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VULNERABILITY ASSESSMENT

OF THE IMPACT OF *Climate Change*

on Gender Equality, Sexual and Reproductive Health and Gender-Based Violence in South Sudan



AFRICAN DEVELOPMENT BANK GROUP

AFRICA CLIMATE CHANGE FUND

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Acronyms

BHI	Basic health infrastructure
CBO	Community-based organization
FGD	Focus group discussion
GBV	Gender-based violence
IPV	Intimate partner violence
KII	Key informant interview
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
NDC	Nationally Determined Contribution
NGP	National Gender Policy
NGO	Non-governmental organization
PHCC	Primary health-care centre coverage
PHCU	Primary health-care unit
SRH	Sexual and reproductive health
TBA	Traditional birth attendant
UNFPA	United Nations Population Fund
UNHCR	United Nations High Commissioner for Refugees

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Most importantly, we recognize the resilience and courage of the women, men, boys and girls in Kapoeta South, Malakal and Rubkona who continue to endure the compounding effects of climate change on GBV, SRH and gender equality. Their voices and experiences underscore the urgent need for policies and programmes that foster safe, inclusive and equitable communities.

On behalf of the Sudd Institute, I extend my heartfelt appreciation to everyone who contributed to this report.

Hon. Atem G. Dekuek
Acting Executive Director
The Sudd Institute



Executive Summary

This study examined the intersection of climate change, gender equality, SRH and GBV in South Sudan, focusing on the most climate-vulnerable regions. It identifies how climate-induced stressors exacerbate socioeconomic challenges for women and girls, while evaluating existing programmes and policies to propose actionable recommendations for mitigating these impacts.

This study used a mixed-methods approach, collecting data through household surveys (528 respondents), key informant interviews (KIIs) and focus group discussions (FGDs) with key stakeholders across Eastern Equatoria, Unity and the Upper Nile States. Additionally, a detailed review of secondary data from government publications, reports from international agencies, academic studies and policy documents was conducted to assess how current climate policies align with goals for gender equality, SRH and GBV resilience in Malakal, Kapoeta South and Rubkona Counties.

Key findings:

- **Climate vulnerability hotspots:** Kapoeta South (Eastern Equatoria State), Rubkona (Unity State) and Malakal (Upper Nile State) faced high climate-related risks, with flooding being the primary threat in Malakal County and Rubkona County and drought conditions severely affecting Kapoeta South County.
- **Impact on SRH services:** Heatwaves significantly disrupt health-care access, forcing facility closures and reducing the availability of maternal and reproductive health services. Water shortages further strain maternal care in health facilities, thereby increasing reliance on traditional birth attendants (TBAs).
- **GBV increase:** Economic instability, displacement and resource scarcity have heightened GBV risks, with 50 per cent of respondents from the household survey (N=528) across Eastern Equatoria, Unity and Upper Nile States reporting a rise in intimate partner violence (IPV) and other forms of GBV in climate-affected areas.
- **Economic hardships and gender inequality:** Women bear a disproportionate economic burden, with traditional income sources disrupted by climate shocks, leading to negative coping mechanisms, including increased financial dependency on their male counterparts, forced labour for young boys and early marriages for girls.
- **Barriers to health care and GBV services:** Limited government interventions across the health system, inconsistencies of support from non-governmental organizations (NGOs) and cultural and financial barriers limit access to health services and prevent effective service delivery, leaving many women and girls without essential support systems.



This study highlights the importance of designing inclusive policies and programmes that prioritize the needs of women and girls, ensuring equitable access to resources and protection in the face of climate change. These findings offer critical insights for policymakers, development agencies and community stakeholders seeking to enhance resilience and gender equity in South Sudan.

Key recommendations:

- **Strengthening climate-resilient health systems:** Establish maternity mobile health clinics and maternities, improve heat-resistant infrastructure and integrate SRH services into disaster response mechanisms.
- **Enhance GBV prevention and response measures:** Expand legal protection frameworks, increase security in displacement camps and implement community-led GBV awareness programmes.
- **Integrate gender-responsive approaches into climate policies:** Align climate adaptation plans with gender equity frameworks to ensure women's representation in decision-making and access to financial resources.
- **Expanding economic opportunities for women:** Provide financial aid, vocational training and alternative livelihood programmes to reduce economic dependency and mitigate GBV risks.
- **Improve access to SRH services:** Address cultural stigmas through targeted awareness campaigns, enhance supply chains for reproductive health commodities and increase trained health-care personnel in remote areas.





1 INTRODUCTION AND BACKGROUND

South Sudan, the world's youngest nation, faces a complex array of socio-political and environmental challenges that significantly hinder its development and stability. Since gaining independence in 2011, the country has struggled with persistent conflict, economic instability and governance weaknesses, all of which have constrained institutional capacity, service delivery and long-term sustainability. These existing vulnerabilities are further aggravated by the global climate crisis, which has intensified environmental degradation, food insecurity and displacement, disproportionately affecting marginalized populations. Climate-induced stressors, including droughts, floods and heatwaves, have severely impacted livelihoods, disrupted access to essential services and heightened risks to vulnerable groups, particularly women and girls.

This report examines the intersection of climate change, GBV and SRH in South Sudan, focusing on the country's most climate-vulnerable states and counties. This study evaluates how climate stressors worsen socioeconomic inequalities and gender disparities, particularly for women and girls, whose access to resources, protection and health care is further constrained in climate-affected areas. By analysing climate-driven risks, this report identifies policy gaps, institutional challenges and urgent areas for intervention.

To provide a structured analysis, this report is divided into four key sections:

- **Introduction and background: Outlines South Sudan's broader challenges, the changing climate, its impact on SRH, gender equality and GBV and the need for gender-responsive climate resilience policies.**
- **Methodology: Describes the research design, data collection methods and analytical approach.**
- **Findings: Presents data from household surveys, KIIs, FGDs and secondary sources.**
- **Policy implications and recommendations: Proposes strategic interventions to strengthen climate-resilient health-care systems, empower women economically, enhance GBV prevention and response measures and integrate gender-responsive policies into climate adaptation frameworks.**

By providing data-driven insights and policy recommendations, this study aims to support government agencies, humanitarian organizations and policymakers in designing climate-resilient, gender-inclusive policies that enhance adaptation efforts, reduce vulnerabilities and promote sustainable development in South Sudan.

1.1 Climate change challenges in South Sudan: Rising temperatures, extreme weather and socioeconomic vulnerabilities

South Sudan faces severe and escalating climate challenges, with rising temperatures, altered rainfall patterns and extreme weather events exacerbating existing vulnerabilities. These climate-induced stressors disrupt livelihoods, threaten food security and augment displacement, particularly in flood-prone areas, such as Jonglei, Unity and Upper Nile States. The country's limited coping capacity, characterized by weak infrastructure, constrained resources and governance challenges, further worsens the humanitarian crisis.

This section provides a detailed analysis of climate-related hazards, including floods, droughts and epidemic risks, and examines how climate change intensifies food insecurity, displacement and resource conflicts. The following subsections evaluate these critical issues, incorporating data-driven insights from international climate assessments and proposing strategic interventions to enhance resilience.

1.1.1 Rising temperatures and changing rainfall patterns

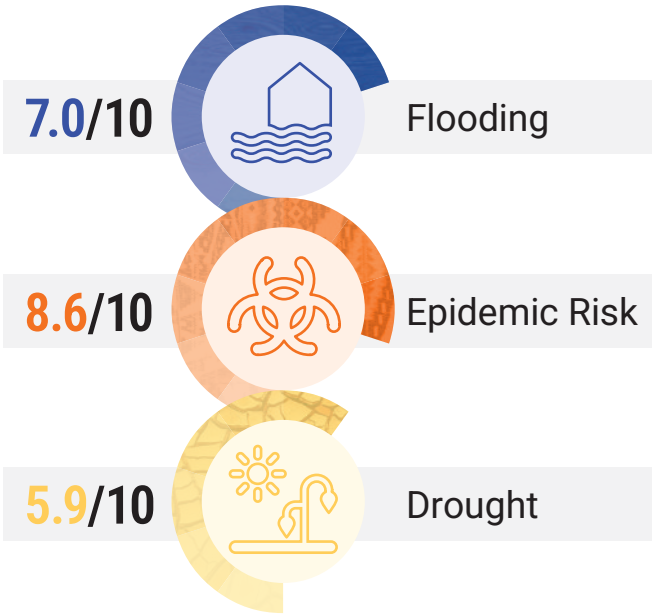
South Sudan's climate, traditionally marked by seasonal rainfall and high temperatures, is increasingly impacted by climate change, leading to more frequent and severe weather events. The World Bank (2023) reports rising temperatures, erratic rainfall and severe flooding, all of which threaten livelihoods and food security.

Temperature projections indicate a rise of up to 2.5°C by 2050 and between 2.7°C and 3.4°C by 2100, exacerbating drought conditions, soil moisture loss and evaporation rates (African Development Bank, 2018; Omondi, 2020). Irregular rainfall patterns intensify floods and droughts, severely affecting agricultural productivity, particularly in Upper Nile, Unity and Eastern Equatoria (Government of the Netherlands, 2019).

The humanitarian consequences are dire, with over one million people displaced by floods since July 2020, especially in Jonglei State, while subsistence farming — South Sudan's economic backbone — is under threat, leaving millions vulnerable to food shortages and economic instability (Anadolu Agency, 2020).

1.1.2 Climate hazards and exposure: Floods, droughts and epidemics

South Sudan faces multiple climate hazards, including flooding, droughts and epidemics, all of which significantly impact livelihoods, food security and public health. According to the INFORM Climate Change Tool (European Commission, 2023), South Sudan's exposure to extreme climate events is rated as follows:



Flooding is most severe in Jonglei, Upper Nile and Unity States, where seasonal and flash floods submerge entire villages, displace thousands and disrupt agriculture and economic stability (World Bank, 2023; United Nations Children's Fund, 2024). Key drivers, such as extreme rainfall, deforestation and poor drainage systems further worsen flood severity, leading to food shortages, disease outbreaks and intercommunal conflicts over dwindling resources (United Nations Office for the Coordination of Humanitarian Affairs, 2024; Food and Agriculture Organization of the United Nations, 2024).

Conversely, drought significantly affects Eastern Equatoria, Warrap and Northern Bahr el Ghazal, where prolonged dry spells and erratic rainfall reduce crop yields, increase competition for water resources and contribute to worsening malnutrition rates, particularly among children (Food and Agriculture Organization of the United Nations, 2024).

Additionally, South Sudan faces a very high epidemic risk, as stagnant floodwaters and inadequate sanitation infrastructure foster **malaria, cholera, typhoid and Hepatitis E outbreaks,** particularly in **overcrowded displacement camps** (World Health Organization, 2023, 2024; United Nations Children's Fund, 2024). According to the World Health Organization (2024), **cholera, malaria and other disease outbreaks surged** in flood-affected areas of the Greater Horn of Africa, including South Sudan, where fragile water, sanitation and hygiene systems and population displacement have heightened public health vulnerabilities.

These compounding crises highlight the urgent need for climate adaptation strategies, enhanced disaster preparedness, improved water and sanitation infrastructure and strengthened public health interventions to mitigate South Sudan's increasing climate vulnerabilities.

1.1.3 Vulnerability and lack of coping capacity

South Sudan's limited coping capacity, rated 9.5/10, is among the highest globally, reflecting severe structural weaknesses that hinder effective climate adaptation and disaster response (European Commission, 2023). The country's vulnerability is made worse by gender inequalities, as women and children face greater risks due to economic and social barriers that limit their ability to recover from climate-induced shocks.

