienced in systematic reviews, using a method designed to optimize term selection[45]. After identifying eligible full texts from databases, we checked the reference lists for additional eligible studies or documents.

We classified grey literature into five categories and searched for guidance within each: journal guidance from Journal Citation Reports[46], publisher policies from the Joint commitment for action[47], ethics guidance from the International Compilation of Human Research Standards[48], generic research guidance from funding agencies[49], and reporting guidance from interest groups across PROGRESS-Plus factors in consultation with the technical committees. We sampled randomly from these five categories in intervals of 20 documents at a time, stratified by country income setting (i.e., high-income countries (HICs), middle-income countries and low-income countries (LIMCs) as defined by the World Bank to get more representative information from the entire research world (https://data.worldbank.org/country/XD). We decided the information as saturation if no new recommendation was found per category of the grey literature, and we stopped searching further in this case. Detailed methods and results of grey literature are presented in **Supplementary Table B3**.

2.4 Study selection process

Search results from databases were imported into Covidence (https://www.covidence.org/). Pairs of reviewers (PD, JH, RD, OD, AR) screened titles and abstracts and full texts in duplicate and independently. All disagreements were resolved through team discussions.

2.5 Data items and extraction

In this scoping review, we developed the data extraction form based on the interim STROBE_Equity guidance and the 36 candidate items[17] using Microsoft Excel 2022 (Version 16.58). We tested the form three times with 2-3 included resources each time and modified as

required based on feedback from the team. We considered the different publication types and scope of the studies (e.g. we tested our form with reports of different study designs). After three rounds of pilot-testing, we started the formal data abstraction.

Pairs of reviewers (XW, JH, PD, RD, OD, EG) extracted data for each included study independently and discussed for consensus. A third reviewer (VW) was consulted for a final decision where necessary. All extractions were verified as an additional data cleaning step (XW). We collected characteristics on the source, type of organization, scope of the document (e.g., population, setting, and type of study design), and methods of development. The extraction form can be found in **Supplementary Appendix A**.

For judgments on whether or not the guidance supports the preliminary STROBE_Equity extension items, we selected from options "support (i.e., suggest reporting)" or "nothing relevant". We also collected the supporting verbatim text and captured any potential new items as free text with verbatim quotes from the source document.

2.6 Methodological quality appraisal

Consistent with the JBI guidance on scoping review conduct, we did not appraise methodological quality or risk of bias of the included studies[50].

2.7 Data analysis and presentation of the evidence

We used the principles of framework synthesis to analyse the data[51]. First, we mapped the recommendations to the preliminary STROBE_Equity checklist of 36 candidate items as our *a priori* framework. Online meetings among team members (XW, OD, EG, VW, RD, JH, PD) were held to evaluate the support for each item of the interim checklist and identify any new items. For recommendations that did not match the items in the checklist, we applied an inductive thematic analysis to develop new items or categories as needed[52]. We also assessed the new items for overlapping concepts then combined and drafted wording based on the existing guidance. The wording of the candidate items was then clarified as necessary and finalized with the writing team and the wider STROBE_Equity team.

