
PEER-REVIEWED ARTICLE

How Can Girls' Education and Family Planning Improve Community Resilience to Climate Change in the Sahel?

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Abstract

Population growth and climate change are currently the two greatest threats to food security in the Sahel region of Africa. The population of the countries that make up the Sahel is projected to nearly double by 2050, from 506 million to 912 million. Paired with the expected rise in temperature and increased frequency of extreme climatic events, these numbers could quickly overwhelm relief efforts. Strengthening human capital and economic stability are critical to prevent catastrophic suffering. This article recommends two evidence-based approaches that expand women's autonomy and support their income-earning potential while building resilience to climate change. The first recommendation, would be greater investments in adolescent girls' education and autonomy, including efforts to delay marriage and childbearing. The second calls for an improvement in the availability and quality of reproductive health services, with a special focus on voluntary family planning. These interventions can increase incomes, reproductive autonomy and gender equity which build community resilience and adaptability to climate change.

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Introduction

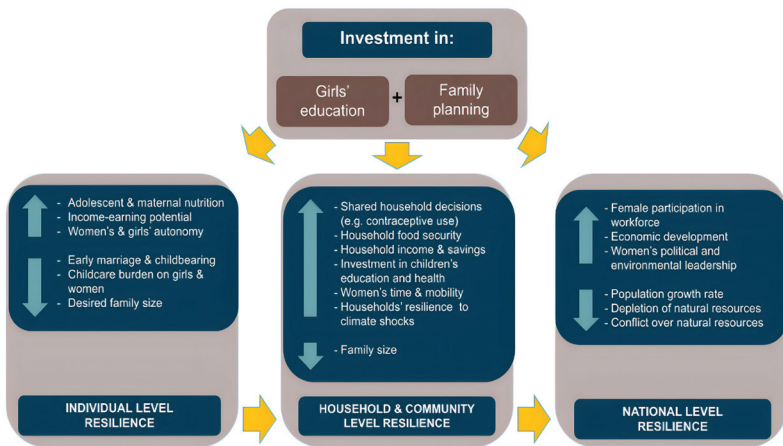
Human presence and consumption patterns have driven global warming and environmental degradation, with the richest tenth of the world's population contributing 52 per cent of cumulative emissions from 1990 to 2015. During that same time period, the poorest half of the global population was responsible for only seven per cent of emissions (Kartha et al., 2020). In higher income countries the primary driver of environmental damage is excess consumption, rather than population growth (O'Neill et al., 2018; Samways, 2022). At the UN Conference of Parties (COP) 27 in 2022, experts reiterated the urgency to reduce global emissions by 43 per cent by 2030 and for rich countries to assume greater responsibility for the climate-related damage that poor countries have had to shoulder to date (UN Convention on Climate Change, 2022).

Populations in ecologically fragile regions like the Sahel bear the worst consequences of climate change. Their vulnerability to direct environmental threats like drought and flooding are exacerbated by two silent demographic phenomena: population growth and a young age structure (Guengant and Lahmani, 2012). Contributing factors are: high desired family size, low contraceptive use, limited reproductive autonomy among women and child marriage (Leahy et al, 2007). Large families are an established norm. However, for impoverished families whose livelihoods are under threat, providing children with adequate nutrition, education and healthcare is becoming a major challenge. Women's participation in society is restrained by gender norms and by a heavy burden of childcare and domestic labour (Coole, 2018; Gribble and Bremner, 2012). At the national level, governments struggle to provide education and jobs to youth, maintain national security, protect natural resources and help their citizens adapt to climate change (Leahy et al., 2007).

Girls' education and voluntary family planning are two solutions that contribute to women's autonomy, smaller families and enhanced climate resilience (Figure 1) (Vollset et al., 2020; Dodson et al., 2020; OASIS, 2021). Despite their relevance, these solutions continue to be viewed as unrelated to core climate objectives and are rarely included in climate strategies (Vollset et al., 2020; Canning and Schultz,

2012; Götmark and Andersson, 2020; Phillips et al., 2012). Many policymakers view the shift in social norms from a larger to a smaller desired family size as a spontaneous occurrence that accompanies economic prosperity, rather than a process supported by strategic policy decisions that also protect individual rights and choices (Coole, 2018).

Figure 1. The combined power of girls' education and family planning for population resilience. Adapted from Muttarak and Lutz 2014



The economic benefits of a demographic dividend⁴ are significant and can last a decade or more. In parts of Asia, North Africa and Latin America, demographic dividends increased Gross Domestic Product (GDP) per capita by 50 per cent to 100 per cent, reducing poverty, improving the quality of life and strengthening resilience and adaptive capacity (Lutz and Muttarak, 2017; Bongaarts and Hodgson, 2022). African leaders have embraced the idea of a demographic dividend but many have sidestepped the fertility aspect, ignoring the fact that declines in both mortality and fertility are necessary catalysts (Cleland, 2017).

