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Documenting the Perspectives of Sub-Saharan African Policy Makers, Researchers, and Activists on the Reproductive Rights, Population Dynamics, and Environmental Sustainability Nexus

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Abstract: While high fertility levels in sub-Saharan Africa pose multiple challenges for economic, social, and environmental prospects, the perspectives of actors from this region have not been well documented. We offer a selection of viewpoints from 42 countries in sub-Saharan Africa along four main dimensions: perceptions of the role of population growth for broader societal implications; the representation of sub-Saharan Africa in discussions of population growth; the integration of population dynamics and reproductive health and rights in environmental considerations and instruments; and the sensitive nature of the topic of population growth. A mixed-methods qualitative project was conducted, using an online survey of 402 participants followed by 18 in-depth interviews, to collect the views of policy makers, researchers, and activists in sub-Saharan Africa. We find overwhelming agreement that population growth has negative implications for environmental sustainability and other social welfare outcomes. We find broad support for the integration of population dynamics and reproductive health and rights dimensions at international environmental meetings and in environmental sustainability instruments. Participants also stressed the under-representation of sub-Saharan Africa in discussions of population dynamics and in international environmental governance. Overall, this paper contributes to a better understanding of sub-Saharan African perspectives and attitudes on the interconnectedness of reproductive health, population dynamics, and environmental sustainability.

Keywords: environmental sustainability; population growth; reproductive health and rights; international environmental meetings and governance; sub-Saharan Africa

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1. Introduction

In 2022, the human population size passed the 8 billion milestone, and while the rate of population growth is slowing down globally, we are on a trajectory to add 2.4 billion humans by the 2080s [1]. The sustained and rapid population growth is both a cause and a symptom of slow progress in development, exacerbating and generating social, economic, and environmental challenges that range from food insecurity and gender inequity to environmental degradation [2]. In this article, we acknowledge the transversal, or crosscutting, nature of population dynamics, and we focus on analyzing the implications of population growth for environmental sustainability and reproductive health and rights. We build on an increasing body of research that explores perceptions and voices around these issues [3–6] by highlighting the voices of sub-Saharan Africans, which have not been well documented.

The voices of sub-Saharan Africans on population dynamics are uniquely relevant, as this global region has experienced the fastest growing population since the 1980s [7]. It has the highest desired family size, which is the strongest determinant of national fertility outcomes. Demographers project Africa's population to be almost double in size and

contribute more than half of the global population increase anticipated by 2050 [1]. The continent has the highest proportion of both unintended pregnancies and unmet need for family planning [8]. Despite having generated a comparatively low contribution to overall greenhouse gas emissions, sub-Saharan Africa is also disproportionately vulnerable to the impacts of climate change [9].

Population size is one of the three key variables, alongside consumption and energy use, in generating environmental degradation and driving human-caused climate change [10]. Despite its transversal and far-ranging implications for a multitude of sectors, demographic trajectories are largely regarded as set in stone by the development community and are omitted from policy instruments. Discussions that stress the negative impacts of global population growth are also widely marginalized and often perceived as unwarranted, alarmist, coercive, and racist [11]. In this demographically divided world, where certain regions are experiencing sustained population growth while others are witnessing a decline, the concern regarding global population growth becomes inherently relative, making it more challenging to express alarm over increasing numbers when viewed in the context of a population decline elsewhere. The 2022 World Population Prospects indicate that "two-thirds of the global population lives in a country or area where fertility is below 2.1 births per woman, roughly the level required for zero growth in the long run for a population with low mortality" [1]. Global fertility is projected to decline from 2.3 in 2021 to 2.1 births per women by 2050. Sub-Saharan African nations stand out globally in terms of fertility rates, registering an average of 4.6 births per woman in 2021. It is estimated that this part of the world may contribute more than half of the global population increase anticipated by 2050.

There are many just ways to influence population trajectories, including by advancing reproductive rights, gender equity, and education [12]. Advancing reproductive autonomy, by ensuring that individuals are given the means to choose the number of children that they wish to have, may have significant benefits for climate change adaptation and mitigation and environmental sustainability.

It is estimated that approximately half of the world's pregnancies are unintended, while over 210 million women have an unmet need for family planning [8]. The scale of the need to improve reproductive rights is thus enormous, with significant demographic implications. These implications were highlighted by a team of demographers from the University of Washington, who estimated that the global population would grow for many more years but could decline to 6.3 billion by 2100. This estimate is predicated on the hypothetical assumption that that the Sustainable Development Goals' targets for contraceptive access and education will be met [13]. This number is much lower than the 10.4 billion median-scenario projection of the United Nations Population Division for that year.

Overall, we ground our inquiry within a planetary health approach, as it reflects the synergistic and bi-directional relationship of human health (through the advancement of reproductive health) and planetary health (through a reduced environmental impact). As such, the aim of this research is threefold: (1) amplifying the voices of sub-Saharan development actors on multi-sectoral development questions, (2) explore perceptions on the reproductive rights, population dynamics, and environmental sustainability nexus, and (3) contribute to normalizing the discussion on this topic to harness related health, well-being, and environmental opportunities.

2. Methods

We adopted a multi-method qualitative approach within an interpretivist and pragmatic paradigm. We conducted an online survey and a series of in-depth interviews intended to facilitate nuanced and comprehensive insights into participants' perspectives on the connections between population dynamics, reproductive health, and environmental sustainability.