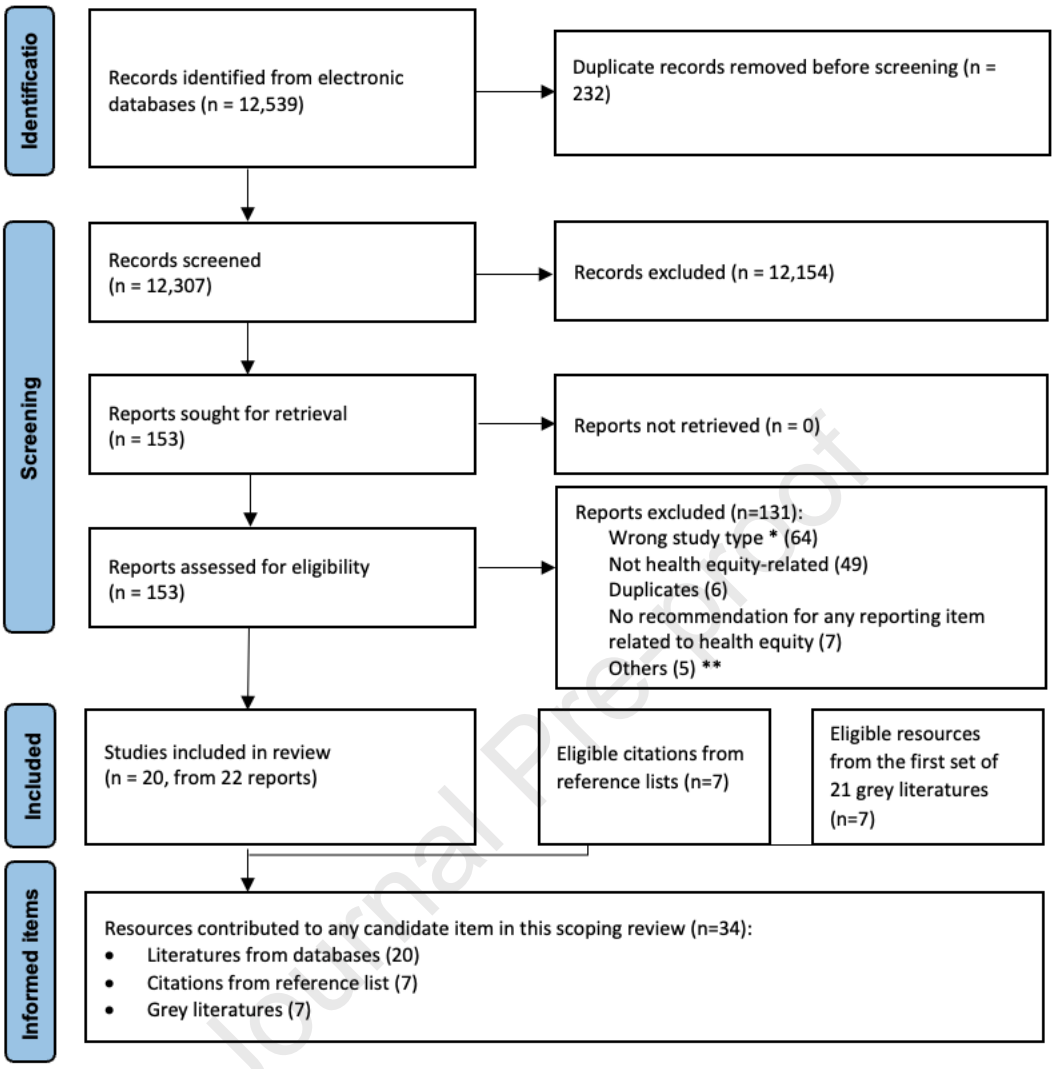
Data synthesis included: 1) descriptive quantitative analysis (frequencies and proportions) of the characteristics for included resources and the supporting recommendations for the preliminary STROBE_Equity checklist of candidate items; and 2) qualitative analysis (i.e., content analysis) of supporting recommendations for each candidate or new item.

We presented the results as a map of the extracted data in tabular form based on the *a priori* framework according to the STROBE structure (e.g., introduction, methods, results, discussion). The unit used when counting the number of sources was the study; thus, if a study was published in more than one report, the reports associated with the study were collectively counted as a single source. For example, the GRADE equity guidelines were published as a series of four reports: the first provided a preamble and rationale, and the other three focused on guidance for health guideline developers [53-56].

3. Results

3.1 Literature search

The electronic database literature search resulted in 12,539 records (**Figure 1**). We retained 153 relevant full-text papers after title and abstract screening. After reviewing the full texts, we found 20 eligible studies from academic databases. In addition, we identified seven eligible citations through screening reference lists of included studies and seven eligible resources from the first set of 21 grey literatures. In total, we included 34 eligible resources supporting at least one candidate item or suggested a new item (**Supplementary Table B4**). **Supplementary Table B5** presented the 33 excluded reports that met all the other criteria but did not make recommendations related to reporting health equity.