Additionally, weak infrastructure, including inadequate roads, bridges and drainage systems, restricts access to emergency services and humanitarian aid, leaving many communities isolated during extreme weather events. Governance and institutional challenges further weaken disaster preparedness, as insufficient government resources and fragmented policies impede effective climate adaptation planning (World Bank, 2023). These compounding vulnerabilities underscore the urgent need for targeted investments in infrastructure, gender-inclusive climate policies and strengthened governance frameworks to enhance South Sudan's resilience to climate-related disasters.

1.2 The intersection of climate change, gender equality, sexual and reproductive health and gender-based violence in South Sudan

The convergence of climate change, gender equality, SRH and GBV in South Sudan presents a multi-dimensional crisis, where structural inequalities, socioeconomic vulnerabilities and environmental stressors interact to deepen gender disparities. Women and girls in climate-vulnerable regions bear the brunt of these crises due to gendered roles, economic marginalization and restricted access to essential services. The lack of gender-sensitive climate adaptation strategies and the failure to integrate SRH and GBV considerations into climate policies further compound these challenges.

This section examines the key issues surrounding these intersections, identifies existing policy gaps and offers evidence-based recommendations for more integrated and effective interventions.



1.2.1 Climate change and gender inequality

Climate change disproportionately impacts women and girls in South Sudan, deepening existing gender inequalities and exacerbating socioeconomic vulnerabilities. As primary caregivers and key contributors to food production and water collection, women bear the brunt of climate-induced challenges. Extreme weather events, such as prolonged droughts and recurrent floods, disrupt agricultural activities, leading to widespread food insecurity and economic instability. These environmental shocks force women into strenuous and prolonged labour, increasing health risks, while simultaneously limiting their opportunities for education and financial independence. Additionally, displacement caused by climate disasters places women and girls in precarious situations, heightening their exposure to GBV and health complications, particularly in resource-constrained settings (United Nations Population Fund, 2025).

The increasing frequency and intensity of climate-induced disasters have also augmented domestic burdens, contributing to declining literacy rates among women and girls. The need for economic survival often pushes girls out of school and into early marriage, reinforcing cycles of gender inequality. Climate stressors have been linked to rising rates of IPV, child marriage and forced marriage, particularly in regions where economic hardship and displacement are widespread (UN-Women, 2024).

Furthermore, extreme heat events — aggravated by climate change — have disproportionately affected women in South Sudan. A recent heatwave resulted in school closures, further disrupting girls' education and compounding existing educational disparities. Pregnant women are particularly vulnerable to heat stress, with augmented risks of miscarriage, stillbirths and other maternal health complications (Taylor, 2023).

These interlinked challenges underscore the urgent need for gender-responsive climate adaptation policies in South Sudan. Strengthening women's access to climate-resilient agricultural practices, expanding educational opportunities and ensuring the protection of women and girls in climate-related displacement settings, are essential for mitigating the adverse impacts of climate change on gender equality.

1.2.2 Sexual and reproductive health challenges in climate-vulnerable regions

SRH services are often deprioritized in climate adaptation and disaster response efforts, leaving women and girls in South Sudan highly vulnerable to poor maternal health outcomes, unintended pregnancies and sexual violence. Climate-induced displacement and resource scarcity significantly limit access to contraceptives, skilled birth attendants and essential maternal health-care services (Burns and Mutunga, 2024). Pregnant women in flood-prone and drought-affected regions face severe barriers to prenatal care, emergency obstetric services and postnatal support, heightening risks of maternal mortality. Additionally, disruptions in supply chains and health-care infrastructure reduce access to contraceptives, menstrual hygiene products and critical reproductive health supplies. The risks of GBV are increased in internally displaced persons' camps, where the lack of security exposes women to sexual exploitation, forced marriages and other forms of violence. In flood-affected areas, the destruction of health facilities and transportation networks further restricts women's ability to seek emergency medical care, while the absence of menstrual hygiene resources in settings for internally displaced persons creates unsafe and unsanitary conditions for adolescent girls and women. Addressing these challenges requires a holistic approach that integrates SRH into climate resilience strategies, ensuring that reproductive health remains a core priority in humanitarian aid and disaster response policies.

1.2.3 Gender-based violence and climate change

Climate change has been directly linked to the rise in GBV through its impact on economic security, migration and resource competition. In South Sudan, environmental stressors, such as prolonged droughts and severe flooding have intensified land conflicts, displacement and economic instability, all of which heighten women's exposure to IPV, sexual exploitation and child marriage (Mai, Jok and Tiemaker, 2018). Forced migration and displacement leave women and girls particularly vulnerable in overcrowded internally displaced persons' camps and informal settlements, where the lack of security and weak legal protections contribute to high rates of sexual violence. Economic hardships further worsen GBV, as climate-induced poverty pushes families to resort to harmful coping mechanisms, including child and forced marriages, as survival strategies. Additionally, inadequate legal frameworks and institutional responses to GBV, particularly in rural and climate-affected regions, leave survivors with limited access to justice and protection services. For instance, families displaced by climate-related disasters often relocate to internally displaced persons' camps where poor security, overcrowding and weak legal enforcement increase the prevalence of sexual violence. Economic desperation also forces families to marry off their daughters in exchange for bride price payments, fueling child marriage rates in climate-affected regions (Taylor, 2023). Despite these escalating risks, GBV prevention programmes in South Sudan rarely integrate climate-related factors, underscoring the urgent need for climate-responsive GBV strategies that address both environmental and gendered vulnerabilities.



2 METHODOLOGY

2.1 Research design

This study employed a mixed-methods research approach, integrating qualitative and quantitative data collection methods to provide a comprehensive and evidence-based analysis of the intersection between climate change, gender inequality, SRH and GBV. By combining statistical analysis with in-depth qualitative insights, the study captures both systemic trends and lived experiences of climate-affected populations across three climate vulnerability hotspots: Kapoeta South, Rubkona and Malakal.

2.2 Study objectives

This study aims to examine the intersections between climate change, gender inequality, SRH and GBV in three hotspot areas in South Sudan, focusing on regions most vulnerable to climate-induced crises.

This study seeks to achieve the following objectives:

2.2.1 Identify climate vulnerability hotspots

- Assess regions most impacted by climate change, with a focus on gender-specific vulnerabilities and alignment with South Sudan's National Adaptation Plan (NAP) and Second Nationally Determined Contribution (NDC).
- Map hotspot areas where climate shocks exacerbate food insecurity, displacement and gender disparities.

2.2.2 Analyse climate change, programme and policy context

- Examine how existing programmes and policy frameworks in climate change adaptation, gender equality, SRH and GBV align with climate resilience strategies.
- Evaluate the effectiveness of national and international climate policies in addressing gender-responsive adaptation.

2.2.3 Evaluate climate impacts on gender equality, sexual and reproductive health and gender-based violence

- Investigate how climate-induced stressors such as floods, droughts and heatwaves intensify socioeconomic vulnerabilities among women and girls.
- Assess the accessibility and functionality of SRH services in climate-affected regions and the barriers limiting women's reproductive rights.
- Document the prevalence of GBV in climate-stressed areas, particularly in displacement camps and resource-scarce settings.

2.2.4 Propose strategic policy actions

- Develop evidence-based recommendations for gender-responsive climate policies and programmes to mitigate the negative impacts of climate change on SRH and GBV.
- Provide actionable strategies for strengthening women's climate resilience, ensuring economic empowerment, health-care access and legal protections.

2.3 Study locations

The study was conducted in three climate vulnerability hotspots in South Sudan, each facing distinct, but interconnected climate-induced challenges. Kapoeta South (Eastern Equatoria State) is a drought-affected region where acute water scarcity, failed harvests and widespread malnutrition drive circular migration patterns as communities search for food, water and humanitarian aid (REACH, 2022). Rubkona (Unity State) experiences severe and recurrent flooding, displacing 90 per cent of the population over consecutive years (Bushby and Regede, 2024; REACH, 2024). Overcrowded displacement camps exacerbate food insecurity, malnutrition and social tensions, deepening vulnerabilities. Malakal (Upper Nile State) also suffers from frequent flooding, leading to disruptions in education, increased GBV risks and severe health challenges due to contaminated water sources and inadequate shelter conditions. These three locations were strategically selected to provide a comprehensive understanding of how climate shocks impact gender dynamics, displacement and access to SRH services.

2.3.1 Rationale for site selection

The study locations were selected based on a non-probability, convenience-based sampling method, focusing on severely climate-affected regions with well-documented vulnerabilities. These locations were prioritized based on:

Alignment with national climate policies:
The selection aligns with South Sudan's NAP and NDC, which identify these areas as climate crisis hotspots requiring urgent intervention.

Accessibility and feasibility:
The locations were logistically practical and secure for data collection, ensuring feasibility while capturing generalizable insights applicable to other climate-affected counties.

Diverse climate challenges:
The study covers drought, recurrent flooding, displacement and socioeconomic impacts, providing a comprehensive understanding of climate-induced disparities.

2.4 Sample size calculation

Since this was the first research study conducted in the targeted areas, there were no prior related studies available for reference. As a result, the sample size calculation adopted a proportion of 0.5 (50 per cent), which ensured the highest possible sample size. This approach was designed to effectively measure the impact of climate change on the population, including women and girls' health, nutrition, education, water, sanitation and hygiene, livelihoods and agriculture.

To determine the number of household respondents for the study, the Cochran formula (1963:75) for sample size estimation in surveys was applied, ensuring a 95 per cent confidence interval. The formula was as follows:

$$n_0 = \left[\frac{Z^2 pq}{e^2}\right] * deff$$

Where:

n_0: Sample size
Z: Value corresponding to a given confidence level (1.96 for a confidence level of 95%-value commonly used)
p: Estimated proportion of an attribute that is present in the population
q: 1-p
e: Desired level of precision (0.05)
deff. Design Effect, (1.2)

Inserting these values in the above formula yields the following result.

$$n = \left[\frac{(1.96)^2 * .5 * .5}{(0.05)^2}\right] * 1.2 = 461$$

Using this formula, the study determined an appropriate sample size to ensure statistical reliability and representativeness of the surveyed population across the targeted study areas. Further refinements to the sample distribution were made based on geographical accessibility, population density and exposure to climate change stressors.

Therefore, the sample size was 461 household heads. Considering a 10 per cent non-response rate, the final sample was set at 507 households across all three states. The sample was distributed equally across the three states, with an initial allocation of 170 respondents per state as a minimum.

The survey questions were designed to capture both demographic information and responses to key assessment inquiries. The selection of survey respondents considered gender and disability inclusion, ensuring diverse perspectives. All respondents were asked to assess the impact of climate change on various sectors from their respective viewpoints. The average duration of each survey ranged between 20 to 30 minutes.

2.5 Inclusion and exclusion criteria

2.5.1 Inclusion criteria

- Household surveys were conducted with adults (18+ years).
- FGDs included youth (18 to 30 years) to explore climate adaptation challenges among younger populations.
- Gender balance was ensured by conducting separate gender-specific FGDs and KIIs.
- Participants included: farmers, pastoralists, traders, humanitarian workers, government representatives, health-care providers and gender advocates.

2.5.2 Exclusion criteria

- **Minors (under 18 years).**
- **Non-consenting individuals.**
- **Individuals involved in study implementation (e.g. enumerators and field supervisors) to eliminate response bias.**

2.6 Data collection

2.6.1 Quantitative data

A total of 528 participants were surveyed across Kapoeta South, Rubkona and Malakal to ensure demographic balance and diverse representation in the study. The distribution of participants was relatively even across the three locations, with 175 respondents (30.8 per cent) from Kapoeta South, 172 respondents (30.2 per cent) from Rubkona and 181 respondents (31.8 per cent) from Malakal as shown in Table 1.

