

RESEARCH ARTICLE

# Research priorities in sexual and reproductive health and rights and climate change: Results of a consensus building and prioritisation process

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## Abstract

Recent literature suggests that climate change can impact sexual and reproductive health and rights (SRHR) outcomes, especially since climate-related events may exacerbate persistent inequalities based on gender, disability status, sexual

online surveys can be found as Supplementary information.

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orientation, and age, among others. Climate change can also impact health infrastructure with an impact on SRHR access and outcomes. However, data are scarce when it comes to certain topical areas, types of evidence, and in using an intersectional approach. Based on a prior expert consultation exercise, we conducted a consensus and priority setting process to develop a list of priority research questions at the intersection of climate change and SRHR. For this, in 2024, we completed an iterative process over three rounds consisting of online surveys and consultations, following modified Delphi and Child Health and Nutrition Research Initiative (CHNRI) methodologies for which 100 people were included. For round one, 56 people responded to the 17-question survey framed around topical areas in SRHR, research methodologies, and intersectionality; 39 people participated in the online consultation. The round two survey had 36 respondents and 41 participants to the online consultation. The third round included a survey with a list of 31 questions that respondents were asked to prioritize. A final list of ten questions emerged which highlighted important areas where there continue to be gaps in evidence, including maternal and perinatal health, contraception and abortion access, and gender-based violence. Other critical areas include intersectional issues regarding gender and poverty and comprehensive sex education. The list can serve as a starting point to guide the SRHR research community to generate the evidence needed for policy action.

## Introduction

Climate change, as defined by long term shifts in temperatures and weather patterns, is affecting everyone around the world and its significant impact on health and health systems has been documented [1–3]. Research shows that about 3.6 billion people already live in areas highly susceptible to the effects of climate change and about 13 million lives are lost each year as a result of climate change-related factors [4]. Recent literature suggests that climate change can impact sexual and reproductive health and rights (SRHR) –a broad area that is linked to overall health and wellbeing, such as sexuality and rights, including the prevention of harmful practices, reproduction and fertility, contraception and family planning, and abortion [5,6]. Climate-related events may, in turn, exacerbate persistent inequalities based on gender, disability status, sexual orientation, and age, among others [7,8]. Of note, climate factors including extreme temperatures, drought, rainfall shocks, cyclones and floods have been linked with adverse maternal and newborn health outcomes as well as increased cases of gender-based violence [6,9,10]. Some other studies speak to the lived experiences of populations negatively affected by climate events [11,12]. These impacts are often more severe for women with disabilities than those without. Fertility and contraceptive decisions have also been shown to be affected by climate change [6,13–17]. Climate change can also impact health infrastructure with a specific impact on SRHR access and outcomes [18]. However, even when data are available, they are sparse with regards to certain topical areas, types of

evidence, and in using an intersectional approach, which includes considering race, gender, class, and other individual factors that shape experiences [7,19–22]. Data are also limited with regards to causal pathways and direct impact [6,7]. Importantly, the evidence is particularly limited regarding issues related to abortion, contraception, and reproductive cancers [6,7].

A first effort undertaken by the UNDP/UNFPA/UNICEF/WHO/World Bank Special Programme of Research, Development and Research Training in Human Reproduction (HRP) and Karolinska Institutet to identify research priorities was completed in May 2023 where a group of experts from multiple countries convened online to discuss the research needs at the intersection between climate change and SRHR [19]. Participants to the consultation were identified through a mapping exercise, professional networks, and existing literature on climate change and SRHR [19]. During the consultation, a framework for guiding work at this nexus was developed and an agreement was reached with the experts that further work needed to be completed in order to more systematically prioritise questions for the research community to address. A consensus and priority setting process was agreed to allow for contributions from a large group of experts including those from a more diverse range of geographic regions and backgrounds and beyond those who participated in the 2023 consultation, through an iterative mechanism that enabled refinement of research priorities [23–26]. In order to engage a wider range of participants including those with lived experiences, the process, undertaken by the HRP Alliance for research capacity strengthening, engaged the Implementing Best Practices (IBP) Network and the African Institute for Development Policy (AFIDEP) [27–29]. The central aim of the activity was to support a climate change and SRHR research agenda setting exercise through expert consensus building on the most pressing gaps and key questions that could help develop actions and policies able to reduce the effect of climate change on SRHR. We anticipated that the process would also require some level of prioritisation to ensure that the most pressing questions were at the forefront of research. While these processes are often limited by the individuals participating and the potential inherent bias of those willing to contribute, they can still provide guidance for steering actions and helping set the research agenda through a systematic mechanism.

This article describes the process for developing a list of priority research questions that address climate change and SRHR as agreed upon by experts in the field.

## Materials and methods

In 2024, we completed an iterative consensus building and prioritisation process utilising two related methodologies: the Delphi and the Child Health and Nutrition Research Initiative (CHNRI) methodologies [26,30,31]. We used a modified Delphi process to develop a set of research questions at the intersection of climate change and sexual and reproductive health based on existing research gaps, as identified in the scoping review conducted by the authors prior to this exercise [6]. As in other modified Delphi processes, we had a steering group (VB, NT, BO) who led the discussions. We followed a process through which we aimed to identify the problem area, select members for the panel, conduct several iterative rounds for consensus, and finalize with closing criteria [30]. We then used a modified CHNRI methodology to allow for further prioritization. We simplified some of the initial steps from the original CHNRI to better align with the preceding Delphi process, which allowed us to rank and prioritise the proposed list of questions following similar steps to what others have done [32]. The activities and analyses were led by a collaboration between the HRP Alliance (VB), the IBP Network (NT), and AFIDEP (BO and CM). All activities were planned to occur online using platforms such as Zoom or Microsoft Teams.