Note

* "Wrong study type" was applied to any report that did not provide guidance on reporting equity in research (e.g., clinical practice guideline)

** One was the interim Guidelines for Reporting Health Equity in Observational Studies [17], which was part of this STROBE_Equity project; Four studies [57-60] about Indigenous Peoples were separated out for the parallel scoping review led by the Indigenous steering committee.

Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram

Characteristics of included resources that informed any candidate item or new item

Of the 34 included resources, the majority of those informing candidate items were journal articles (*n* = 24, 71%). Other resources included documents or webpages from research ethics guidance, government, journal editor and non-governmental organizations. The types of resources included varied but were primarily methodology guidelines (11, 32%), reporting guidelines (7, 21%) and research ethics guidance (7, 21%). Of the 17 methodology and reporting guidelines, only five (15%) were developed through consensus. All the resources were published in English and 19 (55%) were published since 2015.

Table 1 General characteristics of included resources that informed any reporting items (N=34)

Document publisher	*N* (%)
Academic journal	24(71)
Research ethics guidance	5(15)
Government	3(9)
Journal editor	1(3)
Non-governmental organization	1(3)
Document type	
Methodology guidelines	11(32)
Reporting guidelines	7(21)
Research ethics guidance	7(21)
Methodology review	5(15)
Editorial/commentary	3(9)
Journal instruction	1(3)
Publication year	
2005-2009	6(18)
2010-2014	9(26)
2015-2019	10(29)
2020-2022	9(26)
Demographic focus	
General population	25(74)
Focused on specific population*	9(26)
Clinical area focus	
Non-specific	27(79)

Specific [$]	7(21)
PROGRESS-Plus [#]	
Gender or Sex	9(26)
Race/ethnicity/culture/language	6(18)
Place of residence	4(12)
Plus: Personal, time-dependent or relationship dependent factors, such as pregnancy, reproductive capacity	1(3)
Broad focus [¥]	17(50)
What study design is this document for	
No statement on scope of study design	16(47)
Any type of primary research	7(21)
Clinical trials	4(12)
Any type of evidence synthesis (e.g., systematic review, scoping review)	4(12)
Observational studies	2(6)
Clinical practice guidelines	1(3)

[*]Including transgender health, underserved population, women aged 45–55, people who live in rural and remote area, and resource poor setting.
[$] Including oral health, covid 19, psychiatric Anesthesia, women's health, orthopedics, preventative medicine.
[#] Each document could cover more than one factor.
[¥] Broad focus means that the focus is on health equity, but not about specific PROGRESS-Plus factor (e.g., CONSORT-Equity)

3.2 Scope of resources that informed any candidate items or new items

Of the 34 resources, 9 (26%) focused on specific populations who may experience health inequity, including transgender individuals [61-63], those in remote/ rural/ underserved/ low-socioeconomic settings [64-67], women and minorities[68], and women aged 45–55 years[69]; 25 (74%) were focused on health equity with no population restriction. Most (27; 79%) of the resources were non-specific to a certain clinical or public health area, while seven (21%) focused on specific clinical or public health areas, including oral health [70], psychiatry [71], COVID-19[72], anesthesia [73], orthopedics [74], preventative medicine [75] and gynecology [69]. Half of the resources had no restriction on PROGRESS-Plus factors; another half focused on one or more specific PROGRESS-Plus factors, where 9 (26%) focused on Gender or Sex[62, 63, 68, 69, 73, 74, 76-78], 6 (18%) on Race/ethnicity/culture/language[68-71, 79, 80], 4 (12%) on Place of residence[64-67] and 1 (3%)

on personal, time-dependent or relationship-dependent factors (i.e., menopausal symptoms among women)[69]. (**Table 1**)

For documents targeting specific study designs, 7 (21%) were for all types of primary research, 4 (12%) for any type of evidence synthesis, 4 (12%) for clinical trials and 2 (6%) for observational studies. (**Table 1**) There were two resources focused on observational studies. One included consolidated criteria for reporting qualitative research (COREQ) including interviews and focus groups[81], and the other was the guidelines for strengthening the reporting of menopause and aging (STROMA) in cross-cultural comparisons study[69].

