

Girls' education and planetary health:

What is the complexity of the association between girl's education and planetary health? And how is this transferred into the real world?

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Abstract

In this paper the associations between girl's education and planetary health, and their complexities, was investigated, as well as how this knowledge is transferred into the real world. This was done through the conduction of a literature review in combination with a website analysis. Bidirectional relationships were found between girls' education and three planetary health related terms, namely; population growth, natural hazards & climate leadership and participation. Based on these, the conclusion has been drawn that girls' education has the ability to help mitigate the effects of climate change. First, as enabling girls (longer) access to education is associated with lower population growth, as well as forming a strong foundation for climate resilience, adaptation and mitigation. Secondly, as girls' education is considered to be the most important economic and social factor associated with diminishing vulnerabilities to natural hazards. And thirdly, because girls' education helps to mitigate the effects of climate change through the encouragement of empowerment and participation of girls, which consequently supports collective action on climate change impacts. Moreover, by examining the online environments of six international organizations, it became clear that multiple organizations, in varying degrees, paid attention to and undertook action on all three bidirectional relationships and their complexity that were established in the literature review. Therefore, this paper illustrated the influence climate change has on girls' education, as well as the influence that girls' education has on climate change within these 3 specific associations, and presented a (short) overview of how this knowledge is applied into the real world. Illustrating how complexity reflects in practice within the bidirectional relationship of girls' education and climate change.

Keywords: Girls' education, climate change, population growth, natural hazards, climate leadership and participation, bidirectional, complexity, website analysis

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Introduction

Education is a universal human right that is a significant predictor of poverty reduction, economic growth and human development (Chigwanda, 2016). Especially women's education is strongly associated with social, economic and health benefits. Moreover, education has been acknowledged as crucial to combat climate change (UNESCO, 2020). On top of that, estimates imply that education of girls, combined with access to voluntary family planning, has the ability to prevent an approximation of 85 gigatons of carbon emissions by 2050. This will advance a smaller population with sustainable consumption levels with smaller energy, material, transportation, natural systems and food demands (Kwauk, 2022). Despite this knowledge, it has been reported by the United Nations Children's Fund (UNICEF) that worldwide 34 million girls of primary school age were not attending school (UNICEF, 2016). But just as education of girls appears to have an impact on climate change, climate change appears to have an impact on girls' education. Girls and women experience increased economic, social and health impacts due to climate change. For instance, evidence indicates that during climate-related disasters, women's mortality rates are higher than those of their male counterparts. Or, in times of weather-related crises, girls face a greater risk of early marriage as their dowries could ease the burden of their families. As a result, they are then the first to drop out of school, or to attend less often as they are required to execute household tasks (Kwauk & Braga, 2017; Kwauk et al., 2019).

Despite all this information, in a remarkable number of discussions on climate change and gender within the political realm, special attention on girls has been non-existent (Kwauk et al., 2019). This is due to a variety of reasons such as the inadequate consideration of children as non-important stakeholders. As a result, climate decision-makers in climate action and policy repeat this practice (Kwauk et al., 2019). Fortunately, there are a variety of international organizations that do pay attention to girls' education and climate change. These are organizations such as the *Malala Fund*, *She's the First (STF)*, *International Coalition of Girls' Schools (icgs)*, *Campaign for Female Education (CAMFED)*, *One Girl* and *Women's Earth & Climate Action Network (WECAN) International*, to name a

few examples. When looking at the online environment of these organizations it becomes clear that they recognize that “educating girls around the globe raises their awareness of climate change, which allows them to become better environmental champions” (icgs, 2021). Therefore, they all, in their own way, advocate for more equitable access to quality education to reduce gender inequality and positively influence the combat against climate change. Gender equality and education prevail at the center of the Sustainable Development Goals (SDGs) made by the United Nations (UN) as well. Education and gender equality are especially prominent in Goals 1 (no poverty), Goal 4 (quality education), Goal 5 (gender equality), Goal 8 (decent work and economic growth), Goal 10 (reduced inequalities), Goal 11 (sustainable cities and communities), Goal 12 (responsible consumption and production) and Goal 13 (climate action) (Kwauk & Braga, 2017; UNESCO, 2017). Hence, the focus of this paper will be related to these goals. So, there appear to be (significant) relationships between girls’ education and planetary health¹. For instance, climate disasters result in a drop in attendance of girls in schools and the number of years a girl can follow education has an influence on a country’s population size (Lutz et al., 2014). Therefore, this paper will attempt to answer the following research question: What is the complexity of the association between girl’s education and planetary health? And how is this transferred into the real world?

Accordingly, in this paper some of the relationships between girls’ education and planetary health will be investigated more in depth. Moreover, this paper will examine how the knowledge of complexity of these relationships is being used by six international organizations such as CAMFED, WECAN and One Girl. Since, this complexity of the relationships between planetary health and girls’ education appear to have found their way to a variety of international organizations and their actions. Consequently, this paper will be a combination of a literature review and a website analysis of different international organizations that focus on girls’ education and climate change. The paper will first focus on the literature review, providing crucial knowledge on the connections between girl’s education and planetary health and their complexity. Followed by the analysis of international

¹ A framework that addresses the complexity of the bidirectional relationship between girls’ education and climate change based on the literature review can be found in the appendix in figure 1.

organizations that address the complexity of the relationships presented in the literature review, to provide an idea of how they recognize this theoretical knowledge in the real world. On top of that a discussion will be provided that contextualizes the results from the literature review and website analysis.

Positionality

The author of this report is a white, cisgendered, European woman who is obtaining her bachelor and originates from the Netherlands. At the moment this report was written the author was living in the Netherlands and studying at a research university in said country. The author obtains a left-winged opinion on the political spectrum.

Methods

For this research, an extensive narrative literature review has been conducted. The literature that was used for this literature review has been obtained through a wide range of databases. These are databases provided to the researcher through her enrollment at the university of Groningen, such as SmartCat. Moreover, databases from organizations and institutions such as, but not limited to, the Brookings Institution, UNICEF, Project Drawdown, the United Nations and the United Nations Educational, Scientific and Cultural Organization (UNESCO) were used. On top of that, snowballing was used in the literature that was obtained from these databases to acquire other relevant titles on the subject of girls' education and climate change. After the relevant literature had been retrieved, it was reviewed accordingly to gain knowledge on the complexity of the bidirectional relationships between girls' education and planetary health/climate change. This has been done within the sections of Girls' education & Population growth, Girls' education & Natural hazards and Girls' education & Climate leadership and participation.