4 A demographic dividend is accelerated economic growth that can result from a shift in a country's age structure whereby the proportion of workers exceeds that of dependents (Population Reference Bureau. 2012. Attaining the Demographic Dividend. <https://www.prb.org/resources/fact-sheet-attaining-the-demographic-dividend/>).

Expanding access to girls' education is a less controversial goal. It has been embraced by most African leaders for the powerful co-benefits it brings to communities and nations by increasing women's wages, employment options and other economic opportunities (Sterling, Winthrop and Kwauk, 2016). Investing in girls' education benefits the whole household, since women reinvest an average of 90 per cent of their income into their families, compared to the 30–40 per cent of income typically re-invested by men (International Finance Corporation, 2013). However, insufficient funding and competing priorities have limited necessary investments in girls' education.

Scholars increasingly view population dynamics as a variable in climate change adaptation and mitigation. Some highlight the linkages between reproductive rights and environmental sustainability beyond the direct impact of contraceptive use on fertility (Delacroix, 2022). Others also see population decline as critical to achieving a decent quality of living within ecosystem limits. Still others focus on the need for radical global economic changes to achieve socio-economic and environmental justice (Brand-Correa et al., 2022; O'Neill et al., 2012; Samways, 2022; O'Neill et al., 2018).

This article examines the triple threat of rising temperatures, population growth and malnutrition on the well-being and future stability of the Sahel. In the next section, we emphasise the need to complement environmental strategies tackling climate change through reinforcing human capital within individuals and families. We explain how girls' education and family planning are powerful strategies to enhance the resilience and adaptive capacity of vulnerable populations, despite the ambivalence about family planning in the region.

In the following section, Resilience across Sectors, we examine the multisectoral interplay between various sectors including food security, health, education and environment, as they relate to climate change resilience. We highlight the disproportionate effect of environmental changes on women and girls and question the emphasis on military overdevelopment solutions to quell crises in a volatile region.

In the section, Policies and Programs in the Region, we explore policy trends in family planning, education, and climate change, urging policy makers and

governments to employ more integrated and prevention-oriented strategies. We conclude by underscoring the need for systems thinking, and the urgency of investing in women and girls' resilience to improve population health and regional stability.

Population Dynamics in the Sahel

Defining the Sahel

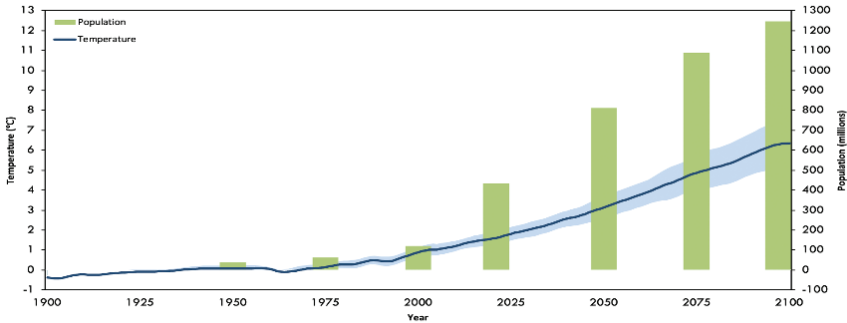
The Sahel, a 1,000-kilometre arid and semi-arid zone between the Sahara Desert in the north and savannahs in the south, expands across ten countries: Senegal, Mauritania, Burkina Faso, Mali, Niger, Nigeria, Chad, Sudan, Eritrea and Ethiopia. We selected this region due to its extreme vulnerability to climate change and its ongoing challenge with health, education and food security. With a projected average surface temperature rise of 3°C to 5°C by 2050, agriculture, pastoralism and watersheds are at risk. To save lives and preserve regional stability, the Sahel requires international attention and collaboration. (Tesfaye, 2022; World Bank, 2021b).

Most interventions seeking to reduce the Sahel's vulnerability employ livelihood and environmental strategies to boost communities' resilience. These include water conservation, biodiversity protection, restoration of degraded land, diversification of income sources, strengthening infrastructure and establishment of early warning systems. Despite the importance of these approaches, this paper focuses on two less common but equally essential strategies: girls' education and voluntary family planning, which foster resilience and adaptive capacity in individuals and families.

In 1950, the Sahel was sparsely inhabited by fewer than 50 million people. By 2050, the UN's medium variant population projection is 912 million across the ten countries mentioned above. (Figure 2). (UNPD, 2023). Except for Eritrea, Ethiopia and Senegal, contraceptive uptake has been slow in the region (Measure DHS, 2023) and the total fertility rate (TFR)⁵ ranges from 3.7 in Eritrea to 6.5 in Niger (Macrotrends, 2023). These demographic trends have serious implications for food security, migration, employment, quality of life and peace for the residents.