3.3 Supporting recommendations

For the 34 resources informing any candidate item, each resource supported a median of five candidate items (range 1-22). For the 36 candidate items, the median number of resources supporting an item were six (range 1 to 15); all candidate items were supported by at least one resource. Six candidate items (one for rationale, four for methods and one for results) were informed by more than 10 resources and 21 were informed by more than five resources. (**Table 2 and Supplementary Table B6**) Of the candidate items, rationale for focus on health equity in *Background* (15, 44%), involvement of patients or community experiencing health in equity in *Study design* (13, 38%), sampling/recruitment methods designed to reach populations across PROGRESS-Plus characteristics in *Setting* (16, 47%), and details of informed consent and ethical clearance (13, 38%) were the top four items suggested.

In addition, 11 resources suggested 13 new items. (**Table 2 and Supplementary Table B7**). These items included one for *Title* and suggested using a health equity term; two for *Background* on defining health equity terms and describing the role of racism and discrimination; seven applicable to *Methods*, including topics on reporting the health-equity logic model, composition and training of the researchers considering equity-related factors, reaching people experiencing health inequity, communicating on discontinuation, and describing comparator and technique validation across equity factors; two for *Discussion* on reporting limitations and implications related to health equity; and one for *Data sharing* on reporting the access to raw data across equity.

4. Discussion

We performed a scoping review of available research guidance and relevant documents across dimensions of health equity from a diverse and comprehensive range of resources to evaluate support for proposed items for a STROBE_Equity extension.

Our findings show that existing resources for reporting equity in health research are spread across various document types and formats that may be challenging for authors to access and implement in practice. This review provides a contemporary collation of health equity reporting guidance established from a comprehensive review of literature and serves as an important resource for the field.

All candidate items were supported by at least one resource with more than half being supported by more than five resources; suggesting a good alignment of our proposed framework with the

current health research landscape. Of these candidate items, rationale for focus on health equity in *Background*, involvement of patients or community experiencing health inequity in *Study design*, sampling/recruitment methods designed to reach populations across PROGRESS-Plus characteristics in *Setting*, and details of informed consent and ethical clearance were the top four items suggested in the resources we included. Additionally, the 13 new items provided more important information on novel intersections, such as describing the role of racism and discrimination in the experience of health inequity in relation to the problem or intervention, reporting the background and research area of the team members considering relevant experience, and providing information on accessing raw data across equity factors. With all these items suggested, our review provides a comprehensive, evidence-based set of reporting items covering all dimensions of reporting health equity in observational studies, including title, abstract, background, methods, result, discussion and other information (e.g. data sharing).

We identified two resources designed for observational studies, one for qualitative research including interviews and focus groups[81], the other for guidelines for strengthening the reporting of menopause and aging (STROMA) in cross-cultural comparisons study[69]. Neither of these covers the breadth of reporting of health equity in observational studies from design to interpretation. Further, we did not identify any reporting guidance that covers all important aspects of reporting health equity related information in observational studies. Instead, the research guidance related to health equity was fragmented -- existing resources for reporting equity in research are spread across various document types and formats that may be challenging for authors to access and implement in practice. Such findings underscore the need for comprehensive reporting resource drawing on such guidance.

Including equity reporting guidance for other study designs gave us a broad view of potential important items. Compared to CONSORT-Equity[36] for clinical trials and PRISMA-Equity[35] for systematic reviews, some of our proposes items are shared across different study designs, such as reporting rationale for focus on health equity, sampling methods designed to reach populations across relevant PROGRESS items, and discussing external validity to populations across relevant PROGRESS-Plus characteristics. Some, however, are unique to observational studies, such as "whether the comparator is considered more advantaged or to have less barriers to health opportunities". Further, some items are not covered by CONSORT-Equity and PRISMA-Equity, but may also be relevant for those study designs, such as report the research area (e.g. personnel with unique professional and cultural backgrounds on equity related issues) and social location (i.e., gender, race, etc.) of investigators, describe any process to ensure that the research is reaching the people experiencing health inequity, and report the definitions of health equity related terms.