## Ethics statement

The study protocol was not registered, and ethics approval was waived by the WHO ethics review committee given only expert opinions would be collected and no personal identifiers would be collected. Results are reported using the ACCORD (ACcurate COnsensus Reporting Document) guidance (S1 Table) [33].

## Participants

All participants from the 2023 consultation, led by the HRP Alliance, were invited to participate in this process [19]. In addition, the IBP network and AFIDEP issued a call for expressions of interest through their networks to take part in a research prioritisation exercise. The HRP Alliance is a network of SRHR research institutions brought together by seven regional research capacity strengthening hubs located in five of the six WHO regions [27,34]. The IBP Network [28], a consortium of 150 civil society organisations and 25,000 SRHR professionals, is a trusted source for engaging SRHR experts across disciplines. AFIDEP, the African Institute for Development Policy [29] is an African-led nonprofit research and policy institute that leverages local expertise around the continent to advance global health goals relevant to the African region. Given the reach of these two networks and the need to include stakeholders from the regions most impacted by climate change, these two networks were leveraged to identify a broader and more diverse set of participants. Participants were selected based on engagement, interest, and expertise in both SRHR research and climate and environment, with the aim of having a broad representation, and they all received invitations to take part in each of the rounds in this process. The group included researchers, policymakers, and practitioners. We had no pre-requisite with regards to the size of the panel. Participation was not anonymous as individuals took part in synchronous online consultations; however, survey data was anonymised. The surveys included a legend stating that responding to the questions assumed consent to participate; no questions were mandatory, and participants could leave the survey at any time. Consent was also obtained verbally from participants at the start of each online consultation. Survey respondents were asked to provide some sociodemographic information during the first round for categorisation purposes only. All data collected through the online survey were stored in a secure server held at AFIDEP.

## Procedures

Each round of the Delphi process consisted of an online survey using SurveyMonkey shared over email followed by an online consultation meeting over Zoom to discuss the survey findings and agree on a way forward. Each survey contained a set of questions aimed at exploring the different aspects relating to climate change and SRHR. Participants were given up to two weeks to respond to each survey, which were anticipated to be completed in approximately 15 minutes. The surveys were available in English, French, and Spanish. The online consultations were held in English but interpretation into French and Spanish was provided by team members fluent in both languages on an individual, needs-basis. Online discussions were scheduled shortly after each survey closed. These consultations served as opportunities to present and discuss summary data from the surveys and obtain agreement on the way forward. In addition, online consultations utilised Zoom functionalities such as polls, breakout rooms, and whiteboards, to facilitate the discussion. All surveys and invitations to online consultations were sent to all identified individuals, regardless of their participation in the previous round and reminder emails were sent for completion of the online surveys. No pilot was conducted for any of the surveys given the iterative nature of the process and the opportunity for discussion following each of the surveys. Copies of all the surveys in English can be found in [S1 Text](#).

**Step 1: Pre-Delphi consultation:** We began this exercise by inviting all identified participants via email to take part in an online pre-Delphi consultation with the aim of explaining the process, agreeing on the broad priority areas at the intersection of SRHR and climate change, and gathering commitment to participation. During this pre-Delphi consultation, preliminary findings from the scoping review were presented to ensure a common understanding of the field and existing gaps [6]. The consultation was held over two sessions throughout the day (early morning and early afternoon Central European Time) to accommodate for participants joining from different regions in the world.

**Step 2: Delphi round 1.** For the first Delphi round, the aim was for participants to rank research priority areas as they related to thematic, methodological, and intersectional approaches. An online survey containing 17 questions was developed using data obtained from the scoping review that informed the consultation processes and information provided by the participants to the pre-Delphi consultation [6,19]. The survey included three sections: one for sociodemographic data,

another where participants were asked to rank their priorities at the intersection of climate change and SRHR, and a section for open text recommendations. Sociodemographic data were collected only in this survey round to avoid repetition over the course of the process. For section two, questions were framed around three key areas: SRHR thematic areas (10 areas), specific research methodologies (10 methodologies), and intersectionality (5 issues). For each of these, respondents were asked to rank thematic areas, study designs, and intersectionality issues according to priority for bridging existing knowledge gaps. During the round 1 online consultation, results from the first survey were presented and a Zoom poll was utilised for participants to further define research priorities.

**Step 3: Delphi round 2.** The second Delphi round aimed to further refine the research questions identified in round one, with a revised starting point on climate change factors. This round included an online survey comprising 12 questions based on responses to the first survey, discussions during the online consultation for round one which included information obtained through the Zoom meeting poll, and an analysis of emerging themes. This survey focused on climate change factors (drought, extreme temperature, floods, rainfall shocks, and cyclones/typhoons) and was structured in three sections: the first asked participants to rank the SRHR domains to be prioritised; the second asked participants to rank health system response and access issues; and the third asked participants to propose additional areas/questions. To help guide participants, a matrix adapted from the scoping review depicting the areas with critical gaps at the intersection of climate change and SRHR was shared with the survey ([S1 Fig](#)) [6]. For each domain being ranked as first, participants were asked to propose a research priority in the form of a research question through an open text field. The round 2 online consultation served to further refine the research areas and questions through interactive discussions and whiteboard discussions.