After the literature review was conducted, a need developed to further investigate how the bidirectional relationships between girls' education and planetary health/climate change², and their complexities, are being addressed in practice. Therefore, different international organizations that (partly) advocate for girls' education, climate change and/or (other aspects of) planetary health through their online environments have been explored. The organizations have been selected through putting terms like "international organization advocating for girls' education and climate change" in environments such as Google, and through secondary sources such as news articles that mentioned organizations in articles about the subject of climate change and girls' education. Therefore, it is important to note that only international organizations that are in possession of their own online environment, in English, have been considered for this research. As a result the following six organizations were selected; *Malala Fund*, *She's the First*, *ICGS*, *CAMFED*, *One Girl* and *WECAN*. After the decision had been made which international organizations would be used in this research, their online environments were examined to determine

1. The amount of attention, and action, the organizations pay to the subject of, the complexity of, girls' sexual and reproductive health and rights. And if this attention is associated with the type(s) of education the girls receive.
2. The amount of attention, and action, the organizations pay to the subject of, the complexity of, girls' heightened risks due to natural hazards. And if this attention is associated with the type(s) of education the girls receive.
3. The amount of attention, and action, the organizations pay to the subject of, the complexity of, girls' presence in climate leadership and participation. And if this attention is associated with the type(s) of education the girls receive.

This has been done to obtain a general understanding of to what extent these organizations address the complexity of the theoretical knowledge presented in the literature review, in their practices and actions in the real world.

² limited to the three bidirectional relationships that are focussed on in this research.

Ethical considerations

This research only makes use of secondary and publicly accessible data. Hence, no sensitive, deeply personal or confidential data will be collected from participants. Therefore, no institutional ethics approval has been sought before executing this research.

Literature review

Planetary health is a comprehensive, interdisciplinary concept (The Lancet Planetary Health, 2019). Overall the concept is entrenched in the recognition that human civilization and human health rely upon the thriving of natural systems and whether these natural systems are stewarded wisely (Whitmee et al., 2015). Planetary health aspires to study Anthropocene problems in environmental and social systems and their connection to the health of these systems (Leal Filho et al., 2022). Therefore, planetary health is connected to “the achievement of the highest attainable standard of health, well-being, and equity worldwide through judicious attention to the human systems—political, economic, and social—that shape the future of humanity and the earth’s natural systems that define the safe environmental limits within which humanity can flourish” (Watts et al., 2015). Hence, the field of planetary health offers a perfect framework to understand and identify the interconnections of, solutions and challenges of today’s environmental, health and social crises (Guzmán et al., 2021). Therefore, the upcoming part of this paper will focus on the information of girls’ education that has been obtained during the literature review within a planetary health framework. This will be done within the sections of Girls’ education & Population growth, Girls’ education & Natural hazards and Girls’ education & Climate leadership and participation. These subheadings, and therefore the focus on these specific relationships, were chosen as these themes were explored in a majority of the literature that has been investigated for this research and therefore appeared to have a significance. Each section will first focus on how the planetary health related term (e.g., natural hazards and population growth) has an influence on girls’ education. Thereafter the focus will switch to how girls’ education has an influence on the planetary health

related term. This to provide an idea whether there is a (bidirectional) relationship between girls' education and the planetary health related term³, and how complex this relationship is.

Girls' education & Population growth

The influence of population growth on girls' education

“To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies” (UN, 1992). When looking at this quote from the Rio declaration from 1992 it becomes clear that, from the very first discussion on sustainable development, both policymakers and academics express the necessity to understand which demographic changes can influence the prospects of sustainable development. Nevertheless, limited efforts seem to have taken place so far to evaluate possible impacts of population change on sustainable development (Lupi & Marsiglio, 2021). There are hardly any experts who question the significance of population in regard to climate change adaptation, but the possible connection between population and climate change mitigation is considered to be more controversial (Stephenson et al., 2010). Since only a slower population growth is not a guarantee that carbon emissions will decrease. As there are other factors, such as energy use and greater use of fossil fuels by companies, that can quickly counterbalance positive impacts of a slower population growth (O'Neill, 2009). To date, contributions to global carbon emissions from low-income and high-fertility countries have been slim. However, their contributions have been expanding as a result of their economic development that aims to reduce poverty. But a rapid population growth does endanger the supply of basic services, human development and poverty eradication. Moreover, it lessens the capacity of developing communities to adapt to climate change (Stephenson et al., 2010). When certain groups face disparities in their access to resources and possibilities, this often results in a heightened likelihood of poverty and a lessened likelihood of access to education and involvement in

³ A framework that addresses the complexity of the bidirectional relationship between girls' education and climate change based on the literature review can be found in the appendix in figure 1.

decisions at the household and community level. These effects are usually not gender neutral, women and girls are generally more affected than their male counterparts (Sims, 2021). Moreover, compared to men, women and girls in low-and-middle-income countries (LMICs) encounter higher economic, health and social impacts of climate change. Approximately 200 million adolescent girls from LMICs are confronted with increased risks of climate impacts. This upsurges the risk that they are exposed to early marriage as households attempt to endure financial burdens with diminished resources. This can result in early pregnancy and girls terminating school-based education, resulting in a vicious cycle of vulnerability and intergenerational poverty (Patterson et al., 2021). If prevailing fertility rates continue, estimations indicate that most of the world's population growth will occur in the Global South for the next 40 years. Where vulnerability to climate risk is highest, carbon emissions are expected to increase the most in the next few decades, women have the least control in their reproductive lives and gender inequalities in access to education are the highest (Kwauk, & Braga, 2017). So, all these things considered, population growth seems to have a negative effect on girls' education, one that has the ability to be intergenerational.

The influence of girls' education on population growth

What would be the number of people who call the earth their home by 2100 or 2150? The answer to this question will mostly depend on fertility rates, advancements on attaining gender equality and increasing human well-being (Project Drawdown, 2020). Today the world's population is exceedingly three times larger than it was in the mid-twentieth century. And by mid-November 2022 the world's population reached 8.0 billion. Moreover, it is expected that by 2050 9.7 billion people will inhabit this planet and continue to peak at approximately 10.4 billion in the mid-2080s (United Nations, n.d.). When the future of climate solutions is considered, the number of people that will be moving, eating, plugging in, using and buying on this planet matters. As population interacts with the two main, largely fossil-fueled, drivers of emissions: consumption and production (Project Drawdown, 2020). A clear link has been demonstrated by research between higher levels of education for girls

and females and lower fertility rates. Women who completed secondary education are likely to have one child less than women who only completed primary school (Kwauk & Braga, 2017). There is a wide range of explanations for this phenomenon where a higher education level results in a lower fertility rate. For example, the typical higher mean ages at first marriage, first sex and first birth for women who attended secondary education than women who only had attended primary education or no education. As these events can overlap, and thus compete with, the participation age of secondary education (Bongaarts et al., 2017). Other explanations are increased spacing between births, greater autonomy, enhanced knowledge about behaviors that strengthen women and children's health, exposure to new gender and childbearing norms, expanded employment opportunities, assortative mating and modifications to childbearing preferences (Kwauk & Braga, 2017; Bongaarts et al., 2017). So, a higher education level of women is associated with a clear devaluation in population growth, due to lower fertility rates. However, it is important to realize that the effect of a better girls' education on population growth takes a long time because of two factors. Firstly, the main effect of more girls entering (primary) education on fertility will take place when these young women enter their prime childbearing years, approximately 15 or more years later. Secondly, due to the large age-structural momentum of population growth, more young women will be progressing into reproductive ages resulting in an increase in the absolute number of births. Therefore, even when fertility rates drop, this will not immediately result in a decrease of absolute numbers of births. But overtime clear differences will show up between scenarios where more girls received education and to what extent and when they did not, as is illustrated in Figure 2 in the appendix of this paper (Lutz et al., 2014). Nevertheless, investing in girls' education and family planning produces a multitude of both sustained, long-term benefits and immediate benefits for girls, women, their families and communities. Moreover, it makes a substantial contribution to realizing nearly all SDGs. Integrating girls' education and family planning in an interconnected system of reciprocal climate solutions can advance firm foundations of climate resilience and adaptation

(Patterson et al., 2021). Thus, girls' education seems to be able to decrease population growth, even if it takes a while to notice this effect.