This review, along with other studies that are part of the larger STROBE Equity project, will be used to inform the development of the Equity extension to the STROBE reporting guideline. We will present and discuss the results with technical committees and circulate the checklist using a global online survey, together with findings from a methodological survey of observational studies [13]. These studies and surveys will be used to reach consensus on a STROBE_Equity extension. The protocol for the overall project is available on Open Science Framework[38].

Strengths and limitations

We used the JBI scoping review methodology [50] to map resources on health equity reporting in research from multiple information sources in an attempt to capture guidance produced and used by relevant stakeholders, including from academic journals, journal policies, research ethics boards, publishers, research funding agencies and interest groups. Another strength is that we used multidisciplinary team and multiple knowledge users with defined roles and governance strategy to engage diverse perspectives in designing and study, and analyzing and interpreting the results [41]. One limitation of our approach is that we were not able to review all available guidance from all sources in every setting. Instead, we employed the principle of saturation such that no new items were identified. We also used a structured approach by seeking different sources and balancing between sources (i.e. HICs and LMICs) as well as across PROGRESS-Plus characteristics[82]. This helped to identify evidence for all PROGRESS-Plus elements and from different countries or settings. Another limitation is that the checklist is currently draft for consultation, and some of the items need further elaboration, which are expected to be completed as a justification document for the checklist after consensus and global survey [39]. Two examples will be: 1) the item on reporting a contextual factor used in adjustment needs elaboration on that the adjustment may hide important differences that could inform health policy [83] and authors should transparently report on this if conducted; 2) for effort to avoid selection bias, further elaboration could be used to describe whether selection bias is related to outcomes as particular outcomes may be affected by systemic discrimination.

As expected, the included resources varied across publication type, publisher, scope, levels of detail and format, which posed a challenge for comprehensive and consistent data extraction. To ensure accuracy of the data extraction, we did all the data extraction in duplicate, with at least one reviewer experienced in equity research for more than 3 years. Each pair of reviewers discussed

the results periodically and any questions were presented and solved in weekly team meetings. Furthermore, a senior reviewer verified every supporting recommendation for each item and all the results presented were based on agreement among the review authors.

5. Conclusions

Existing resources for reporting health equity in research are fragmented and only two included resources were focused on any PROGRESS-Plus factors in observational studies. However, we found a strong agreement of the candidate items of our draft checklist with the current research on reporting of health equity. Based on this review, we have supplemented the checklist with an additional 13 items related to use and define health equity terms, describe the role of racism and discrimination, report background and experience of team members, provide information on logic model, describe process used to reach people experiencing health inequity, describe quality of the comparator (e.g. more advantaged or not), describe the validation of measurements across patients with different backgrounds, report limitations and implications relevant to health equity, and state way to access raw data across PROGRESS-plus factors. This comprehensive, evidence-based set of reporting items will inform the development of the STROBE_Equity extension.

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504

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513
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Table 2 Number of sources identified supporting each of the 36 candidate items and 13 new items.

Topic	STROBE checklist	Proposed Item for an Equity Focused Extension in Observational Studies	N (%) of resources
Title and abstract			
Title	1a Indicate the study's design with a commonly used term in the title or the abstract	• If health equity is a major focus, consider using "health equity" or relevant terms in the title. [$ #]	2 (6)
Abstract	1b Provide in the abstract an informative and balanced summary of what was done and what was found	• Describe population according to PROGRESS-Plus	8 (24)
		• Describe extent/limits of applicability to populations of interest across PROGRESS-Plus characteristics	6 (18)
Background/rationale			
	2 Explain the scientific background and rationale for the investigation being reported	• If equity is a focus, what is the rationale for focus on health equity? [#]	15 (44)
		• Describing role of racism, discrimination and exclusion in health inequities across one or more PROGRESS-plus factors in relationship to the research questions. [$ #]	1 (3)
	None	• Report the definitions of health equity related terms. [$ #]	1 (3)
Objectives	3. State specific objectives, including any pre specified hypotheses	-	
Method			
Study design	4 Present key elements of study design early in the paper	• Report who was involved/engaged/consulted with experience in health equity/inequity in study design (e.g. patients, community, industry, government, etc.) [#]	13 (38)
		• Report the background and research area (e.g. personnel with unique professional and cultural backgrounds on equity related issue) and social location (i.e., gender, race, etc.) of investigators. [$]	4 (12)
		• If applicable, describe whether research staff were selected for or trained with particular skills and experience on working with groups experiencing health inequity (e.g., age inclusion training, disability inclusion training)? [$ #]	2 (6)
		• Report whether a theory of change related to equity was described for the study to design analysis [#]	1 (3)
		• If applicable, provide the information or link to the logic model developed which shows how equity is important [$ #]	1 (3)