Table 1: Number of household participants interviewed

Participants	Frequency	Percentage
Kapoeta South	175	30.8%
Rubkona	172	30.2%
Malakal	181	31.8%
Total	**528**	**100.0%**

2.6.2 Qualitative data

A total of 18 KIIs and 9 FGDs were conducted with experts, policymakers, community leaders and affected populations to capture diverse perspectives on the intersection of climate change, gender inequality, SRH and GBV. Purposive sampling was employed to ensure the inclusion of stakeholders from various sectors, including government, humanitarian agencies, health care, education, agriculture and local communities. This approach facilitated a comprehensive understanding of climate-induced vulnerabilities and adaptive strategies. Data saturation was achieved as recurrent themes emerged across interviews and discussions, reinforcing the reliability and depth of the insights gathered.

2.6.3 Secondary data

Secondary data was collected from national and international reports, including South Sudan's NAP and NDC. Publications from organizations like UNFPA, the World Health Organization and the Sudd Institute were also reviewed to contextualize findings.

2.7 Data analysis and synthesis

The analysis integrated primary and secondary data to provide a comprehensive examination of the gendered impacts of climate change on SRH and GBV vulnerabilities.

2.7.1 Quantitative data analysis

Quantitative data from household surveys was processed using SPSS, where frequencies, percentages and regression models were applied to explore correlations between climate stressors and gendered vulnerabilities.

2.7.2 Qualitative data analysis

Qualitative data from KIIs and FGDs was analysed using NVivo, employing thematic coding to identify patterns related to gender dynamics, SRH access and GBV risks.

2.7.3 Secondary data analysis

Secondary data, including policy reports and literature reviews, was synthesized to contextualize findings and align results with national climate policies, ensuring that the study's conclusions contribute to evidence-based policymaking.

2.8 Ethical considerations

This study adhered to strict ethical guidelines to protect the rights, safety and dignity of all participants. Informed consent was obtained from all individuals prior to participation, ensuring that they fully understood the study's purpose, procedures and their right to withdraw at any time. Confidentiality and anonymity were strictly maintained by securely storing data and removing personal identifiers to prevent unauthorized access. Given the sensitivity of the research, particularly in relation to GBV survivors and other vulnerable groups, trauma-sensitive interview techniques were employed to minimize distress and ensure a supportive environment. Additionally, the study received ethical approval from relevant authorities, ensuring full compliance with national and international research standards.

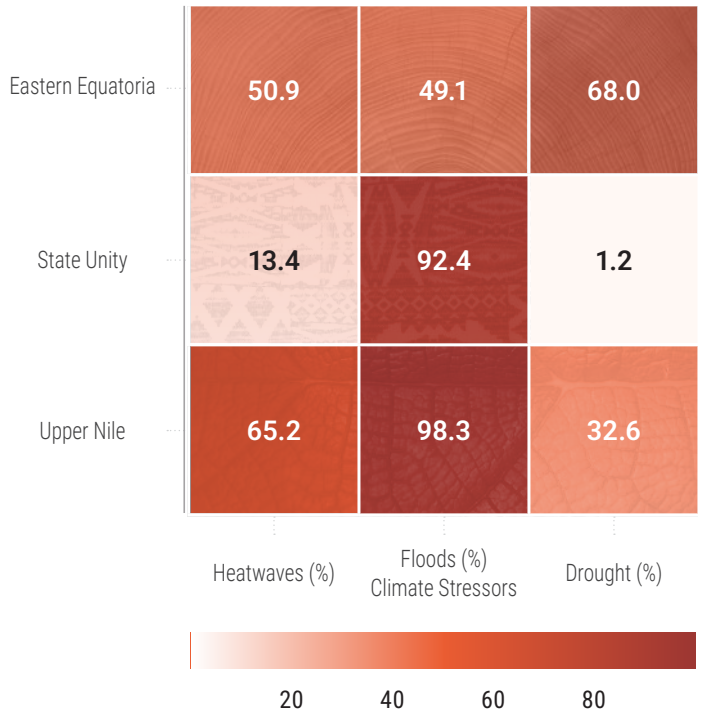


FINDINGS 3

3.1 Climate hazard and exposure

The prevalence of climate stressors, such as drought, floods and heatwaves varies significantly across Kapoeta South (Eastern Equatoria State), Rubkona (Unity State) and Malakal (Upper Nile State), highlighting the necessity for localized climate adaptation strategies. Statistical findings reveal distinct disparities in exposure levels, reflecting each county's unique environmental vulnerabilities as shown in Figures 1 and 2.

Figure 1: Climate vulnerability hotspots heat map



3.1.1 Drought exposure: A severe concern in Kapoeta South

As shown in Table 2, 68 per cent of respondents (119 out of 175) reported that they experienced drought in the last twelve months. This supports previous assessments that water scarcity, agricultural failures and food insecurity are significant challenges in the region. Conversely, Unity State experiences the lowest drought exposure (1.2 per cent), with only 2 out of 172 respondents reporting drought conditions. This suggests that flooding, rather than drought, is the primary climate stressor affecting livelihoods in Unity State. In Upper Nile State, 32.6 per cent (59 out of 181) of respondents reported drought exposure, indicating moderate drought conditions that still pose risks to agricultural productivity and water availability.

These disparities highlight the need for region-specific climate adaptation measures, particularly in Eastern Equatoria, where water security interventions should be prioritized.

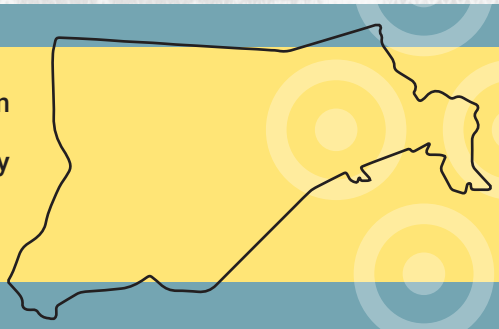


Table 2: Distribution of reported drought incidences across study counties

Drought Experience	Kapoeta South	Rubkona	Malakal	Total
Yes	119	2	59	180
No	56	170	122	348
Total	175	172	181	528

Participants from Kapoeta South, as highlighted in qualitative findings, identified drought and extreme heat as the primary climate hazards affecting their livelihoods, particularly agriculture, livestock and mining. These climatic conditions have disrupted farming cycles, reduced water availability and exacerbated food insecurity. Erratic rainfall patterns make it difficult for farmers to determine optimal planting periods, often resulting in failed crops before germination. Additionally, the participants reported frequent bird infestation, further diminishing agricultural yields and worsening food shortages. Beyond agriculture, water scarcity has significantly affected mining activities, an important alternative income source, while increased livestock mortality has deepened economic vulnerabilities for rural households.

Tiitmamer, Gworo and Midgley (2023) corroborate these findings, highlighting a sharp rise in food insecurity due to climate shocks and economic instability. REACH (2022) also notes an increasing reliance on wild foods, whose availability continues to decline, further exacerbating the crisis. Additionally, severe water shortages have not only reduced agricultural productivity, but have also disrupted alternative livelihoods, such as gold mining, which depends on water-intensive processes.

These findings align with South Sudan's National Adaptation Programme of Action (NAPA 2016) and Nationally Determined Contributions (NDC 2021), both of which recognize drought and erratic rainfall as major climate risks in Eastern Equatoria. These national frameworks recommend climate-resilient crops, irrigation schemes and strengthened agricultural supply chains as key adaptation strategies to enhance food security. The compounding effects of drought, erratic rainfall and resource scarcity in Kapoeta South have intensified food insecurity and economic distress, demanding urgent climate resilience measures.

While drought in Malakal remains a persistent challenge, it is of moderate severity compared to Kapoeta South. Unlike Kapoeta, where prolonged drought significantly impacts agriculture and livelihoods, Malakal experiences periodic dry conditions that disrupt farming, water supply and food security, but to a lesser extent. Participants from Malakal reported that unpredictable seasonal rainfall affects agricultural planning, leading to reduced crop yields and increased reliance on food imports. Livestock keepers also face heightened water stress, necessitating longer migration routes in search of pasture and water, which sometimes results in resource-based conflicts.



These findings underscore the urgent need for targeted climate adaptation strategies in Kapoeta South, with a focus on drought-resistant agriculture, water conservation technologies and livelihood diversification programmes to mitigate the long-term socioeconomic impacts of severe drought.

3.1.2 Flooding as a critical climate stressor in Malakal and Rubkona

Flooding is the most significant climate stressor in Malakal and Rubkona, with 98.3 per cent and 92.4 per cent of respondents, respectively, reporting flood-related impacts. In absolute terms, 178 out of 181 respondents in Malakal County (Upper Nile State) and 159 out of 172 in Rubkona County (Unity State) indicated being affected by floods. These findings are consistent with the data presented in Table 3, which illustrates the distribution of reported flood incidences across the study counties.

Such high exposure rates underscore the extreme vulnerability of these counties to seasonal river overflows, heavy rainfall and inadequate drainage infrastructure.

The flooding patterns not only disrupt agricultural cycles and destroy homes and infrastructure, but also contribute to the spread of waterborne diseases, displace communities and strain local governance and service delivery systems.

This pattern of vulnerability aligns with national-level climate assessments: South Sudan's National Adaptation Plan (NAP 2021) and Nationally Determined Contributions (NDC 2021) identify Malakal (Upper Nile State) and Rubkona (Unity State) as among the country's most severe climate risk hotspots. The persistent and cyclical nature of flooding in these areas presents profound implications for food security, economic stability, public health and population displacement—challenges that are likely to intensify under projected climate change scenarios.

Table 3: Distribution of reported flood incidences across study counties

Flood Experience	Kapoeta South	Rubkona	Malakal	Total
Yes	86	159	178	423
No	89	13	3	105
Total	175	172	181	528

Qualitative insights from FGDs and KIIs indicate that flooding has devastated livelihoods, contaminated drinking water, destroyed farmland, inflated food prices, disrupted fishing by displacing fish populations, damaging fishing equipment and making water bodies unsafe or inaccessible and hindered livestock-rearing activities in Malakal and Rubkona Counties. Nearly 90 per cent of Rubkona remains submerged, making waterlogging a persistent challenge that severely limits agricultural productivity (United Nations Office for the Coordination of Humanitarian Affairs, 2024).

In Malakal, according to qualitative insights, severe flooding has not only displaced thousands, but has also triggered resource-based conflicts, worsening food insecurity and humanitarian needs (United Nations Office for the Coordination of Humanitarian Affairs, 2024). As displaced populations migrate to higher ground, land disputes and competition for scarce agricultural resources have skyrocketed. Additionally, flooding has severely damaged key infrastructure, including roads, markets, schools and health-care facilities, restricting access to essential services. Stagnant floodwaters have contributed to outbreaks of malaria, cholera, typhoid and bilharzia, overwhelming health centres that are struggling to meet the increasing demand for medical assistance.

These findings reinforce the urgent need for policy interventions aligned with NAP and NDC recommendations, emphasizing climate-resilient infrastructure, flood-resistant housing, early warning systems and adaptation strategies, such as flood-tolerant crops and improved drainage systems. Without immediate intervention, flooding in Malakal and Rubkona will continue to drive displacement, economic hardship and food insecurity, worsening South Sudan's humanitarian crisis and threatening the long-term resilience of affected communities.

3.1.3 Heatwave exposure: A widespread but uneven challenge

Heatwaves are an escalating climate stressor in South Sudan, affecting 43.6 per cent (230 out 528) of all respondents, though their experiences and impact vary across regions (see Table 4). Malakal records the highest heatwave exposure at 22.3 per cent (118 out of 528) of the respondents reported experiencing a heatwave, driven by prolonged dry seasons, extreme temperatures and worsening water scarcity. Kapoeta South follows closely, with 16.9 per cent (89 of 528) of respondents reporting extreme heat exposure, reinforcing the county's dual struggle with both heat and drought. In contrast, Rubkona has the lowest reported heatwave exposure at 4.4 per cent (23 out 528), as its climate risks are primarily dominated by flooding rather than extreme heat.