**Step 4: Modified CHNRI prioritisation survey.** Our aim with using this approach was to further refine the questions raised over the prior rounds and rank these in terms of priority. Based on findings from the prior two surveys and online discussions, a list of 31 research questions was compiled, organized according to different climate-related factors and their related SRHR issues. The list was shared through an online survey where participants were asked to state whether they agreed, disagreed, or neither agreed nor disagreed with the inclusion of each specific question in the final prioritised list. They were instructed to consider the following aspects relating to each of the listed research questions: *answerability* (the likelihood of the question being answered through research), *usefulness* (likelihood of the question resulting in interventions that can be delivered with existing resources), and *impact in consideration of equity* (likelihood of having a bigger impact in the burden of disease affecting populations most vulnerable to climate change and poor SRHR outcomes). Each question receiving an *agree* response was assigned 1 point, *disagree* responses were assigned 0 points, and *neither agree nor disagree* responses were assigned 0.5 points. A percentage was calculated for each question based on the total score divided by the number of responses received for each question. To ensure a reduced number of priority questions, we decided to select the ten highest scoring questions for inclusion in the final list. This list was then shared via email with all participants for one final opportunity for feedback and changes were made accordingly.

## Analysis

We used frequencies and percentages to present data on sociodemographic characteristics of the participants. We analysed free-text responses creating categories for similar answers and then presented the results using descriptive statistics. For each question where respondents were asked to rank their responses, we calculated an average score to determine the most preferred option overall. The average score was calculated by applying weights to each answer choice based on its rank, with the highest-ranked choice receiving the greatest weight according to the number of possible response options. The numerator comprised the weighted response counts for each answer choice, while the denominator was the total number of responses. All analyses were conducted using Excel (Microsoft 365 version 2501). The full dataset is available in [S1 Data](#).

## Results

This exercise was completed over three rounds between January and May 2024. Each of the rounds are reported below and [S2 Fig](#) presents a flowchart showing the number of respondents and response rates for each of the rounds.

### Pre-Delphi consultation

Based on expressed interest, a total of 129 experts signed up, of which 100 participated in the pre-Delphi consultation held on 31 January 2024; 39 in the morning session and 61 in the afternoon session. Additionally, three members of the coordinating institutions attended both meetings. Through the online Zoom poll, participants in the morning session ranked topical SRHR areas as their number one priority for guiding research at the nexus of climate change and SRHR; afternoon session participants ranked intersectionality as their first priority. All participants (morning and afternoon sessions) identified the following SRHR topics as important: abortion, gender-based violence (GBV), contraception, maternal and newborn health, access to SRHR services, and fertility. As for research methodologies, participants identified qualitative research, mixed methods, participatory or co-production methods, and implementation research. Lastly, gender, disability, and migration were mentioned as social categories linked with SRHR and/or climate effects and/or their convergence to be included in intersectional analyses [35]. See [S3 Table](#) for the list of the top five priorities for each of the three areas discussed.

### Delphi round 1

**Survey.** The first Delphi anonymous survey was sent to 100 participants on 04 March 2024, with a response deadline of 10 days. A total of 56 responses were received (54 in English and 2 in Spanish). Respondents were mostly female (70%,  $n = 39$ ), aged 25–44 (54%,  $n = 30$ ), working for an international NGO (36%,  $n = 20$ ) or research or academic institution (27%,  $n = 15$ ), were affiliated with an institution located in a high-income country (53%,  $n = 28$ ), and had significant work experience, with 37% having 11–20 years and 28% having over 20 years ([Table 1](#)). While most respondents stated working at the global level (results not shown) many respondents' countries of focus were Kenya and Uganda ([Fig 1](#)).

**Table 1. Sociodemographic characteristics of survey 1 respondents (N=56).**

Characteristic	N (%)
<i>Age (n = 56)</i>	
< 25	1 (2%)
25–44	30 (54%)
45–54	16 (29%)
55+	9 (16%)
<i>Sex<sup>†</sup> (n = 56)</i>	
Female	39 (70%)
Male	17 (30%)
<i>Years of experience (n = 54)</i>	
< 11 years	19 (35%)
11–20 years	20 (37%)
> 20 years	15 (28%)
<i>Primary affiliation (n = 55)</i>	
International NGO	20 (36%)
Research or academic institution	15 (27%)
Government agency or department	7 (13%)

(Continued)

**Table 1.** (Continued)

Characteristic	N (%)
Local non-governmental organisation (NGO) or civil society organization	8 (15%)
International organisation or multilateral agency	3 (5%)
Other <sup>l</sup>	2 (4%)
<i>WHO region of affiliated institution (n = 53)</i>	
Africa	8 (15%)
Americas	19 (36%)
Eastern Mediterranean	1 (2%)
Europe	11 (21%)
South-East Asia	8 (15%)
Western Pacific	3 (6%)
Global <sup>‡</sup>	3 (6%)
<i>Country income group of affiliated institution (n = 53)</i>	
High-income	28 (53%)
Upper middle-income	4 (8%)
Lower middle-income	14 (26%)
Low-income	4 (8%)
Global <sup>‡</sup>	3 (6%)
<i>Type of work (n = 55)</i>	
Research	30 (55%)
Programme implementation	13 (24%)
Policy and advocacy	9 (16%)
Activism	1 (2%)
Other <sup>§</sup>	2 (4%)
<i>Area of expertise (n = 54)*</i>	
Climate change-related <sup>x</sup>	45
SRHR	52
Other <sup>¶</sup>	5

NGO: non-governmental organisation.

WHO regions are clarified here: <https://www.who.int/about/who-we-are/regional-offices>.

<sup>†</sup>No respondents identified other sex than male or female.

<sup>l</sup>self-employed or private sector company.

<sup>‡</sup>includes individuals who reported affiliation with institutions with a global mandate or with subsidiaries around the world.