Participants in the survey were selected based on the following criteria: (1) being a national of, or holding permanent residence in, a country located in sub-Saharan Africa;

and (2) self-identification as working or being "active" in a field that is related to economic, social, or environmental development. "Active" here refers to individuals with a marked interest or concern in these areas of relevance. Participants were thus purposefully sourced from listservs, personal and professional networks, and word-of-mouth communications, and they were encouraged to share the survey invitation within their own networks. A conscious effort was made to reach out to a wide variety of experts in sub-Saharan Africa who would reflect a diversity of geographical, professional, and personal viewpoints. As such, the participant search was made by sector (academia, government, and nongovernmental organizations (NGOs)), disciplinary field (health, reproductive health and rights, environment, economics, gender, agriculture, and development), and geographical location. In our search, we made efforts to maximize the sample diversity by aiming to represent youth, women, and marginalized communities. In total, we obtained 402 responses. Throughout the article, we provide descriptive statistics based on the number of responses received for each question.

The survey, available via Survey Monkey, was available in English and French, and open for responses from August 2022 through to March 2023. It contained 17 close-ended questions and 8 open-ended questions. Close ended questions are questions that allow respondents to choose from pre-defined responses only, responses such as "yes/no" or multiple-choice questions. Open-ended questions invite respondents to formulate their answers in their own words. Throughout the research process, we focused on exploring participants' backgrounds, perceptions, and framing of the reproductive rights and environmental sustainability linkage. We also solicited opinions on the current and potential scope of related interventions and perspectives about social norms related to fertility.

Survey participants were given the opportunity to indicate their interest in a virtual follow-up interview online on the afore-mentioned issues. All participants who expressed an interest in the follow-up interview were contacted, and fourteen (14) virtual in-depth, semi-structured interviews were conducted with those that responded to the invitation. Interviews were also conducted, in English and French, with stakeholders from sub-Saharan Africa who were present at the UN Convention on Biological Diversity COP15 meeting in Montreal in December 2022 (4 participants). In total, 18 interviews were conducted. With participants' consent, all interviews were recorded and transcribed. Interviews took place between September 2022 and April 2023 and lasted between 15 and 45 min. They followed a semi structured format, consisting of 14 questions. The interview guide consisted of background questions and a series of questions designed to elicit views on population growth, its implications, and the representation of sub-Saharan Africans in related discussions.

Because our data have strong limitations in terms of representativeness, we limited the use of descriptive statistics to survey data referring to close-ended questions only. We present our analysis and discussion to provide useful insights on this topic, but do not make claims of representativeness of our targeted population group. Excel (Version 2310 (Build 16924.20150 Click-to-Run) and Survey Monkey (Advantage Plan) were used to conduct descriptive analyses of the data collected. We disaggregated our data by gender, age, and geographical location, but we did not find meaningful differences between subgroups. The large majority of results showed no statistical difference between the disaggregated data. The few times that a statistically significant difference was present between subgroups, we treated it as irrelevant as it pointed to a trend that was unsupported by other related response options. For example, when we asked participants if they thought that sub-Saharan Africa will become a stronger geo-political player on the global scale because of its contribution to more than half of the global population increase anticipated through 2050, participants had the possibility of choosing between 5 response options: strongly agree, somewhat agree, neither agree nor disagree, somewhat agree, and strongly disagree. Results showed a statistically significant difference between female and male participants for options 1 (strongly agree) and 2 (somewhat agree). But while female participants selected the "strongly agree" option significantly less than their male counterparts, they

selected the "somewhat agree" option significantly more. In other circumstances, statistically significant differences that emerged between subgroups were ignored because the number of respondents to sub questions was below 15, a number that we considered too low to deduce valuable disaggregated data insights. For these reasons, we only present non-disaggregated analyses in this paper.

Open-ended responses were analyzed thematically, and emerging themes were organized according to pre-determined and emerging codes and categories. Throughout the paper, quotes are used to provide context and illustrate these findings.

Apart from the descriptive statistics which relate to the survey exclusively, the findings reflect both the survey and interview results. In-text percentages presented in this study were rounded up or down based on the midpoint to enhance readability.

To ensure interpretative rigor, several techniques were employed including triangulation (the combination of multiple methods, sources, and theories to contribute to enhance the validity of research results), reflexivity (awareness of the researcher's own perspectives), and bracketing (effort to refrain from imposing the researchers' perspectives throughout the research process). Ethical clearance for the study was received from the University of Ottawa (Ethics File Number H-08-22-8208).

Participant Characteristics

Of the 401 survey participants who answered the question on gender, 28 percent (114 participants) identified as female, 71 percent (286 participants) identified as male, and one participant preferred not to answer this question. None of the participants chose the "non-binary" or "not listed" options. Of the ten response choices relating to participants professional fields, the most selected answers were health (57 percent/228 participants), environment (26 percent/108 participants), and sexual and reproductive health policy makers/advocates/researchers (26 percent/104 participants). Participants came from 42 different countries located in sub-Saharan Africa. Among them, 50 percent were from Ethiopia, 7 percent from Ghana, and 11 percent from Uganda. Table 1 summarizes the survey participants' characteristics.

Table 1. Survey participant characteristics.

Participant Characteristics	Number of Participants	Total Number of Participants	Percentage
Gender			
Female	114	401	28%
Male	286	401	71%
Prefer not to answer	1	401	0.25%
Age			
Under 30 years old	57	401	14.21%
Between 30 and 45 years old	268	401	66.83%
Over 45 years old	76	401	18.95%
Country of Origin			
Ethiopia	201	402	50.00%
Ghana	29	402	7.21%
Uganda	44	402	10.95%
Other SSA countries	127	402	31.67%
Organization Type			
Government Agencies	97	402	24.13%
Non-Governmental Organizations (NGOs)	140	402	34.83%
Research/Academia	138	402	34.33%
International Organizations	12	402	2.99%
Other Types	15	402	3.73%

The 18 in-depth interview participants came from 10 different sub-Saharan countries, most (5) being Ethiopians. Three interviews were conducted in French and the remainder in English. Only one participant was in the under 30 age group, nine were between 30 and 45, and eight were above 45. Three participants were female, while fifteen were male.