Table 4: Distribution of reported heatwave incidences across study counties

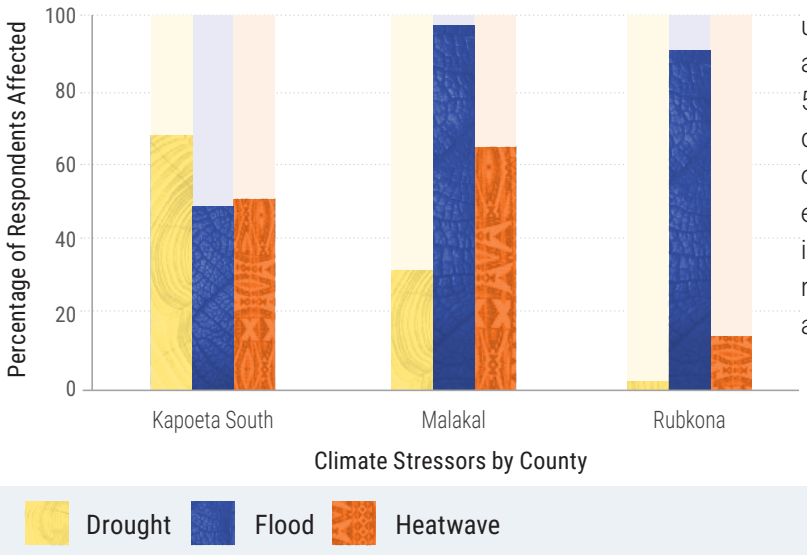
Flood Experience	Kapoeta South	Rubkona	Malakal	Total
Yes	89	23	118	230
No	86	149	63	298
Total	175	172	181	528

Findings from qualitative data highlight that heatwaves have placed immense pressure on local health-care systems, exacerbating existing vulnerabilities. In Kapoeta South, extreme heat events in 2023 and 2024 significantly disrupted health services:

- Health workers struggled to perform their duties due to unbearable conditions.
- Some staff stopped reporting to work entirely.
- Partial facility lockdowns were implemented, further affecting service delivery.

Heatwaves magnify existing climate stressors, compounding water shortages, increasing energy demand and reducing labour productivity across key sectors. The extreme temperatures recorded in March 2024, which ranged between 41°C and 45°C (106°F to 113°F), had devastating effects on communities and infrastructure. In response, schools were temporarily closed (BBC News, 2024). In Malakal and Kapoeta South, prolonged exposure to extreme heat has led to rising cases of heat-related illnesses, increased strain on local water resources and disruptions to agricultural activities.

Figure 2: Prevalence of drought, floods and heatwaves across Kapoeta South, Rubkona and Malakal



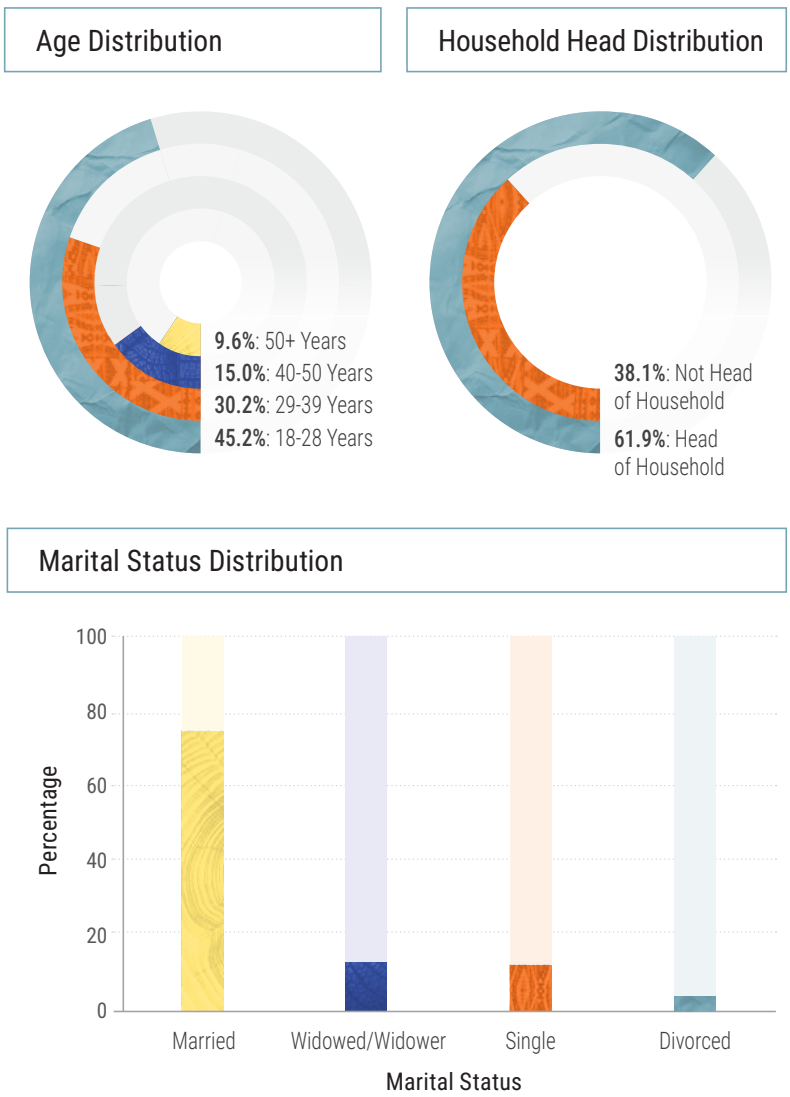
3.2 Climate stressors and population vulnerability

This section examines the demographic profile of participants, which is essential for understanding how different population groups experience and respond to climate stressors. By analysing key demographic factors, such as age, gender, marital status and household headship, the vulnerability and resilience of different segments of the population to climate-related challenges can be assessed.

3.2.1 Age distribution and climate vulnerability

The age distribution of the study population highlights a predominantly young demographic that faces economic precarity and heightened vulnerability to climate stressors (see Figure 3). The majority of participants belong to the age group 18 to 28 years (44.89 per cent) and 29 to 39 years (30 per cent) age brackets, collectively comprising nearly three quarters (74.89 per cent) of the total sample. In contrast, older populations are significantly underrepresented, with only 14.9 per cent aged 40 to 50 years and 9.5 per cent over 50 years. This disparity underscores a high dependency ratio, where a large proportion of individuals are in early adulthood, yet experience unstable employment, financial insecurity and disproportionate gendered responsibilities, particularly in caregiving and informal labour.

Figure 3: Graphical representations of the demographic profile of participants



Young adults, particularly those in rural and climate-affected regions, struggle with limited job opportunities and uncertain livelihoods, increasing their reliance on subsistence farming, casual labour or migration as survival strategies. This economic instability hinders long-term resilience, making them more susceptible to climate-induced shocks, such as floods, droughts and food shortages. Meanwhile, the low representation of older individuals suggests barriers to mobility, health-care and social support structures, leaving aging populations disproportionately vulnerable to climate stressors and food insecurity. The skewed age distribution reinforces the need for age-responsive climate adaptation strategies.

3.2.2 Marital status and socioeconomic vulnerability

Marital status plays a crucial role in shaping economic security and social stability, particularly for women, as disparities in relationship status significantly impact vulnerability in climate-affected regions. The data reveals that the majority of participants (75 per cent) are married, reinforcing the dominance of traditional family structures within the community. However, 11.7 per cent are widowed, 11 per cent are single and only 2.3 per cent divorced, highlighting that single and widowed women face heightened socioeconomic risks. In many climate-affected regions, women's economic security is closely tied to marital status, with those outside of marriage, especially widows, often facing challenges in accessing inheritance rights, land tenure or stable income sources.

However, this generalization requires contextualization, as traditions among Nuer, Cholo and Dinka communities uphold women's rights to land ownership, particularly through kinship structures and customary inheritance practices.

Despite these protections, socioeconomic shifts, legal ambiguities and external pressures, such as climate change and displacement, can undermine women's practical ability to exercise these rights, leaving them vulnerable to poverty, land dispossession and food insecurity.

The marital status distribution of participants reflects deep-rooted gender inequalities, where widowed, single and divorced women are among the most economically vulnerable groups. Without legal protections and financial independence, these women struggle to secure land, access credit or engage in sustainable livelihoods. In the context of climate change, these challenges are amplified, as loss of agricultural land, displacement and limited social protection mechanisms disproportionately affect women without male household heads.

Addressing these challenges requires legal protections for widows and single women, greater access to financial resources and land ownership, and economic inclusion initiatives to strengthen women's resilience against climate stressors and socioeconomic instability.

3.2.3 Residency patterns and climate-induced displacement

The residency patterns of participants reveal high levels of displacement, driven by climate stressors, economic instability and conflict-related pressures. A significant 53.8 per cent of respondents reported having lived in their current location for only one to five years, indicating frequent migration and unstable settlement patterns. In contrast, less than 5 per cent of participants have resided in the same place for over 30 years, demonstrating that long-term residency is rare, and displacement remains a widespread reality for many households.

The high mobility among participants suggests that climate-related events, such as droughts and floods directly influence human settlement patterns in addition to other drivers:

- **Recurrent flooding forces families to abandon their homes, while prolonged droughts deplete natural resources, making agriculture unsustainable and compelling migration to urban centres or humanitarian camps.**
- **Economic instability further restricts families' ability to establish permanent residences, as loss of income, rising food prices and insecure land tenure push individuals to migrate in search of livelihoods, humanitarian aid or safety.**

3.2.4 Gender distribution and climate vulnerability

Women bear the greatest burden of climate vulnerability, making up an overwhelming 83 per cent of study participants, compared to just 17 per cent of men. This stark gender imbalance highlights the disproportionate responsibility women carry in managing households amid climate-induced economic hardships.

The low male representation in this study suggests a high prevalence of labour migration, where men leave rural areas to seek work in urban centres. Additionally, cultural norms often designate women as the primary managers of household duties, increasing their presence at home during the survey, while men may have been working outside the household.

This migration pattern forces women to assume full responsibility for household survival, often with limited financial resources and few income-generating opportunities.

As a result, women face heightened vulnerabilities, including:

- **Food insecurity:** Managing household food supplies despite crop failures and rising food prices.
- **Displacement risks:** Being responsible for children and dependents during climate-induced migration.
- **Economic instability:** Struggling to access stable income sources in male-dominated labour markets.

These findings underscore the urgent need for gender-responsive climate adaptation policies that empower women by expanding their access to livelihood diversification programmes and climate-resilient economic opportunities. Strengthening women's financial independence through microfinance, skills training and land rights reform would enhance their ability to withstand climate shocks and reduce their disproportionate vulnerability.

3.2.5 Household heads and economic vulnerabilities

The economic profile of household heads reveals significant vulnerabilities, with a high proportion of participants engaged in unpaid domestic labour or precarious livelihoods that are highly susceptible to climate stressors. Among the participants, 27.1 per cent of household heads are housewives and 19.9 per cent are unemployed, meaning that nearly half of participants lack stable income sources. Among those engaged in economic activities, 11.7 per cent are farmers, 11.2 per cent are traders and 5.5 per cent run small businesses. Government employment remains low, with only 5.1 per cent working in public service. The dominance of farming and informal trade highlights heavy reliance on unstable income sources.

The high percentage of housewives and unemployed individuals reflects gendered economic disparities, where women's financial independence is constrained by limited access to formal employment, credit and land ownership. Household resilience is weakened by unstable income streams, leaving families vulnerable to climate-induced financial shocks.

Farming and small businesses, which serve as primary income sources, place households at high risk of economic instability, especially due to:

- **Droughts and floods,** which frequently disrupt agricultural productivity.
- **Market disruptions,** affecting local trade and business sustainability.