<sup>§</sup>includes medical professional and grants officer.

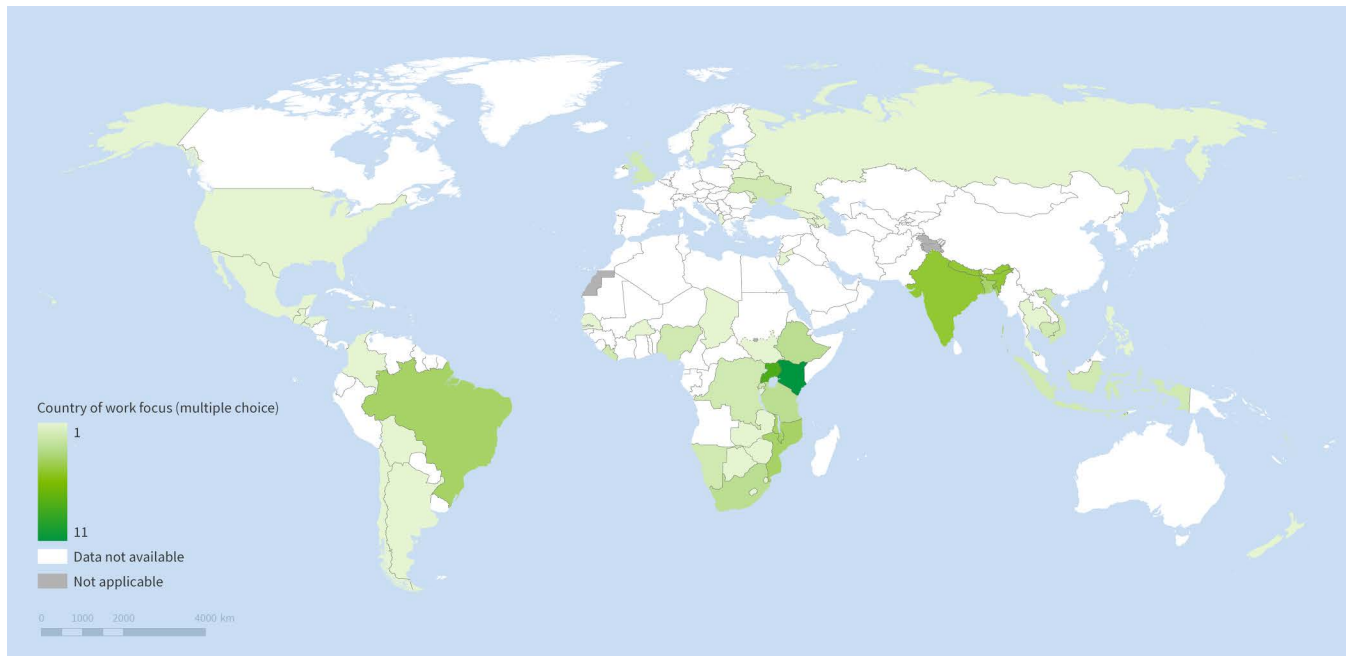
<sup>\*</sup>multiple-choice answer.

<sup>x</sup>includes biodiversity, conservation, environment, and other climate change related.

<sup>¶</sup>includes WASH (water, sanitation, and hygiene), humanitarian crises, interdisciplinary, institutional violence, and health policy and health economics.

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In Round 1, participants ranked priorities within three domains: SRHR thematic areas, research methodologies, and intersectionality issues (Fig 2). Participants ranked access to SRHR services as the top priority (score 8.69/10), followed by maternal and newborn health (score 7.93/10). Our analysis of free text identified five new categories (adolescent SRHR including comprehensive sexuality education, sexually transmitted infections/human immunodeficiency virus (STI/HIV), sexual health, and health systems). With regards to study designs to be prioritised, participants selected mixed



**Fig 1. Countries of work focus (N = 54).** The question allowed for multiple responses; responses indicating “global” are not depicted in Fig 1. Disclaimer: The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement. Note: this map was developed with WHO data under WHO copyright available under CC-BY 4.0 (<https://gis-who.hub.arcgis.com/pages/whogeodatabase>). The boundaries used can be found at this link: [https://extranet.who.int/map/rest/services/GISC/WHO\\_ADMIN\\_BOUNDARIES/MapServer/0](https://extranet.who.int/map/rest/services/GISC/WHO_ADMIN_BOUNDARIES/MapServer/0).