Girls' education & Natural hazards

The influence of natural hazards on girls' education

Every year, the education of approximately 37.5 million learners worldwide is disrupted by environmental threats such as disease outbreaks and weather-related disasters. These disruptions can last for months or even years after the disaster took place. The impacts on education for children can be extreme, with the most marginalized people, including girls, most at risk (Theirworld, 2018). It has been estimated by the Malala Fund that in 2021 at least 4 million girls from LMICs were restricted from completing their education due to climate-related events. If present trends persist, climate change will contribute to the prevention of education completion of at least 12.5 million girls each year by 2025 (Fry & Lei, 2021). There are various ways in which education is disrupted by climate change and natural hazards. To begin with, climate change related hazards are likely to cause a displacement of or an impairment to transport links and infrastructures of one's physical access to education. Moreover, children's wellbeing and mental and physical health is negatively affected by (natural) hazards. This can influence children's neurological and physical development as well as their ability to concentrate (Sims, 2021). Even though climate change related hazards affect all children, the literature indicates a disproportionate impact on girls, as a result of gender inequalities and household expectations. Climate change related hazards have a multiplier effect on the already existing barriers to girls' education, prohibiting girls, particularly in rural areas, to take full advantage of education (Chigwanda, 2016). For instance, under climate-related stress, adolescent girls face an additional risk to be pulled out of school in order to assist with mitigating extra domestic burdens such as fetching water (Booth, 2022; CARE 2016; Chigwanda 2016; Swarupet al., 2011). When girls are prevented from attending school, they are also less likely to learn about climate change, which further reinforces their vulnerability. Moreover, in the aftermath of climate change related hazards,

girls run the risk of being pulled out of education and married early. As an attempt by households to endure financial burdens and/or due to female safety concerns borne as a result of the environmental disaster (Alston et al., 2014; Booth, 2022; Rashid & Michaud 2000). Nevertheless, while gender is a crucial factor in occurrences of climate change related hazards, it is not the only factor, nor does it render all women and girls equal. The intersectionality of diverse characteristics such as class, race and gender make every girl and woman unique, and have a tremendous influence on the lived reality of girls and women. Furthermore, girls and women are active participants in forming the world around them, they are not just homogenous and helpless victims of climate change. Identifying them in such a way would camouflage the multiple and layered factors that render some girls and women more susceptible to climate change, and could result in possibly harmful and ineffective policies and practices. As just the victimization of women and girls disempowers them and could place the responsibility for action on the wrong actors (Pankhurst, 2022). Hence, the apparent relationship between natural hazards and girls' education requires more and careful attention (Bangay, 2022; Pankhurst, 2022).

The influence of girls' education on natural hazards mitigation

Globally, in the face of crises, women who have a higher level of education seem to show more resilience to crisis related consequences. Being capable of better preparing for, adjusting to, and recuperating from natural hazards, all resiliencies that through her extend to her direct family as well. For example, a recent study discovered that women who are better educated are better capable of protecting themselves and their family in the aftermath of environmental and economic shocks. Furthermore, a different study discovered that countries that had higher levels of female education were less likely to endure high death, injury and displacement rates due to natural hazards (Sperling & Winthrop, 2017). Moreover, girls who have numeracy, literacy, critical thinking and problem-solving skills help families in better processing and acting on information, such as weather reports, about risks.

There are several recent studies that examined the social and economic factors affiliated with reducing vulnerabilities that are caused by climate change, extreme weather and natural hazards, especially concerning adolescent girls (Kwauk, 2020; Sperling & Winthrop, 2017; Swarup et al., 2011; Van der Gaag 2013). Female education materialized as being the most crucial, social and economic factor affiliated with reducing vulnerabilities to natural hazards (Booth, 2022; Fry & Lei, 2021; Sperling & Winthrop, 2017). Firstly, because ensuring girls' access to education is a cost-effective and sustainable approach to enhance communities' resilience to climate change. Research illustrated that countries that invested in girls' education suffered fewer losses from natural hazards than countries with inferior levels of girls' education (Fry & Lei, 2021). A study done by Striessnig, Lutz & Patt in 2013 analyzed the links between girls' education and disaster risk reduction. They found that if 70% of women between the age of 20 and 39 received at the minimum a lower-secondary education, by 2050 (natural) hazard related deaths can be decreased by 60% in 130 countries (Striessnig et al., 2013). So, adopting feasible and progressive policies that increase girls' access to and education in general, makes countries unquestionably less vulnerable to natural hazards (Sperling & Winthrop, 2017). Secondly, education indirectly assists in reducing vulnerabilities caused by natural hazards through poverty reduction, social capital enhancement and access to information. Educated persons are affiliated with a greater social capital (such as networks and social support), an advanced and diversified access to relevant information, implementation of emergency preparedness measures, and evacuation at times of emergency. Resulting in, at the level of communities, more adaptive and resilient populations when it comes to preparing for, immediately responding to and during the aftermath of natural hazards (Sims, 2021). When it comes to issues of vulnerability and risk of natural hazards, girls can be especially influential when they have greater access to education than their parents. When girls are provided with better opportunities to develop skills and attain knowledge, this will help them adapt to an uncertain climate future. This includes, but is not limited to, prioritizing livelihood diversification programmes for girls, providing opportunities to learn new climate resilience skills and technologies, and allowing them to have a bigger role in efforts towards

community-based disaster reduction and conserving natural resources (Kwauk et al., 2019; Swarup et al., 2011). So, girls' education is an effective way of increasing natural hazards mitigation. Moreover, when considering climate change specifically, Project Drawdown even ranked female education 6th out of 80 solutions to combat climate change from 2020 to 2050 (UNESCO, 2020).

Girls' education & Climate leadership and participation

The influence of climate leadership and participation on girls' education

Under the Paris Agreement of 2015 parties agreed that climate action should be taken in a way that respect[s], promote[s], and consider[s]" countries' obligations to uphold "human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations, and the right to development, as well as gender equality, empowerment of women and intergenerational equity (Paris Agreement, 2015).