3.2.6 Vulnerable groups

Based on field assessments, stakeholder interviews and community consultations conducted in Rubkona, Malakal and Kapoeta South in South Sudan, several population groups were consistently identified as being at heightened risk of harm due to intersecting vulnerabilities. These findings reflect both the perceptions of local actors and direct observations made during data collection. The most at-risk groups include:

- **Widows** who face systemic barriers to land ownership, limited access to income-generating opportunities and social exclusion, particularly in contexts where male-headed households are prioritized for aid and resources.
- **Pregnant women** who are disproportionately affected by climate-induced health crises due to nutritional deficiencies, limited mobility and inadequate access to maternal health services during floods and displacement.
- **Elderly individuals** who struggle with physical mobility, chronic health conditions and dependency on family or humanitarian assistance, making them particularly vulnerable in contexts of service disruption, evacuation or protracted displacement.

These groups require targeted protection and tailored service delivery strategies to reduce exposure to further harm, especially as climate shocks and conflict continue to undermine resilience across South Sudan.

3.3 Impact of climate stressors on gender-based violence, sexual and reproductive health and gender inequality

3.3.1 Impact of climate stressors on gender-based violence

Statistical analysis reveals that 50 per cent of respondents reported an increase in GBV in climate-affected areas (see Table 5). According to regression analysis among various climate stressors, drought emerged as the strongest predictor of GBV exposure (B = 0.267, p < 0.001) as shown in Table 6, as resource scarcity and economic hardship heightened household tensions and increased women's vulnerability to IPV and exploitation. Heatwaves also had a significant effect on GBV risks (B = 0.096, p = 0.035), correlating with rising social stress, aggression and deteriorating living conditions. While floods did not show a direct statistical impact on GBV risks, they contributed indirectly by displacing communities, increasing economic instability and placing women and girls in unsafe environments, such as overcrowded shelters and informal settlements.

Table 5: Reported increase in gender-based violence

GBV increase

	Frequency	Percentage
No	264	50.0%
Yes	264	50.0%
Total	528	100.0%

Table 6: Regression coefficients for climate stressors predicting gender-based violence increase

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.326	.058		22.772	<.001
	Drought	.261	.048	.247	5.453	<.001
	Floods	.056	.055	.045	1.022	.307
	Heatwaves	.096	.045	.095	2.112	.035

a. Dependent Variable: GBV Increase

To further analyse the link between climate stressors and GBV, a multiple regression analysis was conducted to examine the relationship between loss of income, property damage and health-care access on GBV increase in climate-affected areas. The results indicate that health-care access is the most significant predictor of GBV increase ($B = 0.137$, $p = 0.002$), suggesting that limited access to medical and psychosocial support aggravates GBV risks, particularly in displacement settings and climate-stressed communities. Loss of income showed a positive, but non-significant association with GBV ($B = 0.063$, $p = 0.154$), indicating that while economic hardship may contribute to GBV, its effect is not statistically strong unless compounded by other vulnerabilities, such as displacement and resource scarcity. Property damage was not a significant predictor ($B = -0.021$, $p = 0.769$), implying that losing homes or assets alone does not directly drive GBV risks, but may exacerbate them in broader crisis contexts.

These quantitative findings are reinforced by qualitative insights, which demonstrate that resource scarcity, displacement and limited access to health-care services have severe socioeconomic and psychological impacts on affected individuals, contributing to the increase in GBV. Thematic analysis of qualitative data highlights several key factors that either cause or expose vulnerable populations to GBV. These factors are explored in the following sections, illustrating the complex interplay between climate-induced hardships, economic instability and social vulnerabilities that heighten GBV risks in climate-affected communities.

Climate-induced resource scarcity and gender-based violence

Climate-induced resource scarcity has significantly heightened women's exposure to GBV in Malakal, Rubkona and Kapoeta South, particularly during essential resource collection activities. As climate stressors escalate and humanitarian aid remains insufficient, often failing to sustain households until the next distribution cycle, women and girls are forced to travel long distances into isolated and insecure areas to fetch water, gather firewood for sale and collect water lilies for food. These precarious journeys intensify their vulnerability to sexual violence, harassment and exploitation.

The worsening crisis underscores the urgent need for gender-responsive climate adaptation measures, including increased access to safe water sources, alternative fuel options and strengthened community protection mechanisms to mitigate GBV risks in climate-affected regions.

Findings from the GBV Safety Audit in Bentiu and Rubkona (United Nations Population Fund, 2023) confirmed that women frequently navigate floodwaters and remote landscapes, facing threats from armed groups, predators and dangerous animals, such as snakes and crocodiles. A policymaker in Upper Nile also affirmed this, by stating: *"Women and girls face higher risks of GBV when displaced, often during resource collection activities like firewood gathering or water lily harvesting."* Similarly, a women's FGD in Rubkona emphasized: *"Women often meet criminals while collecting firewood in distant locations."* A KII in Kapoeta South further highlighted, *"Water scarcity forces women to travel long distances, increasing their exposure to sexual harassment and assault."*

The absence of police patrols, weak law enforcement and limited reporting mechanisms further fuels impunity for perpetrators and restricts access to justice for survivors. Addressing these urgent challenges requires:

- Strengthening security in displacement sites and along frequently used routes.
- Expanding economic empowerment programmes for women to reduce dependence on resource collection.
- Integrating GBV prevention strategies into climate adaptation policies.
- Engaging men and boys at the community level as both beneficiaries and agents of change fostering social norms transformation through policies, programmes and strategic interventions.

Without targeted interventions, climate-induced resource scarcity will continue to disproportionately endanger women and girls, exacerbating gender inequalities and increasing vulnerabilities in affected regions.

Intimate partner violence: A climate-induced crisis

The increasing frequency and intensity of climate shocks, such as droughts and floods, have significantly strained household economies in Malakal, Rubkona and Kapoeta South, exacerbating IPV. As traditional livelihoods collapse due to climate-induced disruptions in agriculture, livestock and trade, families experience worsening food insecurity, job losses and financial instability, intensifying household tensions.

Limited income-generating opportunities force men into unfamiliar economic roles, leading to frustration, stress, and, in many cases, IPV.

This interpersonal tension is worsened by rigid social and gender norms that dictate that men fulfill the role of providers for the family. A male respondent in a FGD highlighted this shift, stating: *"Men's responsibilities have increased due to climate change, and they are now engaging in activities traditionally assigned to women. This is causing frustration and sometimes violence at home."*

Similarly, women in a FGD emphasized the direct impact of resource scarcity on household tensions: *"Scarcity of resources, such as food and water, has seriously increased tension and conflict within households, leading to a higher rate of violence."*

As families struggle to cope with economic uncertainty, the pressure to provide for basic needs takes a severe toll on men's mental and emotional well-being. Many men experience feelings of helplessness, frustration and loss of identity, which often manifest in stress-related disorders, anxiety and depression.

The psychological burden of economic distress has driven some men toward harmful coping mechanisms, such as alcohol and drug abuse, further destabilizing households. Substance abuse exacerbates household instability, contributes to the breakdown of marital relationships and escalates domestic violence.



Women and girls, already vulnerable due to structural inequalities, face increased risks of IPV as food scarcity and financial hardship reinforce power imbalances within households. Disagreements over access to resources frequently lead to physical violence, emotional abuse and coercive survival strategies, including transactional sex.

Without urgent intervention, climate-induced IPV will continue to escalate, worsening gender inequalities and protection concerns in climate-vulnerable regions. Addressing these challenges requires targeted strategies, including:

- Strengthening economic empowerment programmes for women to enhance financial autonomy.
- Expanding mental health and psychosocial support services for IPV survivors and vulnerable communities.
- Strengthening engagement of men and boys as beneficiaries and agents of change in GBV mitigation strategies and identifying traditional mechanisms that discourage GBV and strengthen them.
- Integrating GBV protection strategies into climate adaptation policies.
- Addressing systemic poverty through alternative livelihoods and cash-based assistance programmes.
- Increasing access to legal aid and social services to protect at-risk populations.

By integrating climate adaptation strategies with gender-responsive policies, South Sudan can address the root causes of climate-induced IPV, protect vulnerable populations and enhance household resilience amid worsening climate shocks. Additionally, further research is needed to assess the depth and variation of this issue across affected communities, ensuring that interventions are context-specific and effectively targeted.

Survival-driven gender-based violence: A consequence of climate-induced economic desperation

Climate-induced economic desperation has significantly heightened the risk of survival-driven GBV, particularly among displaced women and girls. As food shortages, displacement and loss of livelihoods increase, women are increasingly vulnerable to sexual exploitation and coercion in their struggle to secure basic needs. Participants across Malakal, Rubkona and Kapoeta South reported rising incidents of transactional sex and exploitation due to resource scarcity. A female participant in an FGD described the growing risks: ***"Women and girls are at increased risk of sexual exploitation due to food shortages and displacement."***

Mining sites pose a unique GBV risk, where women engaged in support roles, such as carrying soil and washing gold, are often exploited by male miners. This was highlighted by a men's focus group in Kapoeta South, which reported widespread instances of sexual coercion at mining sites. The dangerous and unregulated nature of informal labour sectors exacerbates power imbalances, making women vulnerable to sexual violence exploitation in exchange for financial support or job security.

Additionally, displacement worsens the crisis, as overcrowded camps and competition for resources create environments where sexual coercion, abuse and violence become more prevalent. Addressing survival-driven GBV requires:

- Expanding economic empowerment programmes to reduce women's financial dependency.
- Strengthening legal and social protection frameworks to prevent sexual exploitation.
- Improving access to safe housing, food and water in displacement camps to minimize GBV risks, especially for women and girls.
- Regulating informal labour sectors, such as mining sites, to protect vulnerable women from coercion.

Without urgent action, climate-induced economic desperation will continue to drive GBV, deepening inequalities and endangering the lives of women and girls in South Sudan's most vulnerable regions.

Climate-induced displacement and gender-based violence risks: A growing crisis

Climate-induced displacement has significantly heightened GBV risks for women and girls, particularly in overcrowded and insecure displacement camps where protection measures are either inadequate or nonexistent. Floods and droughts have forced thousands of families to flee their homes, seeking refuge in temporary settlements that lack security, lighting and safe shelters, leaving women and girls vulnerable to violence, harassment and exploitation. A displaced woman in Malakal explained: ***"When the floods came, we lost everything. Now in the camps, there is no protection for women, and we fear being attacked at night."***

According to UNFPA (2023), the 2024 GBV Safety Audit in the town of Bentiu and Rubkona County highlights the severe security gaps in displacement camps:

- Lack of lighting and secure housing makes women vulnerable to night-time attacks.
- Increased gang activity in Malakal has led to security threats, such as robberies, assaults and targeted violence against women and girls.
- Shelters in these settlements are overcrowded and poorly constructed, lacking secure doors, partitions and fencing, making women and girls easy targets for sexual violence and coercion.

Addressing climate-induced displacement and GBV requires:

- Improving camp security through police patrols and community-led protection measures.
- Installing solar-powered lighting in displacement camps to reduce risks of night-time GBV.
- Strengthening law enforcement and legal accountability for GBV perpetrators.
- Expanding access to GBV response services, including legal aid, psychosocial support and emergency shelters.

Without urgent interventions, climate-induced displacement will continue to deepen gender inequalities, increasing GBV risks for women and girls while further destabilizing already vulnerable communities.

Early and forced marriages as a coping mechanism: A climate-induced crisis

The worsening economic instability caused by climate-induced food shortages and financial hardships has forced many families to resort to early and forced marriages as a survival strategy. With rising poverty levels, young girls are increasingly married off in exchange for cattle, food or financial assistance, reinforcing long-standing gender inequalities and depriving them of education, autonomy and future opportunities. An education official in Unity State stated: ***"Girls are forced to marry early due to poverty and cultural norms."*** Similarly, a women's FGD in Upper Nile revealed: ***"Parents marry off young girls to different communities in exchange for cows."***

The consequences of early marriage are devastating:

- Girls drop out of school, ending their educational prospects.
- High maternal health risks from early pregnancies increase maternal and child mortality.
- Psychological distress from domestic violence and loss of autonomy affects long-term well-being.