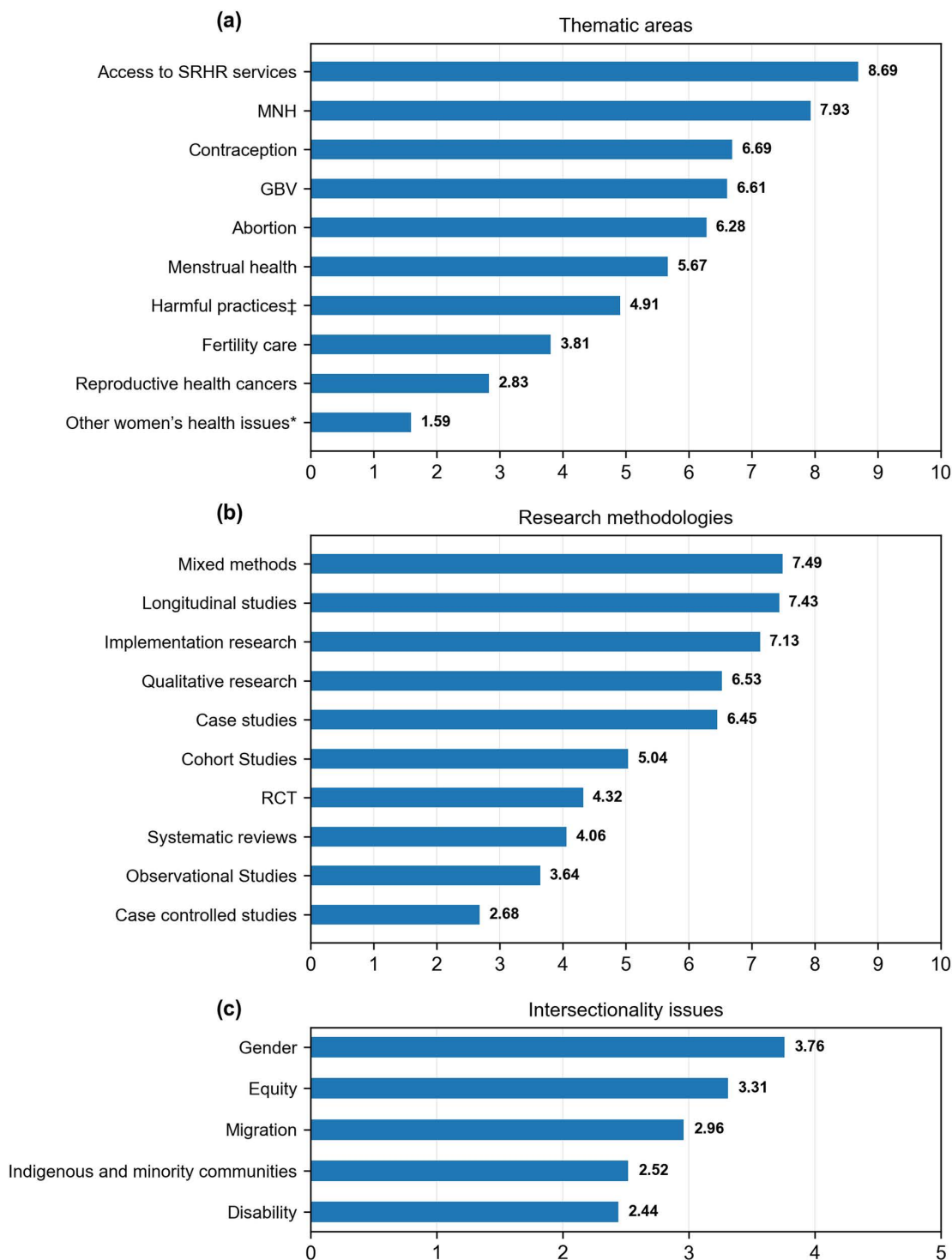
<https://doi.org/10.1371/journal.pclm.0000835.g001>

methods designs in first place (score 7.49/10) followed by longitudinal study designs (score 7.43/10). New categories emerging from the free text sections included community/participatory based research, feminist research methodologies, simulation/modelling studies, and feasibility studies. Lastly, participants prioritised intersectionality issues placing gender in the first place (score 3.76/5) and equity in second (score 3.31/5). Emerging themes included age, race/ethnicity, and conflict/humanitarian settings (Fig 2).

**Online consultation.** Thirty-nine participants, plus hosts, attended the round one online consultation held on 18 March 2024. Results from the on online Zoom poll revealed that participants concurred with the findings of the first survey. During the online discussion participants also highlighted additional topics of importance that were not reflected as prominently in the survey, such as mental health, non-communicable diseases, and fertility care. In addition, participants reflected on the need to identify research priority questions first before discussing methodologies, resulting in a decision to not focus on research methods for subsequent rounds. Finally, as a result of the discussions during the online meeting, the group agreed that the following round should use climate change factors (extreme temperatures, draughts, floods, rainfall shocks, and cyclones/typhoons) as a starting point for consensus building and prioritisation.

## Delphi round 2

**Survey.** The second Delphi anonymous survey was sent to 100 participants in April 2024, and respondents were given two weeks to respond. A total of 36 responses were received (32 in English, 2 in French, and 2 in Spanish). Participants were asked to rank SRHR topic priorities for five different climate hazards: extreme temperatures, floods, rainfall shocks, cyclones/typhoons, and drought. For most climate change factors, maternal and newborn health emerged as the top



**Fig 2. Participants' top five priority (a) thematic areas, (b) research methodologies, and (c) intersectionality issues.** For (a) and (b) the maximum possible score was 10; for (c) the maximum possible score was 5. SRHR: sexual and reproductive health and rights; MNH: maternal and newborn health; GBV: gender-based violence; RCT: randomised controlled trial. †includes child marriage and female genital mutilation. ‡includes endometriosis and menopause.

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research priority area: extreme temperatures (score 4.25/5), cyclones/typhoons (score 3.94/5), rainfall shocks (score 3.79/5), and floods (score 3.69/5). Gender-based violence was identified as the top priority for research regarding drought (score 3.83/5) while contraception emerged as a second priority for floods (score 3.47/5) and rainfall shocks (score 3.32/5) (**Fig 3**). Respondents were asked to identify specific research questions linking the climate change factor and SRHR dimension. A list of the proposed questions can be found in [S4 Table](#).