3. Results

We analyzed results based on four overarching themes: (1) perceptions of the role of population growth for broader societal implications; (2) the representation of sub-Saharan Africa in discussions of population growth; (3) the integration of population dynamics and reproductive health and rights and gender issues in environmental considerations and instruments; and (4) the sensitive nature of the topic of population growth. These are each discussed in detail below.

3.1. Perceptions of the Role Population Growth for Broader Societal Implications

Exponential population growth since the 18th century, and projected ongoing population growth until 2100, was considered as a problem by an overwhelming number of participants (89 percent/276 participants out of 309). Of these participants, 72 percent (221 participants) found it to be an extremely important problem, 15 percent (46 participants found it to be a moderately important problem, and 3 percent (9 participants) found it to be a slightly important problem. Only 8 percent of participants (26) considered that population growth was not an important problem (1 percent/2 participants did not know, and 2 percent/5 participants chose "other"). To elicit further nuance to their responses, we asked participants which sectors were likely negatively impacted by population growth. Participants overwhelmingly agreed that population growth negatively affected environmental sustainability (98 percent/302 participants out of 308), food security (99 percent/300 participants out of 304), migration patterns (96 percent/297 participants out of 308), health and wellbeing (95 percent/294 participants out of 308), resilience (95 percent/292 participants out of 306), peace and security (94 percent/289 participants out of 308), education for all (93 percent/286 participants out of 306), economic development (92 percent/284 participants out of 308), disaster preparedness (92 percent/280 participants out of 306), and gender equity (78 percent/239 out of 305) (see Figure 1 below).

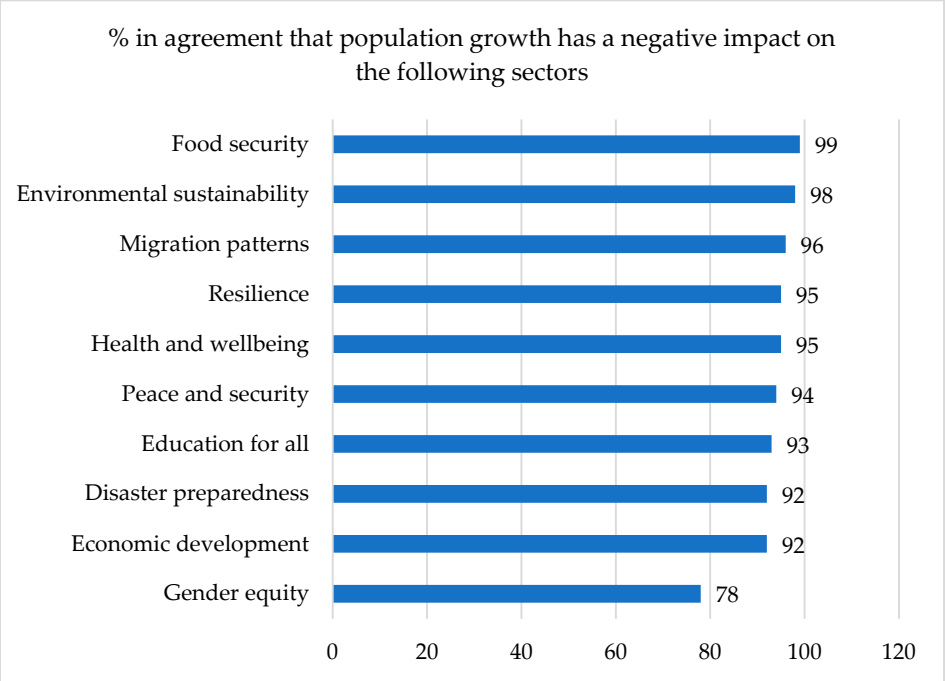

Figure 1. Effects of population growth on welfare outcomes.

Almost all participants agreed that population growth had negative implications for environmental sustainability. The few participants who stressed that population growth did not generate environmental degradation pointed to the minimal role that Africa played in generating carbon emissions and to the disproportionately large contributions of the Global North.

Sub-Saharan Africa is projected to be the global region with the fastest population growth in the coming years, from 1.1 billion today to 3.4 billion by 2100. A large majority of participants felt that this rapid population growth would absolutely not (50 percent/156 participants out of 309) or likely not (19 percent/59 participants) lead to improved wellbeing and quality of life, while 18 percent (56 participants) felt that it likely would, if certain conditions were met, and 11 percent (34 participants) indicated that rapid population growth would absolutely lead to improved wellbeing and quality of life (1 percent/4 participants chose "other"). Table 2 groups these positive and negative responses in separate categories and summarizes these results.

Table 2. Perceptions on population growth and improved wellbeing and quality of life.

Survey Question	Number of Participants/% Participants Who Answered YES	Number of Participants/% Participants Who Answered NO	Other	Total Number of Participants
Sub-Saharan Africa is projected to be the global region with the fastest population growth in the upcoming years. Standing today at 1.1 billion, it is projected that it could reach 3.4 billion by 2100. Do you think that this rapid population growth will lead to improved wellbeing and quality of life for sub-Saharan Africans?	90/29.13%	215/69.58%	4/1.29%	309

On the link between population growth and economic prosperity, participants had mixed opinions—out of 309 participants who provided responses to the question, 44 percent/127 participants agreed that population growth can be accompanied with economic prosperity, 39 percent/112 disagreed, and 17 percent/49 participants neither agreed nor disagreed. Although the majority of respondents held the view that higher population growth rates would lead this world region to becoming a stronger geo-political player on the global scale (57 percent/166 participants agreed, 29 percent/83 participants disagreed, and 14 percent/40 participants neither agreed nor disagreed), there were concerns that a rapid population increase would likely generate more pressing social, economic, and environmental challenges for sustainable development (86 percent/265 participants agreed, 8 percent/25 participants disagreed, and 6 percent/18 participants neither agreed nor disagreed).