5 The total fertility rate (TFR) is the average number of children a woman is likely to bear in her lifetime.

Figure 2. Projections for changes in temperature and population in the Sahel



DATA SOURCES: UN POPULATION DIVISION, 2014; TAYLOR ET AL., 2012.

Meeting the Needs of Women and Girls

From 1970 to 2000, several Asian countries with initial fertility rates between five and six achieved dramatic declines in fertility and mortality which led to demographic dividends and boosted economic growth. Success factors included strong political will to invest in health and education, well-implemented population and health policies and expanded access to family planning (Gribble and Bremner, 2012). The Sahel defies demographic trends observed globally, as fertility has not declined as expected with mortality decline. (Guengant and Lahmani, 2012).

The role of women's reproductive autonomy in a demographic transition is often overlooked. Girls' education and family planning programmes help individuals and families achieve desired family size by providing information and supplies for informed decisions. In the Sahel, where children bring status and many people question the safety and social acceptability of modern contraceptives, change is slow. However, with improved access, once community members witness the health and economic benefits of contraceptive use, interest and uptake often grows.

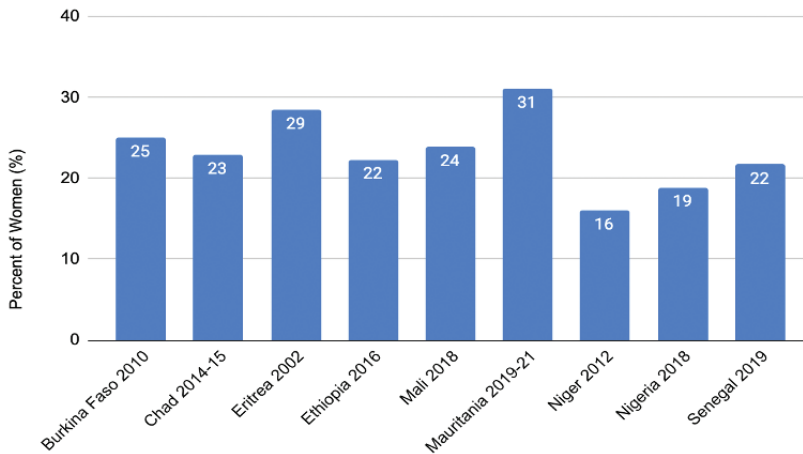
Girls' education indirectly affects fertility by expanding livelihood options for young women and increasing their income-generating potential, which affect their ability to influence strategic life decisions. Being in school also reinforces the fact that girls are still children who are not yet ready for marriage, thus serving as a deterrent to child marriage (Perlman et al, 2017). Higher educational attainment correlates with a lower desired family size as self-determination and economic opportunities for women increase (Bongaarts, 2020). Education has a significant impact on demographic trends because a higher age of marriage delays childbearing. This protects the health of women and children while also lowering total fertility (Sterling, Winthrop and Kwauk, 2016). For example, in Ethiopia, each additional year of girls' schooling led to a 6–7 per cent decline in early marriage and childbearing. A two-year increase in the median age of first birth could reduce population growth by ten per cent (Hugh and Ramanarayanan, 2019).

Of the ten focal countries, in 2023, only Ethiopia and Eritrea had a total fertility rate below four children per woman. Family planning remains a sensitive issue for leaders and policymakers in the Sahel. Some leaders have made it a public priority, while others are concerned about dwindling natural resources and strained social safety nets, but do not know how to tackle the problem. Many others avoid the subject in the face of cultural or religious opposition. The combined legacy of this ambivalence is weak population policies, under-prioritisation of family planning programmes and the world's fastest growing population (Guengant and Lahmani, 2012).

Leaders are not the only ones with reservations about family planning. It is viewed with wariness in many Sahelian communities due to patriarchal norms, cultural and religious values, and a mistrust of external actors who arrive with various agendas. Except for Ethiopia that has a 41 per cent contraceptive prevalence rate (CPR), the CPR is low, ranging from 5 per cent in Chad to 26 per cent in Senegal (Measure DHS, 2023). Some policymakers have misconstrued the preference for large families as fixed, signalling a disinterest in contraception. However, low contraceptive prevalence doesn't necessarily reflect demand. Women's desire to manage their fertility is high, with 16–31 per cent of non-contraceptive-using married women wanting to delay or stop childbearing (Measure DHS, 2023).