**Online consultation.** A total of 41 individuals, plus hosts from the coordinating institutions, took part in the second-round online consultation held on 08 May 2024 to discuss the results from the second survey. During that session, participants reacted to the survey findings and proposed research topics based on the prior discussions and emerging data from the survey. Online discussions identified research themes around access to services, impacts on health systems, and policy implications. For example, themes such as access to contraception or abortion services were raised along with how access to water and sanitation (WASH) services might impact SRHR outcomes. Several questions emerged around health worker wellbeing and the ability of community health workers to continue providing services during extreme weather events. There were also questions raised about the impact of climate events like extreme heat on the integrity of medicines and commodities such as contraceptive methods. Themes around policy included exploring how SRHR is integrated into National Adaptation Plans and how to ensure evidence-based messaging around extreme weather events and SRHR issues. Participants to the online meeting agreed to develop more specific research questions through a third round focusing on the prioritisation of those questions.

### Modified CHNRI prioritisation survey

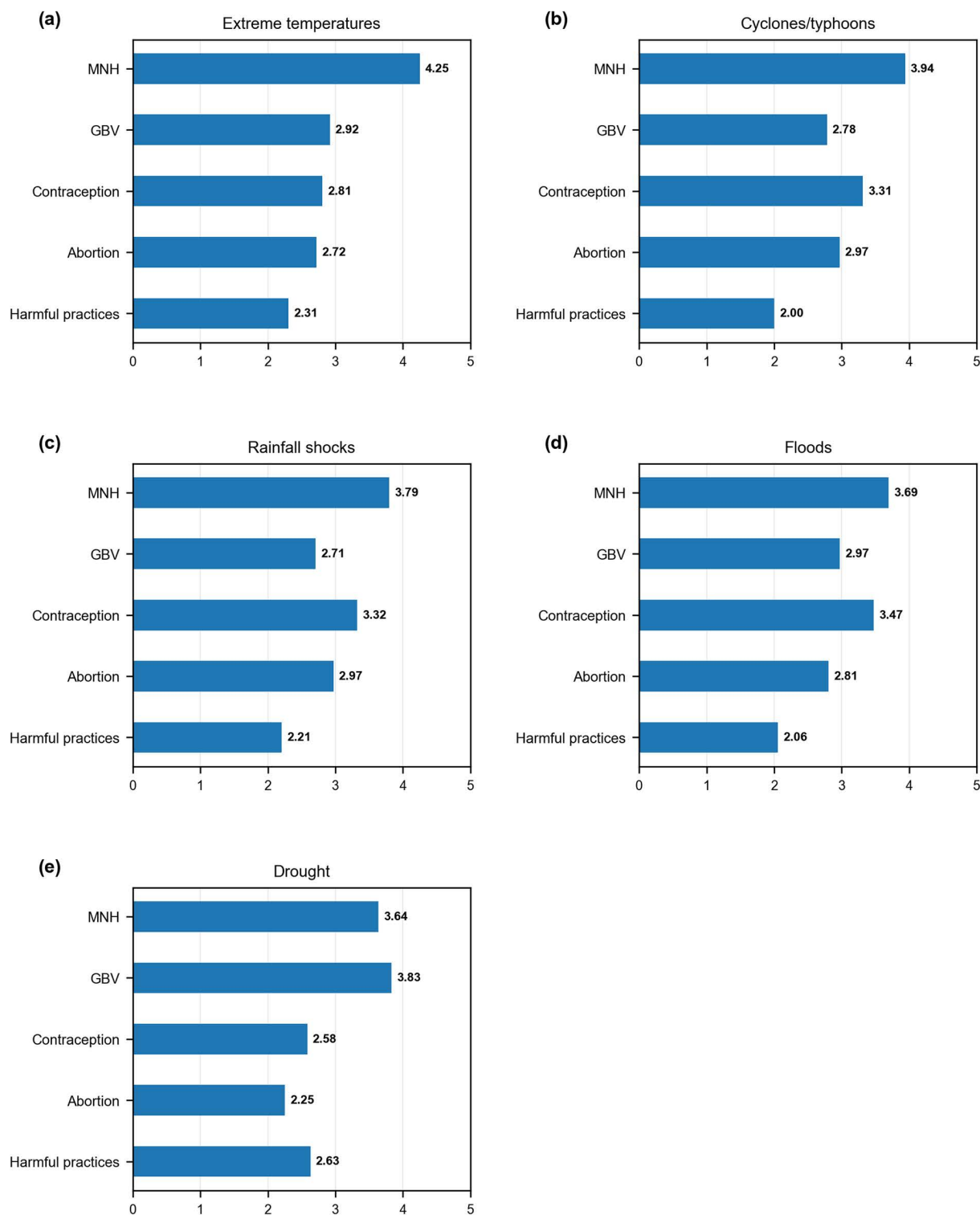
**Survey.** A third, and final, anonymous survey was sent out to 100 individuals on 12 July 2024 and respondents were given two weeks to complete it. This survey followed a modified CHNRI prioritisation methodology incorporating 31 proposed questions based on suggestions from respondents to survey 2, discussions during the online consultation, and analysis of common themes. The 31 final questions were organized according to climate change factors: drought and SRHR; extreme temperatures and SRHR; floods and SRHR; rainfall and SRHR; typhoons/cyclones and SRHR; climate change, health systems, and SRHR; and other areas.

We received a total of 27 responses. The ten highest scoring research questions received a score of 90% or higher. Three of the prioritised research questions fell under the climate change, health systems, and SRHR category, followed by two each in the drought, floods, and additional areas categories. No questions under the rainfall and typhoons/cyclones categories were among the top ten questions. See [Table 2](#) for the list of the ten prioritised research questions and [S5 Table](#) for the full list with individual scores.