It has been suggested that slowing the population growth could lead to substantial emission reductions and play an important role in averting dangerous climate change [14] Inquiries into respondents' opinions on whether policies aimed at improving or preserving the quality of the environment should take population dynamics (population dynamics includes the study of population size, age structure, and urbanization) into account indicated strong support for this idea. An overwhelming majority (95 percent/293 participants out of 309) felt that environmental policies ought to take population dynamics into account, of which 72 percent felt it was extremely important (224 participants), 17 percent (52 participants) moderately important, and 6 percent (17 participants) slightly important. Only 5 percent of participants (14) felt that environmental sustainability policies should not take population dynamics into account (1 percent/2 participants did not know). Table 3 groups these positive and negative responses in separate categories and summarizes these results.

Table 3. Environmental policies and population dynamics.

Survey Question	Number of Participants/% Participants Who Answered YES	Number of Participants/% Participants Who Answered NO	Other	Total Number of Participants
Some studies demonstrate that lowering human fertility rates can have multiple positive implications for environmental sustainability. For example, slowing population growth could lead to substantial emissions reductions and play an important role in averting dangerous climate change. Do you think that policies aiming to improve or preserve the quality of our environment should take population dynamics (population dynamics include the study of population size, age structure, and urbanization) into account?	293/94.82%	14/4.53%	2/0.65%	309

During the COP26 United Nations Climate Summit, Nancy Tembo, Malawi's Minister of Forestry and Natural Resources, stressed that addressing gender issues and population growth needed to be at the center of climate mitigation and adaptation. Her comments contrasted with the rest of the summit's focus, which barely addressed population dynamics. We asked participants if they thought that population dynamics should be given more weight at international UN conferences focusing on climate and the environment, or if these discussions should be left out of such meetings. Participants largely agreed that they should be given more weight (76 percent/235 participants out of 309) due to their far-reaching and transversal nature, while a minority felt that they should be left out (15 percent/47 participants) (9 percent/27 participants did not know).

3.2. Representation of Sub-Saharan Africa in Discussions of Population Growth

Participants expressed the opinion that sub-Saharan Africa was under-represented in global discussions of population dynamics and international environmental governance. Fifty-eight (58) percent of participants (178 participants out of 309) indicated that sub-Saharan perspectives on population dynamics in relation to family planning and reproductive autonomy should be more recognized and sought at the international level; seventy-six percent of participants (235 participants) agreed that the social, economic, and environmental implications of population growth for Sub-Saharan Africa needed to be better understood and studied. Given sub-Saharan Africa's projected population growth over the coming decades, approximately two-thirds of participants (203 participants) felt that the drivers of fertility behavior, as well as the social norms associated with human reproduction, in sub-Saharan Africa should be studied in greater depth.

An interesting take on the reason for the lower participation of African voices on the issue of population dynamics and its implications was the role ascribed to Global North partners. Many participants commented on the imposition of values and funding priorities by the Global North, who may be reluctant to address population dynamics. Survey participant 219, from Kenya, stated that "This is something I witness a lot with other colleagues who do not want to say things to funders fearing they may lose their funding". Survey participant 272, from Congo, stated that "Narratives around global health issues, including family planning, are still colonized by discourses from Global North donors. Experts from South Africa avoided expressing their ideas on many global issues to avoid any frustrations or jobs loss". Survey participant 286, from Kenya, stated that "Global North funders often have pre-conceived ideas as to the challenges and solutions in sub-Saharan

Africa, some of which are often out of touch with local realities, and are at times not open to listening to or supporting contrary ideas".

Some participants viewed the influence of the Global North on discussions of population dynamics with suspicion. Several participants suggested that a growing sub-Saharan African population could serve the hegemonic interests of the Global North by perpetuating a situation of dependence rooted in economic imbalances and historical colonization. Other participants suggested the opposite: the Global North has a hidden agenda to weaken sub-Saharan Africa by engaging in policies to reduce the growth of its population. Participant 257, from Ghana, stated that "We as sub-Saharan Africans are pro-natalist and so communicating population control messages signifies a Western agenda to reduce African fertility. Suspicion is a major barrier".

A number of factors were put forward by respondents on the barriers to addressing population growth. Education and increased awareness of implications ranked high on the list. Participants indicated that the general lack of education in sub-Saharan Africa was a major impediment to addressing population dynamics and related inter-sectoral issues. They remarked that sub-Saharan Africa was largely illiterate and that the quality of education needed to be enhanced. Interview participant 5, from Côte d'Ivoire, stated that "Unfortunately, Africa's major challenge is to combat illiteracy, which means educating the population. Over 50% of the population is illiterate, and in some regions, it goes as high as 80%" (This quote was translated from French by co-author CD. The original version states «Malheureseument, le grand défi de l'Afrique, c'est de lutter contre l'analphabétisme: c'est donc d'éduquer la population. Plus de 50% de la population ets analphabète, et il y a des régions ou cela va jusqu'à 80%»). They also suggested that sexual education and a greater awareness of matters relating to reproductive health, including contraception, would be beneficial. Additionally, more awareness needs to be created about the negative implications of high fertility and population growth on environmental degradation. Finally, a lack of data and cross-sectoral communication around these issues also contributed to a lack of awareness.

3.3. The Integration of Population Dynamics, Reproductive Health and Rights, and Gender Issues in Environmental Considerations and Instruments

When individuals and couples are given the means to choose the number, timing, and spacing of their children, they tend to have fewer children [15]. For this reason, it is sometimes argued that contraception and family planning services can have a positive impact on environmental sustainability [16]. We asked participants if they agreed with the notion that contraception and family planning services can have a positive impact on environmental sustainability. The response was overwhelmingly affirmative: 89 percent agreed with this notion (i.e., out of 309 participants, 61 percent/188 participants strongly agreed, 28 percent/86 participants somewhat agreed), 6 percent/19 participants neither agreed nor disagreed, 4 percent/11 participants somewhat disagreed, and 2 percent/5 participants strongly disagreed. Survey participant 366, from Ethiopia, stated that "Preventing unwanted pregnancies in developing countries through family planning might be one of the most cost-effective ways to preserve the environment". Among world regions, sub-Saharan Africa has the highest proportion of unintended pregnancies, the highest proportion of women who began childbearing in adolescence, and the lowest contraceptive prevalence rate. We asked participants if they thought that making contraception and family planning services an integral component of environmental policies/discourse might help to accelerate progress for reproductive health and rights in sub-Saharan Africa: out of 303 participants who provided a response, 82 percent/249 participants said yes, while 13 percent/38 participants said no (5 percent/16 participants said they did not know).