An education sector key informant in Eastern Equatoria emphasized: ***"There's no scenario where married girls go back to school after marriage."***

Addressing early and forced marriages requires:

- Strengthening legal protections against child marriage.
- Providing economic alternatives for families to reduce financial pressure.
- Expanding access to education for girls in climate-affected regions.
- Raising awareness about the long-term consequences of child marriage through social norms change and community engagement.

Without immediate action, climate-induced economic pressures will continue to force young girls into early marriages, further deepening gender inequalities and violating their fundamental rights.

Climate-induced child labour among boys: Economic survival at the cost of education

Climate stressors, such as droughts, floods and economic instability have placed a significant burden on boys, often forcing them to balance school with household responsibilities or drop out entirely to support their families. A local elder in Kapoeta South emphasized this reality: ***"Boys are the eyes of the family, so few go to school."***

The compounded effects of environmental shocks, recurrent displacement and deepening economic hardship have driven vulnerable populations, especially children into harmful coping mechanisms. These dynamics are reflected in several high-risk locations across South Sudan:

- In Rubkona and Malakal, recurrent flooding has disrupted farming and fishing livelihoods, forcing boys into child labour as a means of household survival.
- In Kapoeta South, informal gold mining sites have emerged as hazardous labour hubs where boys are engaged in physically dangerous work to generate income for their families.
- In urban centres such as Malakal and Rubkona, displacement and economic marginalization have increased the risk of adolescent boys being recruited into gangs, especially where access to education and employment is limited.
- In Rubkona and Malakal, recurrent flooding has disrupted farming and fishing, forcing boys into child labour to help sustain their households.

Addressing climate-induced child labour requires:

- Education subsidies and vocational training to keep boys in school.
- Stronger child labour protections and enforcement against exploitative practices.
- Community-led programmes providing structured social activities to prevent gang recruitment.

Without intervention, climate-induced economic instability will continue to push young boys into exploitation, crime and educational marginalization, deepening the long-term social and economic impacts of climate change on South Sudan's next generation.

Violence against men: Conflicts over resources

Climate stressors, such as droughts, floods and resource scarcity have heightened violence among men in Malakal, Rubkona and Kapoeta South, exposing them to physical attacks, intercommunal conflicts and fatalities in resource-scarce environments. Limited access to clean water, arable land, mining sites and fishing grounds has fueled violent disputes between communities, particularly among pastoralist and farming groups competing for dwindling resources. Traditionally viewed as protectors and providers, men often find themselves at the forefront of these conflicts, risking injury, displacement and even death in their efforts to secure land and livelihood resources for their families. A local leader in Eastern Equatoria described this reality: ***"Droughts have led to deadly clashes between pastoralist communities over shrinking grazing land and water sources."***

In Rubkona and Malakal, the submergence of farmland due to recurring floods has forced many men into conflict over access to higher ground for farming and fishing, often leading to violent confrontations. Additionally, men in overcrowded internally displaced persons' camps face increased tensions over limited resources, such as food rations, shelter space and economic opportunities, sometimes escalating into group violence or retaliatory attacks. These dynamics underscore the urgent need for conflict-sensitive climate adaptation strategies, including:

- Peacebuilding programmes to reduce tensions between competing communities.
- Resource-sharing agreements to ensure equitable access to land, water and fishing grounds.
- Alternative livelihood initiatives to reduce reliance on climate-sensitive resources.

Without immediate intervention, the intersection of climate change, resource depletion and violent conflict will continue to endanger men's safety and undermine long-term stability in climate-affected regions of South Sudan.

- **Barriers to gender-based violence response and support systems: The gaps in protection for survivors**

Despite the high prevalence of GBV in climate-affected regions, access to support services remains critically limited, leaving survivors without safe spaces, legal protections or psychological support. Women facing domestic violence, sexual assault and exploitation often have no access to shelters, legal aid or specialized counselling services, forcing many to endure abuse in silence. This is reflected from a KII from the health sector in Upper Nile: ***"SRH and GBV services became minimal when organizations relocated due to floods"***, and from a women's FGD in Unity State: ***"There is no place for women to go when they face violence. Many just stay silent and endure it."***

The lack of GBV response services leaves survivors trapped in abusive situations, fearing stigma, retaliation or financial instability if they seek help. Traditional justice mechanisms fail to provide meaningful protection, as cultural norms discourage survivors from seeking legal recourse, while formal legal systems remain weak, particularly in rural and displacement settings. In overcrowded displacement camps and informal settlements, the absence of protective measures further exposes women and girls to ongoing sexual exploitation, harassment and physical abuse.

At the same time, the economic and social fallout of climate change is pushing boys into exploitative labour and exposing men to violent conflicts over dwindling resources. Boys, often viewed as the economic backbone of their families, are increasingly engaged in hazardous labour, from gold mining in Kapoeta South to forced labour in flooded regions like Malakal and Rubkona. These survival-driven labour demands not only deprive them of education, but also entrap them in cycles of poverty and exploitation, jeopardizing South Sudan's future workforce and social stability.

Similarly, men who are expected to be traditional protectors and providers are at the forefront of resource-driven conflicts. The escalating competition for land, water and livelihood opportunities has fueled intercommunal clashes, forced displacements and deepened economic instability.

Without alternative livelihood strategies and resource-sharing agreements, these tensions will continue to threaten peacebuilding efforts and community stability.

Addressing the gaps in GBV protection requires:

- Expanding survivor-centred services, including mobile GBV response teams, community safe spaces and accessible legal aid.
- Strengthening formal legal enforcement in climate-affected regions.
- Integrating culturally sensitive awareness programmes to encourage survivors to seek justice and support.
- Improving security and protection measures in displacement camps to prevent GBV.

Without systemic interventions, women and girls will remain disproportionately vulnerable to climate-induced GBV, further deepening gender inequalities in South Sudan's most at-risk regions. At the same time, failure to address the broader socioeconomic challenges facing boys and men will perpetuate cycles of violence, labour exploitation and instability. By investing in survivor-centred services, strengthening legal frameworks and promoting sustainable livelihood opportunities, policymakers can break these cycles of vulnerability and build long-term resilience for affected communities.

3.3.2 Impact of climate stressors on health-care services

This section analyses the relationship between climate stressors (drought, floods and heatwaves) and various health-care service indicators, including primary health-care centre coverage (PHCC), Primary Health Care Unit (PHCU) availability, basic health infrastructure (BHI), hospital availability and reliance on TBAs. The findings highlight key vulnerabilities and potential policy interventions to mitigate climate-related health-care disruptions.


NOT FOR SALE

Drought

Drought has the most significant effect on health-care services, negatively impacting both PHCC ($B = -0.349$, $p < 0.001$) and PHCU ($B = -0.085$, $p < 0.001$) availability, indicating that arid conditions contribute to health-care facility shortages. However, drought has a positive impact on BHI ($B = 0.024$, $p = 0.021$), likely due to targeted investments in response to water scarcity and related health risks. Hospital availability appears to increase in drought-affected regions ($B = 0.391$, $p < 0.001$), suggesting that emergency health-care investments may be more frequent in these areas. Additionally, drought significantly increases reliance on TBAs ($B = 0.408$, $p < 0.001$), as formal maternal health-care services become less accessible during prolonged dry conditions.

Floods

Floods have a mixed impact on health-care services. While floods do not significantly impact PHCC ($B = -0.076$, $p = 0.136$) or PHCU ($B = -0.001$, $p = 0.974$) availability, they significantly reduce BHI ($B = -0.037$, $p = 0.002$), highlighting the vulnerability of health-care infrastructure to flood damage and service disruptions. Hospital availability remains unaffected ($B = 0.023$, $p = 0.645$). However, floods significantly increase reliance on TBAs ($B = 0.166$, $p < 0.001$), likely due to displacement and inaccessibility of formal health-care facilities during flood events.

Heatwaves

Heatwaves do not exhibit a statistically significant effect on PHCC ($B = 0.034$, $p = 0.413$) or PHCU ($B = -0.013$, $p = 0.586$) availability. Likewise, heatwaves do not significantly impact BHI ($B = 0.005$, $p = 0.640$) or hospital availability ($B = 0.057$, $p = 0.169$), suggesting that extreme heat alone does not directly affect health-care facility numbers. However, heatwaves do contribute to increased reliance on TBAs ($B = 0.143$, $p < 0.001$), likely due to disruptions in formal health-care services and increased maternal health risks during extreme heat periods.

Other factors affecting health-care access

Beyond climate stressors, multiple socioeconomic, infrastructural and systemic factors significantly impact health-care accessibility.

These challenges are categorized into three main areas: health system barriers, economic constraints and lack of external support.

Health system barriers

- Shortage of drugs and medical supplies: Frequent stockouts of essential medicines force patients to purchase from private pharmacies at high costs.
- Lack of health-care personnel: Many facilities operate with insufficient medical staff, resulting in long waiting times and inadequate care.
- Closure of health-care facilities: Hospitals and clinics have been shut down due to unpaid staff salaries, further restricting access to medical services.
- Poor quality of health-care services: Reports indicate negligence, lack of medical equipment and inadequate maternity care discourage people from seeking medical help.
- Long distance to health-care facilities: Many rural residents must travel significant distances for medical care, increasing health risks.
- Maternal health challenges: Limited emergency transport and lack of trained birth attendants have led to miscarriages, home deliveries and maternal deaths.

Economic and social barriers

- High cost of treatment: Medical services and medications are expensive, making them inaccessible for low-income families.
- Reliance on personal capabilities: Due to limited institutional support, individuals must depend on personal financial resources to access health care, with some resorting to costly private clinics.
- Lack of financial independence: Many households, particularly those with disabled individuals or elderly members, struggle to afford health care.
- Burden on women and caregivers: Women and young girls often have additional responsibilities (e.g. fetching water and firewood), further limiting their ability to seek timely medical attention.

Lack of response and external support

Limited or no government and NGO intervention:

- Participants reported no effective measures taken to address health-care challenges.
- NGOs provide occasional assistance but often target select groups (e.g. children or critically ill patients), leaving other vulnerable populations without support.
- Government efforts remain inadequate, failing to address recurring issues, such as drug shortages, infrastructure failures and health-care workforce deficiencies.

Neglect of people with disabilities:

- People with disabilities face additional barriers, including mobility challenges, lack of transportation and financial constraints.
- Some families hide disabled individuals from public spaces, further limiting their access to health-care.
- Many health-care facilities are not physically accessible, and medical personnel are not adequately trained to address disability-related needs.

Community support as a last resort:

- In the absence of formal assistance, some rely on community-based networks for help, but such support is often informal and insufficient.
- Faith-based organizations occasionally provide aid, but their interventions are sporadic and not widespread.

Recommendations:

- Drought-resilient health-care infrastructure: Prioritize mobile clinics and health-care delivery models adaptable to dry conditions.
- Flood mitigation measures: Strengthen flood-proof health-care facilities and emergency preparedness plans.
- Equitable health-care investments: Ensure that hospital expansions in drought-affected areas do not create disparities in other regions.
- Maternal health-care access: Strengthen formal maternal health-care services to reduce overreliance on TBAs by providing training and equipping them with essential birth materials, ensuring safer delivery practices and improved maternal health outcomes.
- Improved health-care accessibility: Develop strategies to improve transportation to health-care centres, especially in remote areas, and enhance health-care quality to encourage utilization.
- Strengthening the health-care workforce: Address staff shortages by ensuring timely salary payments and hiring additional health-care professionals.
- Ensuring availability of essential drugs and medical supplies: Improve drug supply chain management to prevent shortages and ensure consistent access to medications.
- Disability-inclusive health-care policies: Improve health-care accessibility for people with diabilities by providing transportation assistance, prioritizing care for disabled individuals and ensuring that health-care facilities are physically accessible.
- Greater government accountability and expanded NGO support: Strengthen oversight to ensure effective allocation of resources and improve intervention programmes to make them more inclusive.
- Reflect the differentiated and intersecting health impacts of climate change on gender, and groups with multiple and intersecting vulnerabilities in relevant health indicators, reporting and programming, including impacts on sexual and reproductive health and rights.
- Strengthen integration of sexual and reproductive health and rights and GBV prevention and other social protection components in key national climate policies of South Sudan including NDC and NAP to include key vulnerabilities, impact, intervention, indicators and budgetary allocation.
- Ensure health management information systems incorporate indicators of climate stress linked to major health impacts, including those related to reproductive, maternal, neonatal, child and adolescent health.