Setting	5 Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	• Report whether methods of sampling/recruitment were designed to reach populations across relevant PROGRESS-Plus characteristics	16 (47)
		• Is there possibility of self-selection bias across PROGRESS-Plus factors?	2 (6)
		• If applicable, describe any process in place to monitor and ensure that the research is reaching the people experiencing health inequity appropriately.[$ #]	1 (3)
		• If applicable, describe how pauses or discontinuation across equity factors were managed as well as how to communicate with participants. [$ #]	1 (3)
Participants	6a. Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	• Give inclusion and exclusion criteria across relevant PROGRESS-Plus characteristics	9 (26)
	Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls	• Report context and relationship to health equity. [#]	8 (24)
	Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants	• Report details of partnerships with populations and communities, where applicable. [#]	11 (32)
	6b. Cohort study—For matched studies, give matching criteria and number of exposed and unexposed	• Report whether any PROGRESS-Plus factors used for matching, how categories were determined and why	1 (3)
	Case-control study—For matched studies, give matching criteria and the number of controls per case		
	None	• If applicable, describe whether the comparator is considered more advantaged or to have less barriers to health opportunities.[$ #]	1 (3)
Variable	7 Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	• Report whether outcomes were identified as relevant and important to populations across PROGRESS-Plus	10 (29)
		• If applicable, report whether to measure inequity as an outcome. [#]	4 (12)
Data sources/ measurement	8 * For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe	• Report the method of obtaining population characteristics (e.g., age)	7 (21)
		• If applicable, describe whether the techniques, especially those developed as diagnostic or quality of life measures	1 (3)

	comparability of assessment methods if there is more than one group	were validated or operate similarly across participants regardless of patients' background (e.g., ethnic/linguistic). [$#]	
Bias	9 Describe any efforts to address potential sources of bias	• Report efforts to reduce selection bias across PROGRESS-Plus	6 (18)
		• Report whether dimensions of context might influence the study (e.g., bias in response/participation)	5 (15)
Study size	10 Explain how the study size was arrived at	• Report whether PROGRESS-Plus characteristics of interest were considered in determining the study size	7 (21)
Quantitative variables	11 Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	• Report how decisions were made about analyses related to PROGRESS-Plus, including whether any categories were defined, and how they were decided	9 (26)
		• Report whether dimensions of context were collected for analysis	3 (9)
Ethical concerns	None	• Report details of informed consent and ethical clearance	13 (38)
Statistical methods	12a Describe all statistical methods, including those used to control for confounding	• If PROGRESS-Plus factors used to control for confounding, describe how they were defined and rationale. [#]	3 (9)
		• Report whether contextual factors were used in adjustment for confounding. [#]	1 (3)
	12b Describe any methods used to examine subgroups and interactions	• Report details of additional analyses related to health equity if applicable. [#]	9 (26)
		• Report whether context or systems were explored.	2 (6)
	12c Explain how missing data were addressed	• Explain whether missing data was related to individual or contextual factors associated with health inequities.	2 (6)
Results			
Participants	13a.* Report numbers of individuals at each stage of study—e.g. numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study,	-	
	13b Give reasons for non-participation at each stage	• Describe the losses and exclusions of participants across PROGRESS-Plus.	5 (15)
		• Describe non-response/nonparticipation across PROGRESS-Plus.	2 (6)
	13c.* Consider use of a flow diagram	-	
Descriptive data	14a Give characteristics of study participants (e.g., demographic, clinical,	• Present characteristics across relevant PROGRESS-Plus characteristics.	11 (32)