It is well documented that education and women's empowerment tend to lower fertility rates [17]. An overwhelming majority of participants strongly agreed that environmental policies and programs should, for this reason, promote access to education and women empowerment (out of 305 participants, 79 percent/241 participants strongly agreed,

14 percent/44 participants somewhat agreed, 3 percent/9 participants neither agreed nor disagreed, 2 percent/7 participants somewhat disagreed, and 1 percent/4 participants strongly disagreed).

It is commonly argued that population policies aiming to influence fertility levels (whether pro- or anti-natalist) can restrict reproductive autonomy. Nonetheless, over 77 percent of participants felt that it was possible to promote messages and policies stressing the positive impact of family planning on environmental sustainability without impairing reproductive autonomy (i.e., out of 306 participants, 46 percent/140 participants strongly agreed, 31 percent/96 participants somewhat agreed, 10 percent/31 participants neither agreed nor disagreed, 6 percent/17 participants somewhat disagreed, and 7 percent/22 participants strongly disagreed). Table 4 groups these positive and negative responses in separate categories and summarizes these results.

Table 4. Perceptions on reproductive rights, education, gender equity, population dynamics, and environmental sustainability.

Survey Question	Number of Participants/% Participants Who Answered YES	Number of Participants/% Participants Who Answered NO	Neither Agree/Disagree	Total Number of Participants
When individuals and couples are given the means to choose the number, timing, and spacing of their children, they tend to have fewer children. For this reason, it is sometimes argued that contraception and family planning services can have a positive impact on environmental sustainability. Do you agree with the notion that contraception and family planning services can have a positive impact on environmental sustainability?	274/88.67%	16/5.18%	19/6.15%	309
Sub-Saharan Africa has the highest proportion of unintended pregnancies, the highest proportion of women who began childbearing in adolescence, and amongst the lowest contraceptive prevalence rate. Do you think that making contraception and family planning services an integral component of environmental policies/discourse might help accelerate progress for reproductive health and rights in sub-Saharan Africa?	249/82.18%	38/12.54%	165.28%	303
Population policies aiming to influence fertility levels (whether pro, or anti natalist) can lead to reproductive autonomy restrictions. Do you think that it is possible to promote messages and policies stressing the positive impact of family planning on environmental sustainability without indirectly promoting coercive practices harming reproductive autonomy?	236/77.12%	39/12.75%	31/10.13%	306
It is well documented that education and women empowerment tend to lower fertility rates. Do you think that environmental policies and programs should, for this reason, promote access to education and women empowerment?	285/93.44%	11/3.61%	9/2.95%	305

3.4. The Sensitive Nature of the Topic of Population Growth

Discussions around population growth are sensitive since they often touch on deeply held social and cultural norms. When asked about the range of their sensitivities to the topic and discussions of its implications, the majority of participants (54 percent/167 participants out of 309) indicated that they felt comfortable talking about population growth at all times, while 42 percent/131 participants felt comfortable talking about population growth but avoided this sensitive topic in some contexts. Three percent/8 participants always avoided this sensitive topic, and 1 percent/3 participants expressed that this did not apply to them.

Another dimension of sensitivity involves concerns about racism. Sub-Saharan Africans have high fertility rates, but low per capita environmental footprints, and therefore, it is often argued that addressing the linkage between population dynamics and environmental sustainability constitutes a form of racism targeting people of color in the Global South. Participants had mixed opinions on this view: 50 percent of participants agreed that this constituted a form of racism (i.e., out of 304 participants, 26 percent/78 participants strongly agreed, and 25 percent/75, participants somewhat agreed), 34 percent disagreed with this proposition (i.e., 23 percent/71 participants strongly disagreed; 11 percent/33 participants somewhat disagreed), and 15 percent/47 participants neither agreed nor disagreed.

When asked about how to navigate the discussion on population growth and environmental sensitivity, while noting the above-mentioned sensitivity concerns, participants repeatedly emphasized the importance of communication and careful framing of the issues to make it both easier to understand and more acceptable to different population groups.

They noted that, in addition to sensitivities ascribed to cultural norms and religion, social and gender roles, fertility, and family planning, there were also suspicions that certain messages seemed intent on coercing individuals into accepting birth control. Several participants commented on population policies as highly political issues, associated with geopolitical power and ethnicity. Survey participant 111, from Ethiopia, stated that "In case of indigenous people and minority people there are fears of domination of the majority of people in ethnic based political systems."

While participants expressed overwhelming support for linking population dynamics, family planning, and environmental sustainability, a few stressed that education and women empowerment offered a better, more acceptable social frame to achieve lower fertility levels. Survey participant 315, from Uganda, stated that "These conversations need to happen, but not within the environmental framework. Linking smaller family size to issues that people care about, like education and job opportunities will get more traction".

Many participants on the other hand stressed the importance of what they called "documenting the truth" on population issues, insisting on the need to raise awareness on the relevance and crosscutting role of population size, population dynamics, and family planning for environmental sustainability, despite the controversial nature of this topic. Interview participant 5, from Cameroon stated that "If we talk of reducing population growth, at the moment we must talk about it indirectly... We would use words such as improving the health of women and children, but without using the words limiting population growth. And so that is the general policy that is being applied, the people are not coming out clearly, and this is a way of allowing the problem to persist. We should say the truth the way it is, because reproductive health issues are issues that touch basic human rights, that touch our survival both now and in the future, and we should not play politics with it".