Climate stressors significantly impact health-care access, with drought showing the most profound effects. Additionally, government and NGO interventions appear to be ineffective, while community-led support has a limited, but positive role. The lack of proactive intervention to address key health-care challenges remains a major concern, forcing individuals to rely on their personal capabilities. Addressing inefficiencies in health-care support systems and strengthening community-led initiatives may enhance health-care accessibility in vulnerable regions.

3.3.3 Impact of climate stressors on sexual and reproductive health

This section explores the ways climate stressors such as heatwaves, droughts and floods impact access to SRH services in Malakal, Kapoeta South and Rubkona. Using regression analysis and qualitative evidence, it highlights the significant barriers posed by climate conditions and systemic failures, emphasizing the need for targeted interventions and climate-adaptive health-care policies.

- **The impact of climate stressors on sexual and reproductive health access**

  The regression analysis examines the relationship between climate stressors (drought, floods and heatwaves) and access to SRH services as shown in Table 7.

Table 7: Regression coefficients for the impact of climate stressors on sexual reproductive health access

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.793	.053		33.826	<.001
	Drought	.056	.044	.060	1.290	.198
	Floods	-.018	.050	-.016	-.360	.719
	Heatwaves	-.157	.041	-.175	-3.805	<.001

a. Dependent Variable: SRH_Access_Num

- **Heatwaves: The most disruptive climate stressor**

  Among the climate variables, heatwaves have the most significant negative impact on SRH access, with a coefficient of -0.157 ($p < 0.001$), suggesting that increasing heatwaves substantially reduce access to SRH services (see Table 7). Qualitative data illustrates the disruptions caused by extreme heat to health-care infrastructure, workforce availability and patient mobility, which increases health-care inequalities.

Key challenges during heatwaves:

- Facility closures: Rising temperatures force health-care facilities to reduce operating hours or shut down entirely.
- Workforce shortages: Absenteeism among health-care staff due to extreme heat undermines service delivery.
- Degradation of medical supplies: Heat-sensitive SRH commodities, such as contraceptives and maternal health medications, become unusable due to poor storage conditions.
- Reduced patient mobility: Extreme heat discourages pregnant women from traveling to health-care facilities, leading to missed prenatal appointments and delays in accessing care.

Qualitative Evidence:

"Extreme heatwaves in early 2024 made our work difficult, staff were absent, and some facilities partiall shut down."

Health-care worker, Kapoeta South.



Recommendations:

To ensure SRH access during heatwaves, climate-adaptive interventions must prioritize:

- Heat-resistant health-care infrastructure, such as cooling systems and climate-controlled medical storage.
- Mobile SRH clinics to reach patients unable to travel.
- Heat-adaptive workforce policies, including rotational shifts and flexible working conditions.
- Strengthened supply chains to protect heat-sensitive SRH commodities.

This critical finding should be reflected in South Sudan's next NDC to consolidate and expand upon what the current NDC has already captured regarding climate risks and their impact on health-care access. Incorporating heatwave-related vulnerabilities and adaptation strategies into national climate policies will ensure that SRH services remain accessible despite rising climate challenges.

- **Droughts: Indirect but severe challenges to sexual and reproductive health**

Although the regression analysis does not show a statistically significant impact of droughts on SRH access (B = 0.056, p = 0.198), qualitative data reveals that droughts indirectly create severe barriers to reproductive health care. Financial strain, water shortages and infrastructure collapse worsen maternal health risks.

Key challenges during droughts:

- Water shortages: Clinics face sanitation failures and hygiene-related infections, leading to the closure of maternal health-care services due to lack of water in some health facilities.
- Economic barriers: Drought-induced financial crises force households to prioritize food and survival over health care, making SRH services unaffordable.
- Reliance on unqualified alternatives: Many women turn to TBAs, increasing maternal and neonatal health risks.

Qualitative evidence:

"Water shortages forced many clinics to shut down, leaving women with no access to maternal care" and "drought-driven poverty makes SRH services unaffordable for most families."

Health-care official, Kapoeta South.

Recommendations:

Integrating SRH services into drought relief programmes can mitigate these challenges. Key actions include:

- Investing in water infrastructure to sustain health-care operations.
- Expanding mobile maternal health services to reach drought-affected areas.
- Providing financial aid programmes to alleviate economic burdens on vulnerable women.

- **Floods: Infrastructure and mobility barriers to sexual and reproductive health**

Floods disrupt health-care access by destroying infrastructure, blocking transportation routes and delaying the delivery of essential medical supplies. While regression analysis shows no significant impact of floods on SRH access (B = -0.018, p = 0.719), qualitative data highlights severe indirect consequences.

Key challenges during floods:

- Transportation barriers: Flooded roads prevent pregnant women and GBV survivors from reaching health-care facilities.
- Medical supply chain disruptions: Washed-out roads delay deliveries of contraceptives and maternal health medications.
- Increased maternal health risks: Limited access to emergency obstetric care heightens the risk of maternal mortality.

Qualitative evidence:

"We have a good number of PHCC facilities that have been destroyed or submerged by water."

Health-care worker, Unity State.



Recommendations:

To address flood-related disruptions, health-care systems must adopt flood-resilient measures, including:

- Mobile clinics and ambulance boats to reach isolated communities.
- Pre-positioning SRH supplies in flood-prone areas.
- Improving flood defenses to protect health-care infrastructure.

- **Institutional support and systemic health-care failures**

While climate stressors significantly disrupt access to SRH services, these challenges are compounded by systemic barriers, including government limited capacity, inadequate institutional support and inconsistent NGO interventions. Key findings reveal the interplay between environmental and institutional failures.

Government limited capacity and public health-care gaps:

- Only 11.8 per cent of respondents reported receiving government health-care support, highlighting a severe lack of public investment in health services.
- Persistent shortages of medical supplies, hospital closures and limited emergency responses worsen health-care inequalities.

Community Voice: ***"Nobody can address this except the government, and they are not even trying."***

- **Selective and inconsistent non-governmental organization support**

NGOs play a critical role in providing humanitarian aid but often fail to address systemic health-care needs:

Key findings:

- Only 16.3 per cent of respondents cited NGOs as their primary health-care provider.
- Programmes frequently exclude women and adolescent girls, focusing disproportionately on children.

Community Voice: ***"NGOs provide little help from time to time, but they are very selective."***

Limited GBV and maternal health interventions:

GBV services remain scarce, with limited access to trauma counselling, shelters and reproductive health care:

Community Voice: ***"The GBV facilities should be increased as they are very few here in Malakal."***

Integrated recommendations:

To address the dual impact of climate stressors and systemic failures:

- Expand government health-care investment: Ensure funding for essential services and climate-resilient infrastructure.
- Improve effectiveness and efficiency of NGO interventions: Foster equitable coverage of interventions supported by NGOs and promote resilient and sustainable health-care programmes.
- Strengthen GBV and maternal health services: Increase the availability of trauma centres, reproductive health-care and community awareness campaigns.

3.3.4 Gender inequality and the impact of climate stressors

Climate stressors such as floods, droughts and heatwaves amplify pre-existing gender inequalities, disproportionately limiting women's access to economic opportunities, education, health care and protection from GBV. These climate-induced crises intensify economic dependency, increase gendered labour burdens and reinforce cultural restrictions, further restricting women's participation in decision-making, financial independence and social mobility.

- **Gender and livelihoods: The burden of economic dependency**

Climate-induced disruptions in agriculture, livestock and trade disproportionately impact women, deepening economic hardship and reinforcing gender inequalities. As floods and droughts destroy crops and livestock, men often migrate in search of work, leaving women as sole providers with limited economic opportunities and increased financial burdens. This economic dependency significantly heightens women's vulnerability to IPV, forced labour and survival sex.

- **Economic burdens and increased workload for women**

Climate-induced hardships have forced women to assume multiple roles as caregivers, income earners and food providers. With agricultural activities increasingly disrupted, women are left to cultivate land, forage for food and engage in small-scale income-generating activities, all while continuing their traditional caregiving responsibilities. A participant in a FGD explained: ***"Women now have to do everything—open gardens, take care of children and find food. Men used to open the farms, but now they have left for towns."***

With limited access to financial resources and economic opportunities, women remain trapped in a cycle of poverty, economic dependence and climate vulnerability. This increases their susceptibility to forced and early marriages, food insecurity and economic exploitation. Without targeted, gender-responsive interventions, women's economic burdens will continue to grow, further restricting their access to health care, education and decision-making opportunities.

Addressing these inequalities requires investment in women's economic empowerment, education access and leadership inclusion to ensure resilience and self-sufficiency in climate-affected regions.

- **Gender inequality in access to essential services and sexual and reproductive health: Cultural and structural barriers**

Climate stressors and deeply rooted gender norms have worsened disparities in access to essential services, such as police protection, legal aid, health care and financial resources. Women's decision-making power and autonomy remain significantly constrained due to cultural stigmas, structural barriers and inadequate institutional support.

Regression analysis highlights key gender gaps:

- **Women face significantly reduced access to police and legal services (B = -0.100, p = 0.021).**
- **Women have limited access to community support workers (B = -0.165, p = 0.001).**
- **Cultural stigma restricts women's ability to seek assistance (B = -0.112, p = 0.010).**

These systemic exclusions further marginalize women from participating in household, community and policy-level decisions, reinforcing structural gender inequalities.

- **Women's exclusion from decision-making: A barrier to gender-responsive climate adaptation**

Despite being the most affected by climate stressors, women are systematically excluded from key discussions on disaster response planning, resource allocation and financial aid distribution.

This exclusion weakens the integration of gender-responsive solutions into climate policies, preventing women from influencing decisions that directly impact their well-being and resilience.

A respondent from Upper Nile emphasized the urgency of women's involvement: ***"Women's participation in communal dialogues must be prioritized as they are the most affected during crises."***

When women's voices are absent from climate adaptation planning, it results in gender-blind policies that fail to address women-specific needs such as health-care access, childcare support and economic empowerment. Moreover, the exclusion of women from financial aid, agricultural resources and livelihood support amplifies food insecurity and economic instability.

Key recommendations to bridge the gap:

- **Establish gender-inclusive decision-making platforms to ensure women's representation in climate policy.**
- **Promote women's leadership at community and government levels.**
- **Invest in gender-transformative education and leadership training to empower women as active participants in climate adaptation.**

Without urgent action, climate adaptation strategies will remain ineffective and unsustainable, deepening gender inequalities and increasing women's vulnerabilities in climate-affected regions.

Barriers to women's decision-making and sexual and reproductive health access: A deepening gender divide

Cultural norms, misinformation and economic distress significantly hinder women's ability to make informed reproductive health choices, limiting access to SRH services, family planning and maternal care. A respondent from Upper Nile explained: ***"In Nuer culture or village life, seeking reproductive health services like family planning is stigmatized, making women less likely to access care."*** Misinformation and peer pressure further discourage contraception uptake: ***"Women who don't use family planning judge those who do, making many afraid to use them."*** (Women FGD, Upper Nile).

Patriarchal control over SRH and maternal health risks:

- Men's reluctance to discuss SRH reinforces patriarchal control over reproductive health, limiting women's ability to access modern contraceptives.
- Cultural taboos prevent men from participating in reproductive health discussions.