### Discussion

We aimed to build consensus and prioritise research questions linking climate change and its effects on sexual and reproductive health and rights. This effort involved a group of experts identified through a mapping exercise completed in 2023 and others that were identified through the networks of the coordinating institutions (HRP Alliance, IBP network, and AFIDEP). The final list of ten research questions that emerged reflected a mix of SRHR topic areas focusing certain climate change events, and health systems issues that will require a range of research methodologies. Unsurprisingly, this list focused on areas, aspects, and issues that reflect common interests in SRHR: impact on maternal and newborn health outcomes, the compounding effect of intersectionality on equality issues that result in GBV, issues around health service access that impact the provision of quality contraception and abortion care and menstrual health, and the impact on the biological aspects relating to fertility.

Access to contraceptive services and maternal and newborn health outcomes remained top SRHR research priorities at the intersection with climate change, as well as some emerging topics such as comprehensive sexuality education and fertility care. Specific to maternal and newborn health, there is growing evidence focusing on outcomes impacted by



**Fig 3. Participants' SRHR areas of priority according to five climate change factors: (a) extreme temperatures, (b) cyclones/typhoons, (c) rainfall shocks, (d) floods, and (e) drought.** For all graphs, the maximum possible score was 5. MNH: maternal and newborn health; GBV: gender-based violence. Harmful practices includes child marriage and female genital mutilation.

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**Table 2. List of ten prioritised research questions at the nexus of climate change and sexual and reproductive health and rights (N=27).**

	Total score* (%)
<b>Drought and SRHR</b>	
What are the impacts of drought on the incidence and manifestations of gender-based violence?	25.0 (93%)
What interventions can effectively ameliorate the impact of drought on SRHR to ensure the quality of care for the most vulnerable populations?	24.5 (91%)
<b>Extreme temperatures and SRHR</b>	
What interventions can effectively ameliorate the impact of extreme temperatures on SRHR to ensure quality care for the most vulnerable populations?	25.0 (96%)
<b>Floods and SRHR</b>	
What are the impacts of floods on SRHR, including maternal and newborn health, contraception, and abortion?	23.5 (90%)
What interventions can effectively ameliorate the impact of floods on SRHR to ensure quality care for the most vulnerable populations?	23.5 (90%)
<b>Climate change, health systems, and SRHR</b>	
What measures can be implemented to maintain service provision during events related to climate change (droughts, extreme temperature, floods)?	23.5 (94%)
How can health systems be strengthened to ensure resilience and continuous provision of quality sexual and reproductive health services, including contraception and maternal and newborn health care, during and after climate events such as floods, droughts, and extreme temperatures?	23.0 (92%)
What mechanisms can be implemented within disaster risk reduction processes to prevent and reduce gender-based violence, particularly for vulnerable populations such as persons with disabilities, in the context of climate shocks?	22.5 (90%)
<b>Additional areas</b>	
What must be done to prioritise SRHR in climate action strategies and policies (such as the Health National Adaptation Plans [HNAPs]) at the national level?	24.0 (96%)
How does climate change compound existing challenges faced by internally displaced persons and migrants with regard to SRHR?	23.0 (92%)

\*Calculated by assigning 1 point for each question being granted an “agree”, 0 points for each “disagree”, and 0.5 points for each “neither agree nor disagree”.

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climate change –e.g., impact of extreme heat and prolonged drought on preterm birth. However, the literature is scarcer when it comes to the impact of climate change on contraceptive access [6,9,36]. There is some documented evidence that links the challenges in accessing contraception during floods and other climate related disasters [37,38]. Identified priorities centred around health system issues such as ways to increase access, decrease costs, and provide quality services under varying climate conditions. Lack of access to modern contraception may also lead to unintended pregnancy causing further complications for safe delivery and birth outcomes. While addressing GBV did not rise as the main priority area, it was also reported as important by the group. A systematic review of the impact of climate events on GBV revealed increased instances of GBV mostly as a result of stressors related to economic instability, food insecurity, increased exposure to men, and disruptions in infrastructure [39]. When examining intersectionality, respondents prioritised social categories such as poverty and gender norms in relation to climate effects on SRHR. While these intersectional aspects are well documented, addressing them in the context of climate change remains understudied [7,40].

In addition to the SRHR topic areas, respondents identified the need for specific research methodologies that could best respond to the prioritized questions, which had been raised earlier by the group participating in the 2023 consultation [19]. While the group decided not to focus on this aspect, discussions emerged in line with existing literature, regarding

the need for longitudinal data that could help establish causality as well as the need to focus on participatory approaches that are informed and designed by the communities most affected by climate change and harmful reproductive health outcomes [7,19]. This exercise also documented other SRHR areas of note, including fertility. Studies have shown impacts of extreme heat on reduced ovarian reserves and on fertility overall and there have been links between climate conditions like extreme heat and carbon emissions on male infertility [14,41].

Importantly, some critical areas relating to SRHR did not rise as top priorities by the experts participating in this exercise, such as abortion, menstrual health, and sexual health. Further issues around WASH, commodities, and policies were mentioned but not prioritised. While the impact of climate change on access to safe abortion has been identified as a knowledge gap in the literature it was only included in the final list of priority questions as part of broader health system access issues [6,7]. Further, there is a growing body of evidence on menstrual health and access-related issues impacted by climate factors [42,43]. In contrast, while sexual health was mentioned by respondents during the online consultations none of the final questions address this specifically. Previous scoping reviews revealed that the evidence on broader aspects of sexual health remain understudied, including aspects relating to sexual orientation and gender identity and disability [6,10,21]. Yet, research documents that sexually and gender diverse persons may be disproportionately affected by climate change due to social and institutional exclusion and that meaningful participation of people with disabilities is achievable and can enhance the quality and relevance of programmes [10,44,45]. Finally, there was no discussion about climate change impacting mental health and reproduction intentions despite some research indicating that climate concerns are associated with less positive views on childbearing and desires for fewer or no children [15,46,47]. While this exercise focused on exploring the effect that climate change is having on SRHR, there is evidence specifically emerging from feminist scholars, urging to look at the sociopolitical aspects to ensure that the discourse does not attempt against reproductive rights and justice by framing SRHR as a mechanism to reduce the effect of climate change [48–50]. And finally, there are a number of distal impacts of climate change on SRHR, including climate-driven migration, which were not explored through this exercise but that are highly relevant in this space [5].