4. Discussion

4.1. Population Growth, Environmental Sustainability, and Social Welfare

Our findings echo previous research indicating a broad ranging public concern for population growth [3–5]. Population growth was overwhelmingly perceived by sub-Saharan African actors as potentially limiting the progress of various social, economic, and environmental goals. Multiple studies stress the negative impacts of a growing population

on environmental sustainability in sub-Saharan Africa [3,6] and document, more specifically, how population growth is perceived by different sub-Saharan African groups and actors as a driver of environmental degradation. Ref. [16] documented that sub-Saharan African researchers and authors were more likely than those of other major world regions to recognize that population growth challenged various environmentally related problems, especially food security, and that achieving better access to, and more use of, reproductive health services could help ameliorate this impact. For example, population growth was identified as a key indirect driver of environmental change by representatives of sectors and local communities in the Mount Kilimanjaro area, in Tanzania [18], as a challenge hampering the planning, conservation, and management of natural areas by actors involved in urban greenspaces in Malawi [19] and as the major cause of deforestation by farmers in South-West Côte d'Ivoire [20]. Survey participant 211, from Lesotho, stated "I think that population dynamics should always be put at the forefront whenever climate and the environment are being discussed".

This general concern for a growing population has a unique significance in sub-Saharan Africa, as this is the region where most of the future world population growth is projected to take place, with the population expected to nearly quadruple to almost 4 billion by 2100 [1]. Rapid population growth generates multiple challenges for sustainable development, including environmental sustainability, food security, economic development, migration patterns, peace and security, health and wellbeing, education for all, disaster preparedness, resilience, and gender equity. Our results indicate that the overall concern of sub-Saharan African actors for population growth extended to all these sectors. Population growth was perceived as a transversal issue with mostly negative implications for sub–Saharan Africa, but which could also, under the right conditions, generate opportunities. This perspective largely aligns with the 'demographic dividend' theory, which is widely promoted in sub-Saharan Africa by the UN and others [2]. The demographic dividend theory postulates a temporary economic window of opportunity associated with a relatively high proportion of a working age population (occurring as fertility declines but diminishing as larger cohorts of elderly people eventually reduce the working-age proportion). Yet the materialization of this dividend is mostly dependent on investments in human capital and available employment opportunities and not necessarily on the existence of large working-age cohorts [21].

4.2. An Unjust Balance in Responsibility

A small number of participants argued that population growth was not a driver of environmental degradation and climate change, and that linking population size and environmental degradation was erroneous at least and harmful at worst. Survey participant 315, from Uganda stated that "It is past time to separate population growth from environmental stability. The evidence is all correlation. Corporations do more harm to the environment than individual people". This view is often put forward to highlight the disproportionate role and responsibility of the Global North in generating greenhouse gases and environmental impact. The inequitable distribution of responsibility for global environmental degradation has played a pivotal role in downplaying the significance of population size as a variable in environmental impact [22] and in the toxification of the population discourse [23]. The erroneous belief that population size does not generate environmental impacts tends to be paired with a concern that population anxiety might lead to the development of policies and instruments that harm reproductive autonomy. For many policy makers and researchers, the idea that global population size matters for environmental sustainability is thus rejected altogether. The 2023 State of World Population Report, issued by UNFPA, the United Nations agency in charge of sexual and reproductive health, exemplifies this phenomenon. Its title ("8 billion lives, infinite possibilities"), its slogan ("Numbers do not matter, but quality of life does"), and its content illustrate the widespread disconnect at play in the population and resource link [24].

Our results reflect the need to acknowledge the role of excessive consumption and global inequities and to center reproductive autonomy and human rights in discussions of population dynamics. However, a large majority of our respondents hold a non-binary and more holistic outlook—one where the disproportionate role of consumption and production (associated with a responsibility of the Global North) does not preclude acknowledging the role of population growth (associated with the Global South) as a driver of environmental degradation. Survey participant 258, from South Africa, stated that "The cumulative impact of 1 billion low per capita footprints still equals a high impact. This is not to discount the high impact of people that may have lower fertility rates and higher per capita footprints—who are as important to address". Participants also repeatedly stressed that population dynamics needed to be addressed alongside other development outcomes. Survey participant 278, from Kenya, stated that "There is however need for this discourse to be better contextualized so that the linkage between population dynamics and environmental sustainability is well understood by all, while at the same time demonstrating equal if not more effort to addressing environmental related issues in regions with a higher per capita environmental footprint, plus also acknowledging the need for sub-Saharan Africa to reach some level of development that helps local populations better appreciate the contribution of various actions to negative environmental impacts." In their review of anthropogenic pressures from the growing human population within sub-Saharan Africa, Ref. [6] adopted a similar holistic outlook, arguing that while many types of environmental degradation are largely driven by high- and middle-income countries' global consumption, it is also important to acknowledge that environmental and sustainable development outcomes across sub-Saharan Africa are, and will increasingly be, influenced by the size of its population. In their 2023 State of the Climate Report, scientists called for climate justice, acknowledging the role of overconsumption and endless growth in high-income countries. They simultaneously called for a stabilization and gradual decrease in the human population with gender justice, through voluntary family planning and by supporting women's and girls' education and rights [25].