Understanding and addressing the contraceptive needs of men, women and youth is paramount. Unmet need refers to the percentage of women who want to stop or delay childbearing but who are not using contraception (Measure DHS, 2023). Eliminating legal, institutional and geographic barriers, as well as reducing or removing user fees, would make contraceptive methods available to interested individuals, regardless of age, financial status or sociocultural barriers. Family planning is a voluntary choice, not a mandate: there is enough work to be done in meeting the needs of those who are interested in contraceptive use.

Figure 3. Unmet need for family planning among married women in the Sahel



SOURCE: DEMOGRAPHIC AND HEALTH SURVEYS. 2023. STAT COMPILER.

The Hush Around Population and Environment

In alignment with a rights-based approach to reproductive health, donors and organisations often avoid discussing fertility rates and environmental sustainability in the same breath. Though well-meaning, this approach has unintended consequences for vulnerable populations, including women and girls. Upholding women's rights is essential but the reluctance to address the linkages between these two topics limits funding and hinders progress towards environmental sustainability and population health (Mayhew et al., 2020).

The words “population” or “family planning” are rarely mentioned in high-level environmental policy discussions. Policies and programmes related to climate change (e.g., agriculture, water and natural resource conservation) seldom mention population dynamics, or the interventions that influence it, like girls’ education and family planning. Yet, the connections are clear: land use patterns and natural resource scarcity directly impacts community health and resources. For example, soil degradation, exacerbated by global warming, has diminished the productivity of inherited land over generations. In communities with large families, the subdivision of inherited land parcels over generations reduces the viability of the land (Giller et al., 2021). Conversely, investments to enhance access to and quality of girls’ education and family planning could yield distinct socio-environmental benefits, from climate change mitigation (e.g. reduced emissions) to resilience (e.g. higher incomes) to adaptation (e.g. climate-smart agriculture) (Jameel et al., 2022).

Resilience Across Sectors

Relationship Between Climate, Food Security and Nutrition

Food insecurity is a major challenge in the Sahel region: emergency food assistance needs nearly quadrupled from 2015 to 2022. In 2022, an estimated 34 million people faced food insecurity, including 2.4 million children with severe acute malnutrition (European Commission, 2014). Volatile food prices exacerbate the issue, leading to reduced protein consumption and difficulty purchasing staple grains. Severe consequences arise when families must sell productive assets, which traps them in debt and chronic food insecurity.

Rising temperatures and increasing extreme climatic events reduce cereal yields, damage livelihoods and worsen food insecurity (Schlenker and Lobell, 2010; Sultan et al., 2013). Chronic low crop yields and sudden losses due to drought or floods significantly impact health and human potential, threatening individuals, communities and nations (Stephenson et al., 2000). Concurrently, arable land is becoming desert, which will render larger parts of the Sahel uninhabitable by the end of this century (Intergovernmental Panel on Climate Change, 2021).

Climate-related conflicts in the Sahel threaten vulnerable families’ food security. Pastoralists have to travel longer distances to feed livestock, leading to clashes with farmers stressed by heatwaves, drought, floods and pests. Lacking access to

information, agricultural inputs and credit, farmers of both genders need support to optimise yields (Potts et al., 2013). Women and girls from both agricultural and pastoralist families also need protection from gender-based violence as they travel farther for water, fuel and fodder.

Climate change directly impacts women and girls by increasing their daily labour, reducing time for girls to attend school and for mothers to care for children (World Food Programme, 2021). Multinational corporations contribute to nutritional deficits in children by aggressively marketing pre-packaged foods to mothers who have less time to cook and care for children. (UNICEF, 2021).

Relationship Between Nutrition and Resilience

Under-nutrition starts in utero, when a pregnant woman's nutritional deficiencies affect her and her developing child (Conde-Agudelo et al., 2012; Kaplan, 1972). Poor diet, overwork and disease during pregnancy increase the risk of intrauterine growth restriction, preterm birth and low birth weight. The first 1000 days of life are critical for a child's cognitive and physical development; malnutrition at this juncture has lasting consequences (Ruel and Alderman, 2013).

Children in the Sahel are susceptible to *marasmus* and *kwashiorkor*, two types of protein-energy malnutrition that can result in wasting, stunting or underweight conditions. Marasmus usually affects infants after sudden onset emergencies. Kwashiorkor, meaning "the sickness the baby gets when the new baby comes" often affects one to five-year-olds who experience chronic protein deficiency over time (Pham et al., 2021).

Low contraceptive use leads to short birth intervals and early weaning, exposing infants to malnutrition and illness (Manda, 1999). Poor dietary diversity impairs growth and increases susceptibility to infection (e.g. diarrhoea), trapping the poorest families in chronic, intergenerational health issues (Grantham-McGregor, 2002).