Women possess crucial (local) knowledge that can add enormous value to climate adaptations and facilitate developments of new technologies that address climate vulnerabilities in areas of water, energy, agriculture and fisheries, food security, health, biodiversity services and disaster risk management (Alston, 2014). And yet, in 2015, only 24 percent of the 173 focal points to the UN forum on forests, 12 percent of the heads of 881 national environmental sector ministries from 193 UN member states and 4 percent of 92 national member committee chairs on the World Energy Council were women (IUCN, 2015a).

This is problematic because research done by Beaman, Duflo and Toplova (2012) illustrates that the presence of women in leadership positions (e.g., as role models) positively changes educational outcomes and aspirations of adolescent girls (Beaman et al., 2012). Moreover, while having the goal to have a gender balance on the board of key climate-financing mechanisms, just 15 percent of the Green Climate Fund's board positions were actually held by women. With 35 percent, the highest representation of women could be found by the Adaptation Fund (IUCN 2015b). Not only are (young)

women and girls often underrepresented, but their voices are also seldom heard within global negotiations on climate change (Swarup et al., 2011). On top of that, attention to girls in most (political) discussions on gender and climate change has been completely absent. This is partly caused because climate policy makers neglect to sufficiently consider children as prominent stakeholders, agents of change, beneficiaries or communicators of good practice. The aforementioned status quo is then being replicated by climate decision-makers in climate policy and action (Kwauk et al., 2019). Actors from the climate change and gender fields have participated in discussions that featured the important role of expanding women's participation in community-led adaptation efforts. These discussions did include the importance of adult (female) education but missed the important link of quality (girls') education throughout life, starting at early childhood, through adolescence and to adulthood. It is crucial to establish this link considering the high dropout rates of girls from secondary schools as a result of gender-discriminatory practices and social norms. Therefore, endeavors to enable women and girls a place for their voices may fall short, as interventions fail to consider the cumulative psychological and social effects of the denial to quality education for years on end (Kwauk & Braga, 2017). Research on girls' education has proven strong connections between the achievement of, quality, empowering and transformative girls' education, the achievement of girls' rights, and the types of social change and outcomes necessary to alter the global warming trends. This means that when girls and women are denied access to climate leadership and participation (which is their right), this has a negative impact on girls' education and the types of social change and outcomes necessary to alter the global warming trends. But still, climate strategies, and the people and organizations that develop them, do not acknowledge or prioritize the important contributions girls' education can make in the combat of climate change (Kwauk, et al., 2019).

The influence of girls' education on climate leadership and participation

Girls' opportunities for leadership and decision-making can be enlarged by an empowering education (Lv & Deng 2019; Mavisakalyan & Tarverdi 2018). Besides, when the status and political participation

of women and girls (aspects that are firmly connected to their level of and access to education) in a country is increased, this has beneficial effects on that country's environmental protection efforts (Fry & Lei, 2021). According to ecofeminists the reason for this is that both gender and environmental degradation have the same social and structural root, namely patriarchal domination. Consequently, this domination is visible through language that feminizes nature, literary and symbolic representation, religious imagery and empirical evidence on the disproportionately suffering of women and girls concerning consequences and risks of environmental degradation. Therefore, ecofeminists claim this relationship explains the increased environmental protection by women in parliament (Nugent & Shandra, 2009).

Moreover, it has been found that education that encourages empowerment and participation increases agency and voice, which consequently also supports collective action on climate change impacts (Rao et al., 2019). But, as mentioned in the previous section, a focus on (and access to) early learning and constructing a pipeline of girls' to women's participation and leadership for long-term and widespread change through education is missing. Therefore, strategic efforts between organizations involved with increasing female participation and leadership in climate action and organizations involved with girls' leadership and girls' education are required. This in order to ensure a clear pathway for girls to grow from community youth leaders to adult key (climate) leaders.

Analyses indicate a positive association between years of education for girls and the percentage of women participants in official governmental delegations. Hence, such an association indicates an important opportunity in connecting actors concentrating on expanding the number of women in climate leadership and actors focused on girl's education. Such an association is especially crucial to ensure continuity in leadership between people who, for example, have knowledge about reproductive or sexual health and their connections to adapting to and mitigating against climate change (Kwauk & Braga, 2017). A wide range of studies from different regions discovered a positive correlation between education, attitudes toward and concern for the environment and the development of skills that help to make environmentally beneficial decisions. Furthermore, several

studies emphasize the importance of girls' education to address climate change by supporting female empowerment and alleviating social inequalities (Balls, 2016; Chankrajang & Muttarak, 2017; Clery & Rhead, 2013; Franzen & Vogl, 2013; Kwauk, 2020). For example, a study done by Chankrajang and Muttarak (2017) found that more years of (girls') schooling results in greater probabilities of environmentally-friendly, knowledge-based (political) actions being taken. Moreover, various studies found that countries that have a bigger number of women in government or parliament are more inclined to create protected land areas and to endorse environmental treaties (Norgaard & York, 2005; Nugent & Shandra, 2009). Lastly, it has been found that when girls and women participate in environmental programmes, the programmes are more effective and have better (environmental) outcomes, than those programmes with restricted girls' and women participation (Sims, 2021). So, when girls are given the ability to develop skills, which is strongly linked to their education; that empowers them, improves and give them access to their leadership skills, and makes them able to participate in decision-making processes related to their environment, this has environmental advantages (Fry & Lei, 2021; Lv & Deng, 2019). In other words, girls' education appears to have a very strong link to climate leadership and participation.

Website analysis

The next section of the report will present the results of the analysis of the online environments from the following six organizations; *Malala Fund, She's the First, ICGS, CAMFED, One Girl* and *WECAN*⁴. First, a general and short description of these organizations will be offered, followed by 3 sections that each (re)present one of the criteria set for this part of the research. Consequently, a general understanding will be obtained of the extent to which these organizations address the complexity of the three bidirectional relationships presented in the literature review, in their practices and actions in the real world⁵.

⁴ A table with all six organizations and a link to their online environments can be found in the appendix in figure 3.

⁵ A graphical overview that illustrates which organizations pay attention to and/or undertake action on the complexity of which topic can be found in the appendix in figure 4.

General and short description of the six organizations

The Malala Fund

The Malala Fund is a non-profit, international organization that invests and advocates for girls' education programmes to help girls to attend school and reach their full potential. The organization was co-founded in 2013, by Malala Yousafzai, the youngest Nobel Prize laureate and Pakistani activist for female education, and her father Ziauddin Yousafzai, to fight for every girl's right to 12 years of free, quality and safe education. *Malala Fund* is engaged to create a world in which every girl can learn and lead. Therefore, *Malala Fund* invests in education advocates and activists who are driving solutions within their communities to barriers girls face to access education (Malala Fund, n.d.).

She's the First

She's the first is a non-profit, international organization whose mission it is to work together with grassroots organizations to ensure every girl, wherever she lives, is educated, respected and heard. *She's the First* was launched on November 1, 2009 as a simple video on youtube by Tammy Tibbetts. The original idea behind this was to inspire and motivate Millennials through social media to support education for girls. When Tibbetts took this idea to Facebook, Christen Brandt promptly messaged her and consequently the organization was born. Now the organization consist of advocates, changemakers, dedicated teachers, ambitious students, seasoned policymakers, inspiring artists, feminist fathers, resilient mothers, business leaders and community organizers from many backgrounds and countries, who all share the belief that " every girl, no matter where she is born, deserves to be educated, respected, and heard" (She's the First, n.d.).