4.3. Population and Sexual and Reproductive Health and Rights

Previous research indicated support for the development of cross-sectoral policies acknowledging the interrelated nature of gender equity, reproductive rights, population dynamics, and environmental sustainability goals [4,5]. This study corroborated these results with sub-Saharan African actors, as participants were overwhelmingly in favor of integrating reproductive health and rights and population dynamics considerations in environmental sustainability discourses and agendas. Survey participant 286, from Kenya, stated that "Increasing populations exert more pressure on natural resources such as land and water, often resulting in adverse environmental effects. The direct contribution of contraception and family planning on the number of children a family has directly influences the population size in a country or region hence this can potentially have a positive impact on environmental sustainability". There are many examples in sub-Saharan Africa of cross-sectoral initiatives that integrate reproductive health and rights goals in broader sustainability instruments. The inclusion of references to population dynamics and sexual and reproductive health in countries' Nationally Determined Contributions, which are a government's official communication to the UN Framework Convention on Climate Change [26], and the prevalence of population, health, and environment programs in this part of the world [27] are just two of them. Population, health, and environment programs aim to improve environmental and social outcomes to achieve long-term and wide-ranging development and conservation results, simultaneously prioritizing family planning and reproductive health services with environmental objectives.

4.4. Representation of sub-Saharan African Voices in Discussions of Population Growth

By focusing on sub-Saharan African actors, this article aims to amplify the voices of people that are among the most exposed to rapid population growth, the most vulnerable

to climate change and environmental degradation, and where gender equity and access to family planning faces significant challenges. Interview participant 14, from Ethiopia, stated that "Most people in Africa are not highly educated enough and also do not have access to media and internet, so they do not have a lot of power to speak up about these issues". Researchers, policy makers, and activists in sub-Saharan Africa experience multiple barriers to meaningful involvement in scientific and policy discourses. A lack of funding, inadequate access to the literature, and poor infrastructure are a few of these barriers, which are cross-sectoral. In the environmental sphere, for example, it is documented that there is a lack of meaningful representation from the Global South actors in the climate science community, including in relation to the production of knowledge and to the limited acknowledgment of their concerns [28]. The need for empowerment, participation, and representation of people within or beyond sub-Saharan Africa on issues of population dynamics, reproductive rights, and environmental sustainability were emerging themes that arose throughout our study. Interview participant 3, from Uganda, stated that "Sub-Saharan African voices are not represented on the global scale due to inadequate evidence of these issues to inform policy discussions nationally, regionally and globally; inadequate funding to implement programmatic interventions because we see small projects here and there that are not making impact on the community; poor sensitization, mobilization and conceptualization of the population and environment issues". Participants pointed to the lack of representation and participation of local communities in establishing the agendas of funders, often based in the Global North. They also alluded to an interest by the Global North in maintaining the Global South in a precarious, and dependent, situation. These concerns are rooted in the exploitative history of the West towards sub-Saharan Africa [29] and result in global power imbalances.

Discussions of population growth can be downplayed and ignored because they are perceived as racist [23]. The unjust balance in responsibility for environmental degradation, described above, largely contributes to this association, as countries with high levels of fertility tend to be in the Global South and tend to have low environmental footprints. As [11] explain, "The ethical question posed is that the global "North" or "West" should not tell people in the "South" that they should have fewer children, opening a Pandora's box of potential accusations" (p. 134). [11] explained that these allegations of racism blocked conversations around population. Several participants acknowledged that discussions of population growth could be linked to racism or could be motivated by racist objectives. Survey participant 250, from Uganda, referenced "Interference from external actors on how families should be structured, and selective funding to achieve "lower fertility", "stable population growth" and other racist outcomes". Survey participant 249, from South Africa, stated that "This is a very sensitive topic, given the history of colonization and racial discrimination in Africa".

Overall, our results indicate that while discussions of population growth had a history of racist overtones, such discussions were not perceived as inherently racist. Several participants commented on the need to transcend this issue to address population dynamics. Interview participant 7, from Chad, stated that "It is indeed true that the argument of population growth can be used as a, let us say, scapegoat, unfairly insinuating that Africa is responsible for a significant portion of environmental issues. In this sense, those who link global population growth and environmental impacts exhibit racism. However, stating that population growth is a false issue is a mistake. We have economic and social growth challenges that are connected to our young and expanding population, and these challenges are very real". (This quote was translated from French by co-author CD. The original version states "C'est exact que l'argument de la croissance de la population peut servir de, disons, de bouc émissaire, en sous-entendant injustement que l'Afrique est à l'origine d'une grande part des problèmes environnementaux. Dans ce sens, ceux qui lient accroissement de la population mondiale et impact environnementaux font preuve de racisme. Mais dire que l'accroissement de la population consitute un faux problème est une erreur. Nous avons

des enjeux de croissance économique et sociale qui sont liés à notre population jeune et croissante, et ces enjeux sont très concrets").

Participants also stressed the importance of taking a culturally sensitive and context-specific approach to cultural norms and pointed to the fact that family planning, reproductive autonomy, and gender equity were notions that were presented in a manner that was not always well aligned with the values of African communities. Survey participant 116, from Ethiopia, stated that "Sub-Saharan countries should be encouraged to apply a family planning approach based on their norms, cultures as well as religions". These concerns echo the dilemma of international development actors involved in promoting reproductive autonomy and gender equity, who must find a balance between the need to change social norms, laws, and policies [30] while simultaneously adopting a culturally sensitive and participatory approach driven by local needs and priorities. Several participants stressed that traditional norms and values, and religion in particular, were barriers to reproductive autonomy and discussions of population and sustainability. Survey participant 225, from Zambia, stated that "Unless education is a key factor as to why contraception and family planning are important, it will be difficult to change the mindset and thinking of the various populations, particularly those that are influenced by cultural and religious influences". In comparison to other world regions, despite its immense geographical and cultural diversity, sub-Saharan Africa as a whole experiences a slow and delayed fertility transition, explained in part by a higher desired family size associated with unique social, economic, and cultural pronatalist practices [31] as well as religious attitudes towards fertility [17,32].