From 2000–2016, childhood stunting in West and Central Africa increased by 20 per cent (23 to 28 million), while the rest of the world saw a decrease (UNICEF, n.d.). Current stunting rates range from 23 per cent in Mauritania to 44 per cent in Ethiopia, Eritrea and Niger (Measure DHS, 2023). Stunting compromises growth

and cognitive potential (Kaplan, 1972), with impact varying by gender. Stunted girls face increased risks of obstructed labour, fistula, stillbirth and maternal mortality. To effectively prevent stunting, nutritional interventions must target pregnant women and mothers of children aged 0–18 months, before the impact is irreversible (Velez et al., 2007).

Table 1. Indicators of nutritional status among children under five years old in the Sahel

Country	Under five mortality median rate per 1000 live births*	Moderate + Severe Stunting (%)	Exclusive Breastfeeding <6 months (%)	Complementary feeding 6–8 months (%)	Zero Fruit and Vegetable Consumption (6–23 months)
Burkina Faso	85	26	58	61	26
Chad	110	35	16	71	48
Eritrea	39	49	69	44	n/a
Ethiopia	49	35	59	69	69
Mali	91	26	40	59	44
Mauritania	71	24	40	74	51
Niger	78	47	22	80	43
Nigeria	114	35	29	74	53
Senegal	38	17	41	64	52
Sudan	57	34	55	61	67
Cut-off indicative of public health problem		≥20 of concern	good is ≥ 50	good is ≥ 80	

SOURCES: ADAPTED FROM WEUHLER, HESS AND BROWN, 2011; UN DATA WAREHOUSE, 2022

Table 1 includes indicators of child health that influence the physical and intellectual potential of future generations. Family planning, exclusive breastfeeding and safer weaning have the potential to improve children's outcomes, but undernutrition will remain the primary driver of child deaths attributed to climate change (World Food Programme, 2021). Climate change exacerbates childhood malnutrition through reduced yields, less parental care time and increased disease exposure. Undernourished populations are less productive and less resilient to climate shocks (Tirado et al., 2013).

To uphold the basic rights of communities living in the Sahel region, the global community needs to address structural factors that increase vulnerability. Improving knowledge and behaviour related to exclusive breastfeeding,⁶ birth spacing and sanitation/hygiene is one step (Labbok, 1994). Promising data from radio programmes and other 'edutainment' approaches have successfully stimulated an uptake in contraceptive use and more equitable spousal decision-making (Sarrasatt et al., 2018; Jah 2014).

Diversifying income sources and implementing social safety net programs, such as fortification of staple grains, school feeding programs, vouchers for education or healthcare and cash-for-work programs are important investments for communities with climate-dependent livelihoods (UNICEF, 2021). Agroecological interventions like tree or shrub planting provide long-term benefits, including shade, food, fuel and fodder, which can protect the nutritional status of marginalised families and reduce the need to migrate in the lean season (Tirado et al., 2013). The resultant gains in health, nutrition and cognition contribute to higher educational attainment, increased workforce productivity and enhanced resilience against climate change impacts (Ruel and Alderman, 2013).

Relationship Between Family Planning and Resilience

Integrating family planning into food security, nutrition and climate interventions is an often-overlooked strategy for improving nutritional status and increasing household resilience to shocks (Hardee et al., 2018). While family planning is often considered unrelated to the core objectives of non-health sectors – and outside of the expertise of implementing organisations, cross-sectoral collaboration is

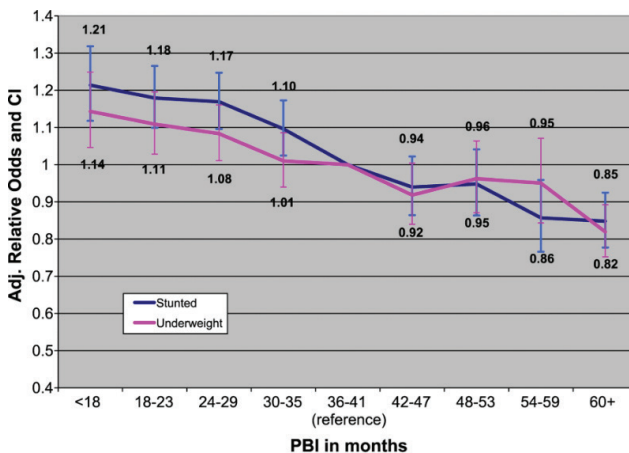
6 Exclusive breastfeeding, or Lactational Amenorrhea Method, optimises child nutrition while providing protection against pregnancy for postpartum mothers.

advantageous. Family planning could positively impact all of the UN Sustainable Development Goals by transforming people's ability to adapt to crises, including environmental ones (Smith and Woodward, 2014; Bremner et al., 2015).