	social) and information on exposures and potential confounders		
	14b Indicate number of participants with missing data for each variable of interest	• Describe whether data on PROGRESS-Plus factors are missing (e.g., ethnicity data in some settings has a high level of missingness.	3 (9)
	14c.* Cohort study—Summaries follow-up time (e.g., average and total amount)	-	
Data	15.* Cohort study—Report numbers of outcome events or summary measures over time	-	
	Case-control study—Report numbers in each exposure category, or summary measures of exposure		
	Cross-sectional study—Report numbers of outcome events or summary measures		
Main result	16a Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included	• Report if confounders were defined for contextual or PROGRESS-Plus factors that are associated with health inequities	2 (6)
		• Justify why certain categories of PROGRESS-Plus are not disaggregated for analysis	2 (6)
	16b. Report category boundaries when continuous variables were categorized	-	
	16c. If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-	
Other analysis	17 Report other analyses done (e.g. analyses of subgroups and interactions, and sensitivity analyses)	• Report other analyses to address health equity questions, if the study had objectives related to health equity. [#]	6 (18)
Discussion			
Key results	18. Summaries key results with reference to study objectives	-	
Limitations	19. Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	• Report any limitations related to assessing effects on health equity. [$#]	3 (9)

Interpretation	20 Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	• Consider importance of context in interpretation of health equity. [#]	7 (21)
Generalizability	21 Discuss the generalisability (external validity) of the study results	• Discuss external validity to populations across relevant PROGRESS-Plus characteristics, considering issues of possible self-selection, healthy volunteer bias, losses across PROGRESS-Plus	6 (18)
		• Consider implications of exclusion of people across PROGRESS as well as differential participation and/or loss to follow-up	3 (9)
		• Consider context in discussion of generalizability	9 (26)
Implications for research [$]	None	• Provide implications for research, practice or policy related to health equity where relevant (e.g., types of research needed to address unanswered questions). [$#]	1 (3)
Other information			
Funding	22. Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based		
Data sharing [$]	None	• Describe where the raw data across PROGRESS-plus factors could be accessed. [$]	1 (3)

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
$ New items suggested based on resources identified in this review.
# Some items are more generic for all observational studies, while some (with #) maybe more specific to observational studies related to health equity.

Highlights

- All candidate items proposed to extend STROBE (Strengthening Reporting of Observational studies in Epidemiology) for equity were supported by at least one resource.
- We identified 13 additional items related to defining health equity terms; these described the role of racism and discrimination, composition and training of the researcher(s), considering relevant factors in the study methods, and data sharing specific to and across equity factors.
- These items will be used for the consensus process to develop a research reporting guideline on health equity to extend STROBE.

Declaration of interests

☐ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☒ The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Vivian A Welch reports financial support was provided by Canadian Institutes of Health Research. Luis Gabriel Cuervo is an official of the Pan American Health Organization, but the views expressed in this publication are his sole responsibility and do not necessarily represent the decisions or policies of the Pan American Health Organization (PAHO/WHO).

Author statement

XW, OD, AR, LM, and VW conceptualised this review. TR conducted the literature search. XW, OD, MM, AR, JH, PD, RJD, and EG screened the references and extracted the data. XW analyzed the data and drafted the manuscript. OD, AR, EG, TR, SGN, AA, BS, BJH, CC, CSW, CF, DOL, EAO, EK, EE, HW, HE, CJP, HSW, JR, JGR, JJ, JT, JL, LM, LW, LLN, LGC, LW, MK, MTA, MKS, MJM, MN, OM, PC, PT, SF, SGN, TK, TH, TY, TP, ZB, AM and VW revised the manuscript. All authors reviewed and edited the manuscript and approved the final draft. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.