4.5. Gender

Gender equity was perceived as being intimately linked to the population dynamics and environmental sustainability question and was a recurring theme for participants. They reflected on the sensitive nature of gender roles; on the importance of involving women and girls at the center of the discussion of population dynamics; on the need to empower women, especially in relation to their fertility choices and the use of family planning; and the need to engage men as allies in achieving gender equity and exercising reproductive rights. Survey participant 381, from Ethiopia, stated that "When there is a larger family size, gender inequality prevails, and this is when girls get deprived of a quality education. This cycle goes on and we will have a population who has a limited knowledge in devising techniques to surmount existing environmental problems". Several participants expressed the view that decisions related to family planning and reproductive choices ultimately rested with men and that educating women, along with improving gender equity, was paramount for the acceptability and uptake of family planning. Improving gender equity outcomes has implications far beyond reaching a state where women and girls have the ability to exercise full autonomy on their lives. It is an integral component of achieving sexual and reproductive rights and health, as gender inequity is, for example, one of the key drivers of the global crisis of unintended pregnancies [8]. It is also well documented that men have a significant influence over women's reproductive autonomy in sub-Saharan Africa [33]. Finally, participants stressed another largely documented phenomenon, the gendered nature of the implications of environmental degradation, whereby women and girls are disproportionately affected by environmental degradation [34].

4.6. Education

Education and awareness were two major themes emerging from our findings. Participants insisted that the general lack of education in sub-Saharan Africa was a key impediment to addressing issues of population dynamics and reproductive health and rights. Sub-Saharan Africa has among the highest illiteracy rates in the world. Global data show general improvements for literacy worldwide, youth literacy rates are improving and gender gaps reducing, but youth illiteracy rates in sub-Saharan Africa remain the highest in the world, and relatively large gender gaps persist to the determinant of women and girls [35]. Sub-Saharan Africa is also the world region with the highest rates of education

exclusion, a measure encompassing several variables associated with the ability to obtain a valuable education [36]. These include, for example, exclusion from entry or regular participation into a school, from meaningful learning experiences, or from having the living conditions needed for learning (inadequate housing, food, clothing, security, etc.).

Participants also specifically addressed the ignorance in relation to reproductive health questions, including on contraception and sexuality, as well as on the broader implications of population dynamics and of high fertility rates for society and on environmental degradation. These themes are well reflected in the literature, as general education levels play an important role in the above-mentioned questions. The level of illiteracy, especially among women, was shown to be one of the factors associated with unmet needs for family planning in sub-Saharan Africa [37]. In South Africa's secondary school system, the awareness and perceptions of climate change risks were linked to environmental education [38]. Opposition to family planning and fear of side effects associated with contraceptive use are well documented factors driving the unmet need for contraception in sub-Saharan Africa [39].

Overall, this study contributes to a broader effort to document the needs and opportunities for environmental sustainability from a diverse array of stakeholder perspectives, reflecting that human relationships vary with culture and knowledge systems [18]. It also reflects the growing interest and endorsement of a more holistic, less siloed approach to the drivers of human and environmental health, as exemplified by the planetary health frame, which contextualizes human health within an overarching sustainability frame. Planetary health views population numbers as one of the key factors triggering human-induced environmental change and identifies the reduction in population growth as a solution to environmental problems [40].

5. Limitations

A key limitation of this study relates to sample representativeness. Our inclusion criteria were exceptionally wide, both in terms of disciplinary fields and geography, and our number of participants was too limited to be representative of the targeted group. For this reason, our sample cannot be said to be representative of sub-Saharan African perspectives on this issue. Moreover, participants were unevenly represented across sub-Saharan Africa and overly represented in Ethiopia, in particular. Our results also show a strong gender imbalance, with fewer females than males. Nevertheless, despite not accurately reflecting the diversity of the group being studied, we believe our findings do provide useful insights into an otherwise largely neglected field of inquiry. Another limitation of this study was the insufficient sample size for statistical measurements. Future research is warranted in this field, with a more systematic analysis by population and disciplinary groups.

6. Conclusions

Anthropogenic pressure is driving humanity out of the conditions that allowed it to flourish, and the role that human population size plays in this process is widely debated. While high fertility levels in sub-Saharan Africa pose multiple challenges for a multitude of economic, social, and environmental prospects [41] the perspectives of actors from this region have not been well documented. To this end, this project documents the voices of sub-Saharan Africans on this contentious issue.

Findings from our mixed-methods online qualitative survey were informative. We found a deep concern for population growth among our participants, which was perceived as a transversal issue and closely associated with challenges to environmental sustainability and other economic and social goals, such as food security, resilience, and peace and security.

Most respondents were supportive of the promotion of messages and policies stressing the positive impact of family planning on environmental sustainability, and most agreed that integrating family planning as a component of environmental policies would contribute to accelerating the progress of reproductive health and rights. Additionally, most respon-

dents felt that policies aimed at improving or preserving the quality of the environment should take population dynamics (population dynamics include the study of population size, age structure, and urbanization) into consideration. About three-quarters of the respondents felt that population dynamics should be given more weight at international meetings focusing on climate and the environment.

Our findings also revealed that sub-Saharan Africans did not feel well-represented or sufficiently heard in international environmental governance. On many levels, the population question coalesced the tensions associated with Global North and Global South inequities. The disproportionate role of the Global North in generating environmental impacts was acknowledged by participants but did not preclude acknowledging the role of population growth as a driver of local environmental degradation. This perspective aligns with scientific evidence but contrasts with the discourses arguing that population is a dangerous distraction from the real drivers of environmental degradation.

Environmental discourses and policies must be reframed to achieve the necessary transformative change required for our collective wellbeing. This process must embrace the holistic nature of anthropogenic environmental destruction, and it requires a renewed framing of population that acknowledges its central and cross-cutting nature. Our study contributes to this effort by presenting sub-Saharan African views on the inter-connectedness of population dynamics, reproductive rights, gender equity, education, and environmental sustainability for broader societal goals.

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