Organisations and projects from non-health sectors that partner with reproductive health initiatives, particularly those targeting adolescent girls, pregnant or postpartum women and mother-child dyads, could strengthen household resilience and adaptive capacity. By integrating reproductive rights, communities can enhance their ability to adapt to climate shocks through health, education and greater economic stability.

Family planning prevents malnutrition and improves the resilience of vulnerable populations through birth spacing. Studies show reduced risk of stunting and undernutrition with a pregnancy interval of at least 24 months. The risk decreases further as birth intervals widen to three or more years (Gribble, Murray and Menotti, 2009; Rutstein, 2005). In a systematic review of 22 countries, most saw a reduction in stunting of ten to fifty per cent with pregnancy intervals of over 36 months (Dewey and Cohen, 2007). Figure 4 demonstrates how the risks of stunting and underweight decrease as birth intervals increase.

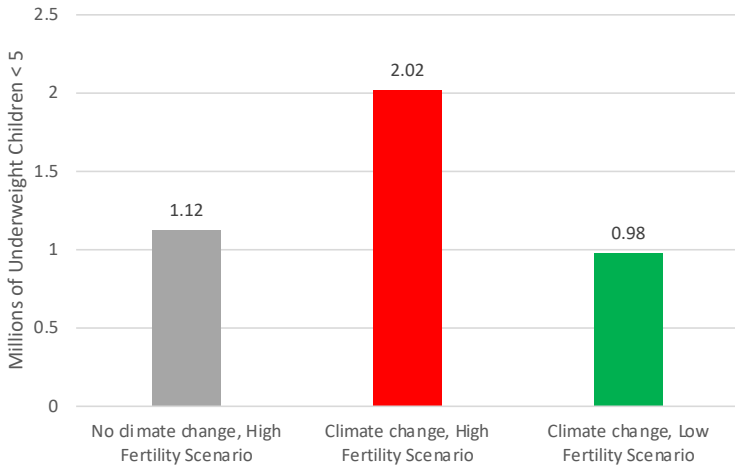
Figure 4. Impact of preceding birth intervals (PBI) on reducing stunting and underweight



SOURCE: RUTSTEIN, 2005. WITH THANKS TO SHEA RUTSTEIN FOR PERMISSION TO USE

Improved access to family planning could reduce malnutrition rates by enabling couples to space births or end childbearing when they choose to do so. A study modelling potential outcomes for food security in Ethiopia compared the projected shortfall in calories using the UN’s low versus high fertility projections (Figure 5). The model shows that achieving the lower fertility projection could nearly cancel out the adverse impact of climate change on caloric intake for children – with 51 per cent (roughly 100 million) fewer malnourished children by 2050 (Moreland and Smith, 2013).

Figure 5. Malnourished children in Ethiopia: three projected scenarios for 2050



SOURCE: ADAPTED FROM MORELAND AND SMITH, 2013

From 2014 to 2020, the United States spent \$809 million on peace and security in the G5 nations, compared to \$65 million on family planning (US Foreign Assistance Explorer, 2022). An additional \$107 million from the global community is still needed to meet the current levels of unmet need for family planning (OASIS, 2021).

Investing in universal access to contraceptives has long-term benefits that exceed direct investment in military solutions and public health campaigns. The Copenhagen Consensus shows that every US dollar invested in access to family planning yields US\$120 of improved economic output, far surpassing yield

per dollar spent on in peacekeeping (US\$5), childhood malnutrition (US\$45) and scaling up immunisation programmes (US\$60) (Herzer Risi et al., 2022; Copenhagen Consensus, 2015). These data call for a critical examination of how overseas aid and government investments are being allocated in the Sahel (Blankespoor et al., 2010). European and American donors, as well as Sahelian governments, have spent a lot more money addressing the social and economic consequences of natural and man-made disasters than investing in programmes that could prevent them from occurring.

Relationship Between Education and Resilience

Girls' education is associated with smaller families and greater investments in future children's nutrition, health and education (Population Reference Bureau, 2015). Exposure to formal education promotes the skill of advance planning, broadens perspectives and facilitates adaptability and risk assessment. It increases access to diverse livelihood options and is linked to stronger social capital, social support networks and better access to communication technologies (Muttarak and Lutz, 2014). Supporting girls' autonomy and leadership skills is the foundation for their future engagement in community life, politics or environmental conservation. A 72-country study that ran over three decades found a positive association between women's participation in civil society and positive environmental outcomes, including a reduction in carbon emissions (Lv and Deng, 2019).