International Coalition of Girls' schools (ICGS)

The ICGS is an non-profit, international coalition of Girl's Schools that was founded in 1991. The Coalition is unified in elevating leadership of women worldwide through educating and empowering students to be globally and ethically minded changemakers. The Coalition is the leading advocate for

girls schools and globally collaborating and connecting schools, individuals and mission-aligned entities that are committed to empowering and educating girls (icgs, n.d.).

Campaign for Female Education (CAMFED)

CAMFED is a non-profit, international, non-governmental organization that was founded in 1993. It is the organization's mission to eliminate poverty in Africa by educating girls and empowering young women. *CAMFED* is a pan-African movement that supports girls to go to school, thrive and develop into changemakers and influential leaders in their communities. Programs of *CAMFED* perform in countries such as Ghana, Zambia, Zimbabwe, Malawi and Tanzania. *CAMFED* supports girls by investing in every aspect of their lives, thereby providing both social and financial support, as well as working to alter contexts that exclude girls from fully participating in their communities (*CAMFED*, n.d.).

One Girl

One Girl is a non-profit organization that mobilizes the power of education to stimulate change for girls and their communities. The organization was co-founded in 2009 by Chantelle Baxter and Dave Dixon. *One Girl* aims to break down barriers that girls face to access an education. They do this by operating girl-led programs to foster positive change for girls and their communities in Sierra Leone and Uganda (*One Girl*, n.d.).

Women's Earth & Climate Action Network (WECAN)

WECAN is an international, climate justice-based initiative that was founded in 2013, to unite women across the globe as powerful stakeholders in policy advocacy, sustainability solutions and global movements that construct ecological and social justice. *WECAN* enlists scientists, women grassroots activists, business and Indigenous leaders, farmers, policy makers, culture-shapers and academics, to collaborate within the goal of halting the escalation of climate change and communal and

environmental degradation. Simultaneously intensifying the just implementation of climate solutions through women's empowerment, on-the-ground projects, advocacy at international policy forums, advocacy campaigns and economic, social, political and environmental action (WECAN, n.d.).

The organization's attention to population growth and girls' education

When looking at the online environments of the different organizations and their attention to population growth and girls' sexual and reproductive health and rights, girls' education, and their complexity, there are four organizations that give attention to this subject in varying degrees.

Firstly, *CAMFED* mentions on their website that it tackles poverty and its related injustices such as child marriage and teenage pregnancy through girls' education. However, on their websites they do not elaborate on what specific actions they undertake to achieve this (*CAMFED*, n.d.). Whereas the website of *Malala Fund* illustrates various research projects in which they were (indirectly) involved that illustrate a bidirectional relationship between population growth and education in general. An example of such a research project is the *Missed Opportunities: the High Cost of Not Educating Girls* report that was written by the World Bank in collaboration with *Malala Fund* (Wodon et al., 2018). However, no direct actions they undertake on this knowledge is illustrated on their website (*Malala Fund*, n.d.). The website of *One Girl* demonstrates clearly how much the organization values education in relation to population growth and girls' sexual and reproductive health and rights. As they exhibit a lot of information on how girls' education positively affects population growth. For example on climate change, by illustrating and referencing research that suggests that educated women choose to have fewer children. On climate justice, by mentioning that their collaborations in Uganda and Sierra Leone that dismantle barriers, such as child marriage and early pregnancy, that prevent girls from reaching their full potential. On top of that, *One Girl* founded Girls Clubs, which are places where girls can learn about their sexual and reproductive rights, and discuss what safe and respectful relationships look like (*One Girl*, n.d.). But the organization that focuses the most on the influence girls' education has on population growth and girls' sexual and reproductive health and

rights is *She's the First*. *She's the First* does not only show a lot of statistics on the topic on their website, they also present a lot of actions they undertook. For instance, *She's the First* successfully managed to abolish a ban for pregnant girls to go school in Sierra Leone. As well as that, together with their partner coalition, they achieved lower drop-out rates due to pregnancy during Covid-19. Moreover, in their three year plan for 2023-2025 they included the topic of sexual and reproductive health and rights for girls (She's the First, n.d.). So, based on these four organizations' attention and action they undertake, according to their website, on the topic of population growth, girls' sexual and reproductive health and rights and girls' education,

it can be assessed that no organization addresses the complexity of this relationship in an adequate way. Because while every organization does undertake action on the importance of girls' education for population growth, no (adequate) attention appears to be undertaken on how population growth has an influence on girls' education as well.

The organization's attention to natural hazards (mitigation) and girls' education

When looking at the online environments of the different organizations and their attention to natural hazards and girls' education, there are five organizations that give attention to this subject in varying degrees. Two of the organizations, *ICGS* and *WECAN*, appear, to a certain extent, to recognize the bidirectional relationship between natural hazards and girls' education. However, this is only illustrated through the presentation of certain research on their websites. There are no direct actions visible that they undertake on this topic (ICGS, n.d.; WECAN, n.d.). *Malala Fund*, presents a lot of research upon the topic, but on top of that they have provided two grants to partner organizations in Bangladesh, *Campaign For Popular Education (CAMPE)* and *Friendship*, that work to build girls' climate resiliency and minimize the division between boys and girls (Malala Fund, n.d.). The organizations that foremost recognize and take action upon the bidirectional relationship of natural hazards and girls' education are *One Girl* and *CAMFED*. *One Girl* presents this relationship as one of the reasons why they work to break down the barriers that girls have to face when accessing

education. They dedicate a whole part of their website on the topic of girls' education and tackling climate change. On this page they show research about how natural hazards keep girls out of school and how girls' education has a positive influence on this (One Girl, n.d.). CAMFED's organizational model considers girls' education as the foundation for social change. Just like *One Girl*, CAMFED dedicates a whole part of their website on the topic of girls' education and tackling climate change. On this part of the website they illustrate research and their own experiences that show how educated girls and women have an increased and improved adaptation and resilience to the effects of climate change. As well as research that illustrates how natural hazards push girls out of their education, such as how girls are forced into early marriage, which ends their education, as a coping mechanism of their families after a natural hazard. CAMFED therefore, illustrates the bidirectional relationship of natural hazards and girls' education within their online environment. On top of that they use this information as one of the arguments why they invest in girls' education (CAMFED, n.d.). So, based on these five organizations' attention and action they undertake, according to their website, on the topic of natural hazards (mitigation) and girls' education, it can be assessed that not every organization appears to address the complexity of this relationship in an adequate way. *One girl* and *Camfed* are the organizations that appear to adequately address this relationship as they pay attention to and undertake action on both aspects of the bidirectional relationship, as illustrated in the paragraph. But for the other organizations (*ICGS*, *WECAN* and *Malala Fund*) this is difficult to assess as they mostly focus on research on this topic on their website.