Further, most of the national adaptation and health national adaptation plans lack a comprehensive inclusion of SRHR domains and even when these do exist, they are mostly around maternal and newborn health, GBV, and infrequently around contraceptive access [51]. By 2024, no NAP/HNAPs included dimensions relating to abortion and only one did for comprehensive sexuality education revealing an important gap in both knowledge and policies able to address some critical aspects in SRHR [52]. This exercise highlighted how some SRHR areas continue to be understudied and without concerted efforts in trying to shed light on these, with a common understanding of climate factors affecting health, inequalities will continue to persist.

### Strengths and limitations

While there were several strengths in having this consultative and iterative approach to reaching consensus and prioritising research needs, there were also limitations. Perhaps the most important one had to do with the use of this methodology for a complex intersecting area, such as climate and SRHR. While we had discussions following each round with written feedback, these were insufficient to truly highlight some of the multifaceted aspects, including intersectional and context-specific issues that were not being prioritised by respondents. Perhaps a different approach may be needed for extracting the level of granularity needed to best affect change in this space. Relatedly, and given the scope of this activity, we were unable to explore some power and political issues that affect the discussions around climate and SRHR which could have brought further nuance into the priorities identified. Further to this, there were several limitations specific to this analysis. First, participation reduced significantly after each consultation round. While expected for a multiple round consultation exercise, the reduced numbers meant that the final priority list was based on responses from far fewer experts than those that had participated in the original consultation. Relatedly, because we did not collect socio-demographic data during rounds 2 and 3, and given that the surveys were anonymised, we were unable to assess any

differences in responses according to expertise, country of work focus, or other factors. And also, the fact that we did not conduct a pilot for any of the surveys may have impacted respondents' understanding. However, the online consultations following each survey round also provided participants with an opportunity to comment on the survey itself, including if there were any issues that arose during survey completion. Second, responses were based on those who attended the virtual sessions and completed the surveys, meaning that the areas and topics being identified likely reflected the areas of interest of participants. Third, despite intentional efforts to diversify the participants to reflect wider geographic regions and technical expertise in climate as well as SRHR, ultimately participants were overwhelmingly SRHR professionals from countries in the Global North. This resulted in perspectives that were likely skewed towards priorities in the Global North and narrowly focused on SRHR. A wider pool of experts, including those across sectors such as climate scientists and environmental researchers, may have enabled a broader range of perspectives and identified a more comprehensive set of research gaps related to climate impacts on SRHR more broadly such as mental health, fertility intentions and reproductive decision making. This also suggests a need to consider alternative, more inclusive approaches, like in person community dialogues or focus groups which might be more culturally appropriate for participants to comfortably share diverse perspectives on SRHR and climate change. Finally, inherent to the methodology, data syntheses and structuring of each prioritisation round was done by the individuals coordinating the activity, meaning that the range of SRHR areas or climate related conditions might have been influenced by our own biases. However, we did try to overcome this by allowing for open discussion, agreement, and course correction with the larger group during each online consultation session. Relatedly, our decision to select the ten highest scoring questions was based on our decision to keep the final list limited in number, though we are aware that there are other ways in which this could have been established.

## Conclusion

The Delphi and CHNRI prioritisation processes provided a systematic approach to identifying priority research questions linking the impact of key climate events with selected SRHR areas which will require specific research methodologies able to quickly result in action as well as that represent the communities most affected. The prioritised questions can help the research community focus evidence generation activities in the future, such that adaptation plans can be reflective of existing data. The gaps emerging from this activity should also serve as a guiding principle to ensure typically understudied elements of and populations affected by climate change and SRHR are prioritised to ensure countries are able to quickly adapt to the rapidly evolving environment. Finally, given the complexities of climate change and SRHR, country and community context will be important considerations in how this list of priorities and other research in this area moves forward in the future.

## Supporting information

### **S1 Text. Surveys sent out for the modified Delphi and CHNRI processes.**

(DOCX)

### **S1 Data. Full dataset from all three online surveys.**

(ZIP)

### **S1 Fig. Matrix depicting areas with knowledge gaps at the intersection of five most commonly cited climate change factors and five most commonly found SRHR dimensions (from a 2023 scoping review).** FGM: female genital mutilation. Adapted by authors from Arunda et al. [6].

(TIF)

### **S2 Fig. Flow chart of respondents and response rates.** CHNRI: Child Health and Nutrition Research Initiative.

(TIF)

**S1 Table. Sexual and Reproductive Health and Rights and Climate Change Delphi Consensus Building Group.**  
(DOCX)

**S2 Table. Accurate consensus reporting document (ACCORD) checklist.**  
(DOCX)

**S3 Table. Top five priorities according to SRHR domains, research methodologies, and intersectionality aspects identified during the pre-Delphi consultation.**  
(DOCX)

**S4 Table. List of the questions proposed by respondents from Delphi round 2 consultation.**  
(DOCX)

**S5 Table. Scoring of proposed research questions at the nexus of climate change and sexual and reproductive health and rights (modified CHNRI).**  
(DOCX)

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