Education is critical for mitigating and adapting to climate shocks in agriculture, pastoralism or business. A Nepali study found education to be more strongly associated with reducing vulnerability to natural disasters than income or wealth, in terms of human lives lost, animals lost and damage to households (KC, 2013). Investing in girls' education may offer wider climate resilience benefits than direct emergency preparedness because of its role in advancing gender equity, which also lowers climate vulnerability (Blankespoor, 2010). Furthermore, numerous studies show that countries with higher proportions of women in parliament or government positions are associated with greater ratification of environmental treaties and action to protect land (Norgaards and York, 2005; Nugent and Shandra, 2009).

Between 2014 and 2020, total investments in education for the G5 Sahel were about US\$246 million annually, but still only a quarter of what is needed (OASIS,

2021). In 2018, over half of the funding requested for food and nutritional aid in the Sahel was received, while only seventeen per cent of the aid requested for education was received (UNOCHA, 2018). This trend has remained steady over time, with the amount requested for education in 2021 being barely a fifth of that for food security (UNOCHA, 2022).

Policies and Programmes in the Region

While a comprehensive policy analysis is beyond the scope of this paper, the sections below mention policies and regional initiatives related to: a) family planning b) girls' education and c) climate change adaptation.

Family Planning: Policies and Programmes

West African governments, with the exception of Ghana, were not focused on population growth until the mid-1980s (Caldwell and Sai, 2007; UNPD, 2010). Senegal was the first francophone African country to adopt a population policy and by the 1990s, most neighbouring countries had done the same, but this did not lead to a significant increase in contraceptive use in the Sahel region (Guengant and Lahmani, 2012).

In February 2011, a major regional effort to revitalise family planning in the francophone Sahel was launched when nine West African countries signed the Ouagadougou Declaration for Population, Development and Family Planning. The countries and donors of the Ouagadougou Partnership (OP) integrated family planning into national development plans and poverty reduction strategies, scaled-up training, decentralised services and encouraged governments to increase budget line items to support programmes (UNFPA, 2011). Ten years later, the program had surpassed expectations – there were over three million new contraceptive users and funding from core donors had more than doubled (Fleishman, 2020).

Countries in the region seized this opportunity in numerous creative ways. Ethiopia focused on policy change, outreach and demedicalisation, increasing the contraceptive prevalence rate (CPR) from 6 per cent to 37 per cent between 2010 to 2022. Burkina Faso changed policies, implemented a solid plan for contraceptive security and supported mobile outreach: its CPR rose from 17 per cent in 2012 to 31 per cent in 2022 (Measure DHS, 2020; Track 20, 2023).

Senegal's awareness campaign promoting birth spacing included debates on television, press coverage and radio programs about this previously taboo topic. With support from politicians, lawyers, entrepreneurs and religious leaders, a monumental shift in norms took place in Senegal which currently has a CPR of 28 per cent and a TFR of 3.7 (Gates, B. and Gates M., n.d., Track 20, 2023).

Despite these gains, political instability in the Sahel region threatens the progress made in the health and education sectors by diverting government resources from development to the military, resulting in school and health centre closures and unsafe roads for civilians. Besides risks brought by extremist groups, conflicts over access to land due to climate change and population pressure have heightened tensions between pastoralists and farmers. The current security situation underscores the need for regional cooperation in the Sahel because instability spills quickly across porous national borders.

Girls' Education: Policies and Programmes

Despite global support for universal education, extreme poverty hinders equal access. Household poverty was the primary factor for school dropouts in a study of 63 developing countries from 2005–2011 (UN, 2013b). School-related costs account for 25 per cent of poor families' budgets in Africa (UN, 2013a), while families in countries with the highest GDP spend only 10 per cent of their budget on education (World Bank, 2021b). Mali, Niger, Chad and Burkina Faso are in the lowest quintile of GDP per capita and have the highest proportion of their populations living in extreme poverty.

Universal primary education has been a top global priority for decades. Ethiopia, Burkina Faso, Sudan and Nigeria made significant progress, with current primary school completion rates ranging from 64 per cent to 74 per cent. However, completion rates in Mali, Chad, Eritrea and Niger remain low, between 45 per cent and 58 per cent (WB/UNESCO, 2022). In Chad, Burkina Faso, Ethiopia, Mali and Niger, only 26–40 percent of girls aged 11–15 attend school (UNICEF, 2017). The G5 Sahel region also has one of the highest pupil-teacher ratios (1:41) worldwide, triple that of industrialised countries (Leist, 2022). This untenable ratio, paired with insufficient resources for teacher training and supplies, reduces educational quality. Over half of primary students in the Sahel graduate without meeting minimum literacy or numeracy standards (Leist, 2022).