The organization's attention to girls' and women's presence in climate leadership and participation and girls' education

When looking at the online environments of the different organizations and their attention to girls' and women's presence in climate leadership and participation and rights as well as girls' education, all organizations appear to have a passion for girls' leadership and participation and its relation to education. However only three of the organizations seem to include, in varying degrees, the topic of

girls' and women's presence in climate leadership and/or participation and its relationship to girls' education. First, *ICGS* illustrates a variety of research on their website on how all-girls' education has a positive effect on (climate) leadership positions girls have and how it transforms students into environmental activists. Moreover, within the organization itself they appear to have a lot of sessions on the topic (ICGS, n.d.). Secondly, *Malala Fund* focuses on the bidirectional relationship of girls' and women's presence in climate leadership and participation and girls' education through a wide variety of advocates that fight for this topic who are linked to the organization. These women and girls advocate for the inclusion of (more) young women, especially those that are directly affected by climate change, in decisions that impact them. Hereby, they also focus on the importance of (climate) education for girls, to further enable young girls and women to be present and participate in climate discussions and obtain (climate) leadership positions (Malala Fund, n.d.). The last organization that focuses on the bidirectional relationship of girls' education and climate leadership is *CAMFED*. On their website they have a whole section dedicated to women's leadership. In this section they explain how girls' education is the foundation for women's leadership. *CAMFED* states that it is working to build a world in which women's participation and leadership is welcomed and nurtured by breaking down inequalities inside and outside of the classroom. Therefore, they have established a whole association, the *CAMFED* Association, that is a network for peer support and leadership of young women activists for girls' education. This association consist of teachers, nurses, sustainable agriculture experts, entrepreneurs and grassroots activists that hold influential positions at local, national and international levels, actively working to shift norms and advocating for policy change on a wide range of topics, from which girls' (climate) leadership and participation is one (CAMFED, n.d.). So, based on these organizations' attention and action they undertake, according to their website, on the topic of girls' and women's presence in climate leadership and participation and girls' education and girls' education, it can be assessed that it appears that every organization addresses the complexity of this relationship in quite an adequate way. Since all three organizations, but in varying

degrees, appear to pay attention to and undertake action on both aspects of the bidirectional relationship, as illustrated in the paragraph.

Discussion

The aim of this report was to investigate associations between girls' education and planetary health, their complexity, and how this knowledge is transferred into the real world. The research found evidence on the bidirectional relationships, and their complexity, between girls' education & population growth, girls' education & natural hazards and girls' education and climate leadership and participation in existing literature. Moreover, the research discovered a variety of international organizations that address this knowledge in their work to varying degrees. However, this research also illustrated that the intrinsic complexity of the planetary health related terms is difficult to (adequately) address in practice.

The following section of this report will contextualize the results as presented in the literature review and website analysis and offer perspectives for the future. Therefore, this section will be divided in the subjects of research, policy and practice as well as the limitations of this specific research.

Research

This paper has presented a variety of data that illustrates how girls' education both influences, and is influenced, by population growth, natural hazards and climate leadership and participation, as well as data that demonstrates how this knowledge on these complex relationships is applied by a number of international organizations. It is important to have this data for future research because it presents a fairly straightforward and understandable demonstration of issues girls' education faces as well as the solution girls' education is to these issues. On top of this, this data illustrates if, and so yes how, various organizations apply this knowledge in the world. This is an incredibly valuable contribution to the field of planetary health, as no similar research exists on this topic that combines a literature

review with a website analysis. Therefore, it might be interesting for future research to further explore and investigate the bidirectional relationship between girls' education and climate change. To further explore the complexity of the bidirectional relationships between girls' education and population growth, climate change (mitigation) and climate leadership & participation, as well as other factors that might be of importance to the bidirectional relationship between girls' education and climate change that have not been considered in this research.

Other possible research opportunities would be investigating if there are similar bidirectional relationships between boy's education and population growth, natural hazards and climate leadership and participation, and compare this to the data as presented in this research. Or to extend the website analysis by investigating more and/or different international organizations.

Practice

In this report it has been illustrated that there are bidirectional relationships between girls' education and climate change, as well as how complex these relationships are. The complexity of these relationships has become especially clear when a closer look was taken at the actions and attention of international organizations on these relationships. As this illustrates how difficult it is to adequately implement the complexity of these bidirectional relationships in practice. This is a problem as it results in less satisfactory solution implementations, despite tremendous efforts, as significant factors to the problem(s) are not taken into account. Important lessons about this can be learned from the paper "*Critical complexity in environmental health practice: simplify and complexify*" written by Hans Keune in 2012. In this paper Keune concentrates on complexity and its practice in a contemporary, complex and challenging field; the relationship between environment and health. As all relevant elements to this relationship (e.g., genetic factors, lifestyle, pollutants and health parameters) generate a highly complex interaction which is practically impossible to conceive, describe, measure

and comprehend. As a specific example Keune mentions the study of cocktail effects⁶ as a good example of how due to their complexity, those environmental and health issues can not be reduced to studying single pollutants and their distinctive possible health effects. Consequently, current mainstream environment and health knowledge is not an adequate basis for evidence based policy making (Keune, 2012). Similar conclusions can be drawn to the bidirectional relationships of Girls' education and climate change where a comparable complex interaction exists. Therefore, making it necessary that multiple factors that are relevant to the relationship(s) of climate change and girls' education are studied and considered together in order to provide an adequate foundation for practices that try to work on (aspects of) this relationship. However, as these complex interactions are essentially impossible to conceive, describe, measure and comprehend this appears to be impossible. Therefore, it is important to apply what Keune (2012) said: *"We should not though remain too much on an ideal theoretical level: we need to take into account practicalities, we have to be pragmatic. We have to find a clever balance between respect of complex reality and practical attainability"*. Hence, actors, such as the international organizations mentioned in this research, have to make important choices when they decide upon their actions based on the answers to the following questions: what is important, what is relevant and what is the meaning of what they aim to achieve? While still taking into account the relevant elements of the bidirectional relationships complexity.

Policy

The data presented in this paper is not only important for (future) research purposes and practices, but also for policy-making. Because, in a remarkable number of discussions on climate change and gender within the political realm, special attention on girls has been non-existent. This is due to a variety of reasons such as the inadequate consideration of children as non-important stakeholders. As a result, climate decision-makers in climate action and policy repeat this practice (Kwauk et al., 2019).

⁶ New research found that cocktails of pollutants construct dynamics that exceed the level of effects of single pollutants and therefore cause stronger health effects than what would be accounted for if the single pollutants effects would be added (Kortenkamp, Backhaus & Faust, 2009).

Therefore, this research can help in raising awareness on the importance of girls' education in climate action and policy. As well as provide guidance to international organizations to incorporate the complexity of the bidirectional relationships of girls' education and planetary health. Therefore, based on this research, the following policy recommendations are made:

1. A clear link has been demonstrated between higher levels of education for girls and females and lower fertility rates. Therefore, it is recommended that girls' education and family planning are unified in an interdependent system of context-sensitive climate solutions. First of all, in general, this means significant investments in girls' education should be made, reducing (some of) the barriers that girls' face when accessing education⁷. Secondly, family planning courses should be offered throughout the life course of adolescents (both girls and boys).
2. Women with a higher level of education appear to be more resilient to natural hazard related consequences, and extend this resilience to their direct families as well. But simultaneously natural hazards increase barriers girls' face when (attempting to) access education. Nevertheless, policies and practices fail to adequately incorporate this complexity of the bidirectional relationship, mainly focussing on the effect girls' education has on natural hazards. Therefore it is recommended that both governmental and non-governmental organizations start to incorporate this complexity of the bidirectional relationship. For example, by implementing policies that still enable girls to go to school after a natural hazard. An instance of such a policy could be to enable them to attend school for half of the day when they are obligated to assist their families with consequences of the natural hazards.
3. Discussions of actors from the climate change and gender fields include the importance of adult (female) education but miss the important link of quality (girls') education throughout life. Consequently, endeavors to enable women and girls a place for their voices may fall

⁷ For example how *She's the First* successfully managed to abolish a ban for pregnant girls to go school in Sierra Leone. As well as, their programme together with their partner coalition, to achieve lower drop-out rates due to pregnancy during Covid-19.

short, as interventions fail to consider the cumulative psychological and social effects of the denial to quality education for years on end. Therefore, it is recommended that strategic efforts between organizations involved with increasing female participation and leadership in climate action and organizations involved with girls' leadership and girls' education take place. This in order to ensure a clear pathway for girls to grow from community youth leaders to adult key (climate) leaders.

Limitations

This research had some limitations that will be discussed in this section of the report. First, even though there was the aim to include as much research as possible in the literature review, a selection and exclusion of research articles has taken place. Therefore, there is a possibility that important knowledge has not been included in the literature review. Secondly, it is worth mentioning that the researcher of this research had no previous experience with conducting a website analysis. Therefore, the author might have lacked certain skills that can only be obtained through experience with conducting website analyses. Thirdly, for the website analysis only the online environments of six organizations have been investigated. This only presents a very limited overview of all the (possible) actions in which the theoretical knowledge is applied in the real world. Moreover, websites from the international organizations do not show every action that is being undertaken. Therefore it is possible that certain actions have not been included. Furthermore, only organizations that have online environments in English have been investigated, therefore the outcome of the website analysis might be skewed. Lastly, while the focus of this research was globally, most, if not all, data was focussed on LMICs. Hence, it is debatable whether these findings also apply in high income countries.

Conclusion

In this paper the associations between girl's education and planetary health, and their complexity, were investigated, as well as how this knowledge is transferred into the real world. Consequently, bidirectional relationships and their complexity were found between girls' education and three planetary health related terms (population growth, natural hazards & climate leadership and participation). Moreover, the online environments of six international organizations were examined to further investigate how the theoretical knowledge of the bidirectional relationships and their complexity of girls' education and planetary health/climate change is being applied in practice. This illustrated that, in varying degrees, attention was paid and action undertaken on all three bidirectional relationships by multiple organizations but that there is still room for improvement on addressing the complexity of these relationships. Hence, this paper illustrated the influence climate change has on girls' education, as well as the influence that girls' education has on climate change, and presented an overview of how the complexity of these relationships are reflected in practice. However, despite this knowledge, it is important to remember that girls are not a means to an end, nor a strategy, in the battle against climate change, and they should not become one. Girls are human beings who are entitled to the same opportunities and rights as their peers, regardless of the positive influence this might have. Moreover, even if every plausible outcome of girls' education on climate change would be realized, this alone would not save the world. Climate change is the result of a complex of interacting processes and systems developed over time that cannot be solved by one form of a solution alone.

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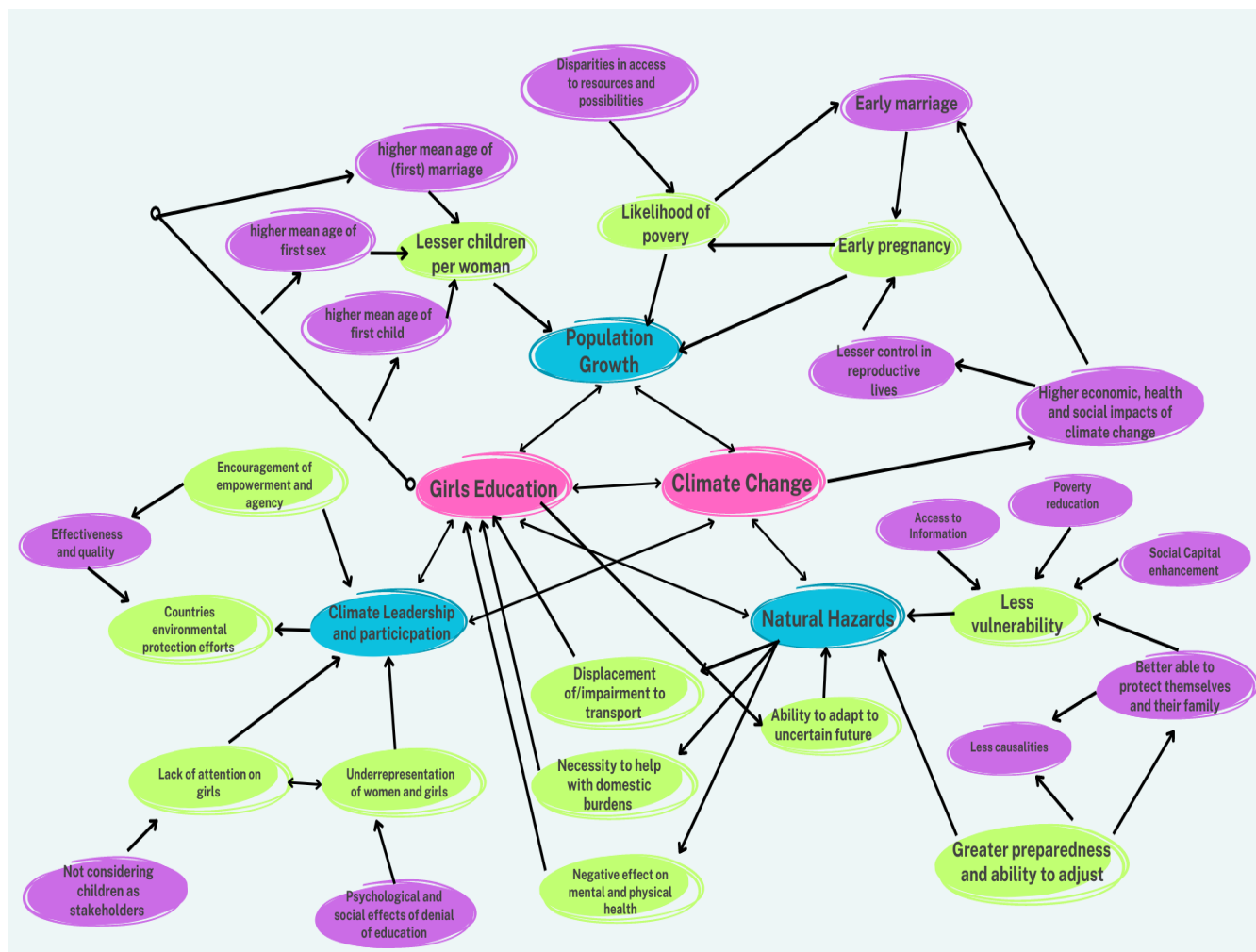
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Appendix