Social protection programmes that have abolished school fees, used conditional cash transfers and established school feeding programs have improved enrolment rates (African Development Bank, 2013). In the past fifteen years, at least seven sub-Saharan countries saw explosive growth in primary school enrolment after eliminating school fees. One study in five African countries found that removing fees led to a 12–51 per cent increase in enrolment within a year and improved gender parity. However, attracting more students can present new challenges; in Malawi and Mozambique, for example, education quality declined when school fees were abolished, with teacher-student ratio rising to 1:66 to 1:74, respectively, over two years (World Bank / UNICEF, 2009).

Demographic trends, often overlooked in the field of education, significantly impact educational quality. From 2000–2011, Africa added 32 million primary school age children to its rosters (UN, 2013b). In the Sahel, schools need to make room for one million new school-aged children every year, forcing education systems “to sprint to stay in place” (World Bank, 2021b).

Although the education sector in the Sahel needs funding, governments must also address pressing humanitarian and environmental crises. Students and schools across the Sahel have been targeted by extremist groups, leading to fear and displacement. From 2017 to 2019, Burkina Faso, Mali and Niger suffered a six-fold increase in school closures due to insecurity (World Bank, 2021b). Environmental crises equally weaken the education sector, as aid for rebuilding schools during droughts or floods is often insufficient. While food aid remains a top priority, greater funding for education can enhance the long-term effectiveness of humanitarian aid by reducing vulnerability, increasing incomes and decreasing the number of people needing help in future crises.

Between 2015–2019, the World Bank disbursed US\$212 million dollars for the Sahel Women’s Empowerment and Demographic Dividend Project (SWEDD), aiming to promote education, women’s earning potential, gender equity and demographic change in nine African countries. Though designed and managed externally, SWEDD had a significant impact. From 2015 to 2020, it provided financial support for schooling to around 160,000 girls, established over 3,400 safe spaces for out-of-school girls and provided vocational training to 20,000 young women. Additionally, 6,400 religious leaders promoted girls’ education

and family planning and 24,000 young men participated in programs addressing violence and fostering gender equity (World Bank, 2020). In 2020, Phase Two of SWEDD began with a commitment of US\$376 million and US\$72 million has been disbursed so far.

The Nouakchott Declaration, signed by G5 Sahel leaders in 2021, is a recent regional framework aiming to enhance education quality in the Sahel. It outlines four main objectives: supporting teachers, improving learning environments, increasing educational spending from 3 per cent to 4 per cent of GDP by 2030 and prioritising out-of-school children's needs (World Bank, 2021a). The implementation of this declaration is yet to be observed.

Climate Change: Policies and Programmes

In 2009, high-emitting countries pledged US\$100 billion annually from 2020–2025 to help low-income countries combat climate change. This commitment has remained only partly fulfilled. Eleven African countries, including Chad, Eritrea, Ethiopia, Sudan, Mali and Mauritania, whose greenhouse gas emissions are 27 times below the global average, now face climate adaptation costs exceeding their national healthcare budgets. In future years, climate adaptation costs to safeguard livelihoods are likely to compete with development funding (Tearfund International, 2022).

In 2022, the UN COP27 in Egypt concluded with a historic decision to set up a fund for countries most affected by unpreventable climate disasters (UN Climate Change, 2022). However, family planning and girls' education were not included as climate adaptation strategies in National Adaptation Plans at COP27. These topics have been largely ignored in climate discussions and funding streams (Mogelgaard, 2018). Major funds, such as the Green Climate Fund and the Adaptation Fund, have not yet incorporated these interventions as priorities (Adaptation Fund, 2022; Green Climate Fund, 2022). Unless family planning and education are integrated into national climate adaptation plans, they will not be considered when allocating climate change adaptation funds in the future (Patterson et al., 2021).

Conclusion

Population dynamics, human health and environmental health are inextricably linked. Insufficient attention to any of these three factors could make current

challenges in the Sahel insurmountable. Over 11,000 global scientists assert that the climate emergency should not be considered a standalone environmental problem (Ripple et al., 2019). The Intergovernmental Panel on Climate Change (IPCC) also emphasises that gender equity and social justice are core elements of strategies aiming to limit temperature increases below 1.5 degrees Celsius (IPCC, 2018).

Global initiatives for environmental sustainability and climate change have not paid sufficient attention to the importance of population dynamics and to women's self-determination. Two key interventions – voluntary family planning and girls' education – offer positive spill-over effects on demographic trends, nutrition, employment, health, climate resilience and adaptive capacity. Considering these numerous benefits, girls' education and family planning should be prioritised when budgets are being drawn up to tackle humanitarian and environmental crises.

In the Sahel, women's lives will be increasingly affected by climate change. They had no role in creating this crisis, yet they are on the frontline facing its impact. The health of future generations – and of the planet – will hinge on whether the global community invests sufficiently in women and girls, who are uniquely positioned to build human resilience from within their households for a multigenerational ripple effect.

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