Figure 1: The complexity of the bidirectional relationship between girls' education and climate change



Description:

The graph above illustrates the complexity of the bidirectional relationship between girls' education and climate change. The variables in pink illustrate the main bidirectional relationship of this research, whereby the in blue illustrated variables show the three particular bidirectional relationships that were examined in this paper. The in green and purple illustrated variables represent the drivers and consequences of the bidirectional relationships. By which the green variables appear to have a more direct influence than the purple variables.

Figure 2: Different demographics based on population size and educational level

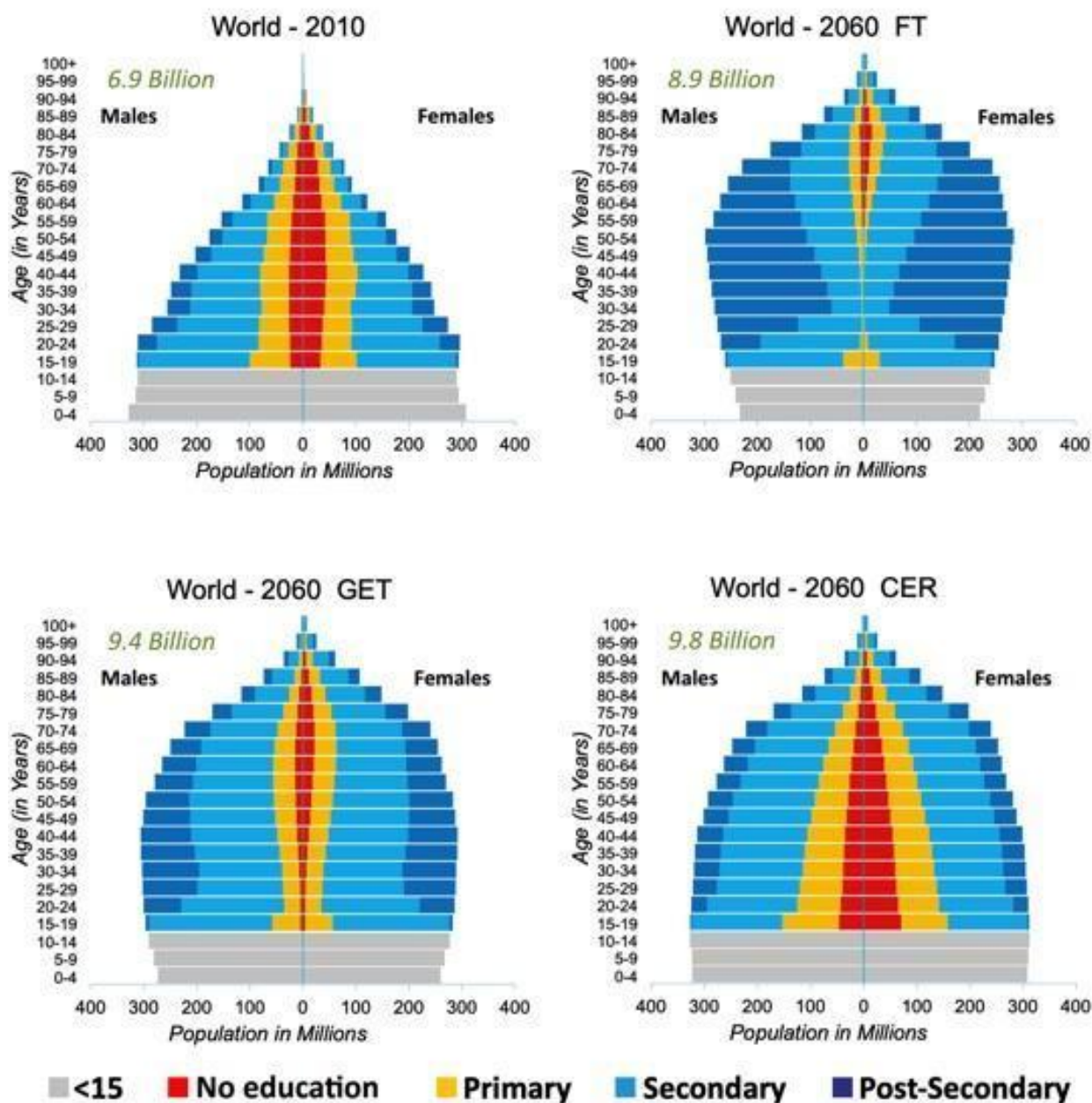


Figure 1: Age and education pyramids for the world in 2010 and projected to 2060 under the Global Education Trend (GET⁸), Fast Track (FT)⁹, and Constant Enrolment Rate (CER)¹⁰ scenarios under medium education specific fertility and mortality assumptions. From *world population & human capital in the twenty-first century: executive summary* by W. Lutz, W.P. Butz & S. KC, 2014.

Figure 3: Link to the online environments of the organizations

⁸ The Global Education Trend (GET) scenario is moderately optimistic and can be considered as the most likely. It assumes that the country will follow the average path of school expansion that other countries already further advanced in this process have experienced.
⁹ The Fast Track (FT) scenario is the most optimistic scenario. It assumes that all countries will expand their school systems at the fastest possible rate, comparable to the best performers in recent history such as Singapore and South Korea.
¹⁰ The Constant Enrolment Numbers (CEN) scenario is the most pessimistic scenario. It assumes that no more schools are being built and the absolute number of students is kept constant, which under conditions of population growth means declining enrolment rates.

Organization	Link to the online environment
Malala Fund	https://malala.org/
She's the First	https://shesthefirst.org/
ICGS	https://girlsschools.org/
CAMFED	https://camfed.org/eur/
One Girl	https://www.onegirl.org.au/
WECAN	https://www.wecaninternational.org/

Figure 4: Graphical overview of the website analysis

Organization	Population Growth	Natural Hazards	Climate Leadership and Participation
Malala Fund	Only Attention ▾	Attention + Action ▾	Attention + Action ▾
She's the First	Attention + Action ▾	Nothing ▾	Nothing ▾
ICGS	Nothing ▾	Only Attention ▾	Attention + Action ▾
CAMFED	Only Attention ▾	Attention + Action ▾	Attention + Action ▾
One Girl	Attention + Action ▾	Attention + Action ▾	Nothing ▾
WECAN	Nothing ▾	Only Attention ▾	Only Attention ▾