A male respondent from Kapoeta South admitted: ***"It is our culture that hinders us a lot; some of us do not want to be seen going to the hospital to access sexual-related treatment."***

This lack of SRH access contributes to higher maternal mortality rates, unsafe abortions and increasing GBV.

Urgent interventions needed:

- Expand women's inclusion in climate decision-making.
- Strengthen legal protections against GBV.
- Reduce stigma around SRH services.
- Invest in women's economic empowerment programmes.

Without immediate action, gender inequalities will continue to deepen, increasing maternal health risks and perpetuating cycles of poverty.

- **Gender and education: The rise in early marriages and school dropouts**

  Climate stressors have magnified economic hardship, forcing many families to prioritize immediate survival over education, disproportionately affecting girls' school attendance. As a result, school dropout rates among girls have increased, reinforcing gender disparities in education and economic opportunities. A respondent in Unity State noted: *"Girls are forced to marry early due to poverty and cultural norms."*

  Similarly, dowry practices and food insecurity drive early marriages as families marry off daughters in exchange for cattle or financial support. A women's FGD in Upper Nile confirmed: *"Parents marry off young girls to different communities in exchange for cows."*

  Once married, girls rarely return to school, depriving them of literacy, financial independence and life skills necessary for economic stability. This cycle traps women in poverty, reinforces economic dependence and reduces their decision-making power in households and communities.

- **Consequences of early marriage and educational exclusion:**
  - Early pregnancies and maternal health risks.
  - Increased vulnerability to GBV and domestic violence: Early marriage heightens the risk of GBV and domestic abuse by limiting young girls' autonomy, economic independence and access to education.
  - Economic dependence on men, reducing financial independence.

- **Solutions to mitigate early marriages and school dropouts:**
  - Implement cash transfer programmes to incentivize girls' education.
  - Strengthen policy enforcement against early marriages.
  - Expand access to alternative education programmes, such as flexible learning and safe boarding schools.

  Without immediate action, early marriage and school dropout rates will continue to escalate, exacerbating gender inequalities and limiting future opportunities for girls in climate-affected regions.

  Climate stressors are deepening gender inequalities by restricting women's access to economic opportunities, SRH services, legal protection and education. Without gender-responsive policies and urgent interventions, women and girls will continue to bear the brunt of climate change's socioeconomic impacts. Addressing these disparities requires inclusive decision-making, economic empowerment initiatives and strengthened legal frameworks to ensure that women and girls in climate-affected regions are protected, empowered and given equal opportunities to thrive.

3.4 Adaptive and coping capacity

3.4.1 Alternative livelihood strategies in climate-affected counties

Climate change is increasingly disrupting traditional livelihoods in climate-affected regions, such as Rubkona (Unity State), Malakal (Upper Nile State) and Kapoeta South (Eastern Equatoria State). Rising temperatures, erratic rainfall, recurrent flooding and prolonged droughts have forced communities to reassess their economic survival strategies. These environmental stressors have led to displacement, loss of agricultural productivity and declining livestock populations, leaving families struggling to maintain stability as presented in previous sections.

In response, communities are adopting alternative livelihood strategies that challenge traditional socioeconomic roles. Women are emerging as key economic players in climate adaptation, while men are taking on non-traditional roles to ensure household survival. Additionally, local resilience strategies, such as cooperative farming, food preservation and irrigation system improvements, are gaining traction to mitigate the effects of climate-induced shocks. However, these efforts remain constrained by limited financial resources, inadequate infrastructure and insufficient policy support.

This section explores the transformative economic shifts occurring in South Sudan's most climate-affected counties, examining the ways in which communities are adapting, the gender dynamics at play and the structural barriers that must be addressed to ensure long-term resilience.

3.4.2 Climate-driven economic shifts and gender role transformations

The increasing frequency of climate shocks has forced communities in Rubkona, Malakal and Kapoeta South to diversify their livelihoods and adopt non-traditional roles to sustain their households.

In Malakal, recurrent flooding has displaced communities, prompting them to form cooperative societies and engage in group farming to maintain food security and economic stability. One participant observed, ***"NGOs are training women on vegetable gardening to generate income,"*** underscoring how women are emerging as key economic actors in climate adaptation.

Similarly, in Kapoeta South, prolonged drought conditions have led families to sell livestock and migrate to economic hubs like Juba and Torit in search of better opportunities. A respondent noted: ***"Families are selling their animals and moving, but the problem extends across the county and even the State,"*** highlighting the widespread economic distress caused by climate change.

These economic shifts have also led to changes in traditional gender roles, as both men and women take on unconventional income-generating activities. In Malakal, men have turned to charcoal production, firewood collection and casual labour to support their families. One participant explained: ***"Men collect firewood and sell it in the market to buy food for their families."*** Similarly, in Rubkona, men have begun engaging in food gathering, a task traditionally performed by women. A respondent remarked: ***"Men are now doing activities that were once exclusive to women, like searching for food in the bush."*** These shifts illustrate how climate stressors are reshaping household responsibilities and challenging established socioeconomic structures.

Despite these adaptive efforts, barriers, such as limited access to capital, market instability and inadequate infrastructure, continue to hinder long-term economic resilience. Expanding climate-smart agricultural investments, improving vocational training and strengthening financial inclusion programmes are critical to enhancing community adaptation strategies.

Moreover, gender-responsive economic policies are needed to ensure that both men and women have equal opportunities to thrive in an evolving climate landscape. Addressing these challenges through policy-driven support and infrastructure investment will be crucial to reducing vulnerability and fostering long-term sustainability in South Sudan's most climate-affected counties.



3.4.3 Innovative resilience measures: Community-led adaptations to climate shocks

Communities in Kapoeta South, Malakal and Rubkona are increasingly adopting innovative resilience strategies to withstand climate-induced challenges, such as droughts, floods and unpredictable weather patterns. These measures reflect a shift from short-term coping mechanisms to proactive adaptation efforts that ensure food security, economic stability and long-term survival.

In Kapoeta South, where erratic rainfall patterns and drought threaten agricultural productivity, households are prioritizing food and seed preservation as a preparedness strategy. One participant shared: ***"Some families are preserving food and seeds for the next planting season,"*** a practice that ensures food security even when harvests fail. By safeguarding agricultural inputs, communities reduce dependence on emergency aid and strengthen their ability to recover from climate shocks. Similarly, in Malakal, where seasonal floods disrupt food production and displace households, communities are stockpiling grains and implementing artificial irrigation systems to stabilize food availability. A participant emphasized: ***"We started saving grains to prepare for unexpected floods."*** Artificial irrigation systems help farmers counteract irregular rainfall and prolonged dry spells, ensuring consistent crop yields despite environmental uncertainties.

In Rubkona and Malakal, communities are constructing dykes and managing irrigation systems to mitigate flooding risks and protect agricultural land. By reinforcing flood defenses, households can reduce the likelihood of displacement and sustain farming in flood-prone areas. These efforts underscore the importance of localized, community-driven adaptation measures, as they directly address region-specific climate threats and empower residents to take charge of their resilience-building strategies.

Despite these innovative adaptations, significant challenges remain, including limited access to agricultural resources, lack of financial support and inadequate extension services. Strengthening resilience requires:

- Investment in climate-smart agricultural techniques.
- Improved water management infrastructure.
- Capacity-building programmes.

Government and NGO support in scaling up irrigation technologies and providing access to drought-resistant crops will further enhance climate resilience across vulnerable regions. By reinforcing community-led adaptation strategies with policy-driven interventions, South Sudan can build a more sustainable and climate-resilient future.

3.4.4 Education and climate awareness: Building resilience through knowledge

Education plays a critical role in strengthening community resilience to climate change, equipping future generations with the knowledge and skills necessary to adapt and mitigate climate-related risks.

In Kapoeta South, schools are integrating climate education into curricula to ensure that students understand adaptation strategies and how to apply them in their daily lives. By embedding climate resilience topics into school programmes, young learners are empowered to become change agents in their communities, promoting environmentally sustainable practices and disaster preparedness. A participant emphasized: ***"Climate education empowers students to be more resilient and proactive about their education in the face of climate challenges."***

Beyond formal education, community-led initiatives, such as kitchen gardening projects, provide practical, hands-on learning opportunities for families.

In drought-prone areas like Kapoeta South, these programmes promote small-scale agriculture using efficient water conservation techniques, ensuring that families can grow vegetables and maintain food security even during dry spells. Kitchen gardening not only addresses immediate nutritional needs, but also fosters a culture of self-sufficiency, reducing reliance on humanitarian aid.

However, challenges persist in expanding climate education programmes due to limited resources, teacher training gaps and inadequate infrastructure. Governments, NGOs and education stakeholders must:

- **Scale up investment in climate-focused curricula.**
- **Adapt teacher capacity-building programmes.**
- **Develop school-based adaptation projects.**

By reinforcing climate education and practical adaptation training, South Sudan can enhance local capacities to combat climate-related vulnerabilities, ensuring that both current and future generations are equipped to navigate the challenges of a changing climate.

As climate change continues to reshape economic and social structures in South Sudan, communities are demonstrating resilience by adopting alternative livelihoods, innovative adaptation strategies and education-based solutions. However, these efforts must be reinforced by targeted policy interventions, improved access to resources and gender-responsive economic programmes to ensure sustainable and equitable adaptation. By integrating local knowledge with institutional support, South Sudan can create a more climate-resilient and economically stable future.

3.5 Policy and institutional responses: Evaluation of secondary data against findings from quantitative and qualitative analysis

This evaluation examines the alignment between secondary data (policy documents, reports and climate adaptation plans) and findings from quantitative and qualitative analysis on gender equality, SRH and GBV in climate policies. It identifies gaps, contradictions and areas needing improvement for effective policy implementation.

3.5.1 Gender-based violence and climate-induced vulnerability: Key findings vs. secondary data evaluation

Key Finding	Secondary Data (NAP, NDC, National Gender Policy (NGP) Reports)	Evaluation
49.9 per cent of respondents reported an increase in GBV in climate-affected areas.	NAP acknowledges GBV risks, but lacks data-driven GBV mitigation strategies.	Underestimation of GBV risks – policies do not capture the full extent of GBV linked to climate stressors.
Drought is the strongest predictor of GBV exposure ($B = 0.267$, $p < 0.001$).	NAP and NDC connect climate shocks to resource scarcity, but do not specify how drought escalates GBV risks.	Lack of specificity – no quantitative data or direct response strategies.
Health-care access is the most significant predictor of GBV risks ($B = 0.137$, $p = 0.002$).	NAP highlights gender-responsive health care but lacks a GBV health-care access integration framework.	Policy gap – GBV prevention is not integrated into SRH services.
72 per cent of women face GBV risks while collecting water and firewood.	NAP and NGP acknowledge risks, but lack implementation strategies for safe access to essential resources, such as water and cooking fuel.	Insufficient action – no protected water points, fuel alternatives or safety measures.
Policies do not propose specific security measures for GBV-affected women.	No framework for GBV-sensitive law enforcement and survivor-centred justice.	Critical gap – no legal protection measures.

Policy enhancement needs:

- Integrate GBV risk mapping into climate adaptation plans.
- Expand GBV services in displacement settings.
- Strengthen legal frameworks to address GBV in climate-vulnerable areas.

3.5.2 Sexual and reproductive health in climate strategies: Key findings vs. secondary data evaluation

Key Finding	Secondary Data (NGP, NAP, NDC, Minimum Initial Service Package Reports)	Evaluation
Heatwaves are the most disruptive climate stressor for SRH ($B = -0.157$, $p < 0.001$).	NAP mentions climate-induced health risks, but does not address heatwave-specific SRH disruptions.	Policy gap – no adaptation measures for heat-related SRH challenges (e.g. facility closures and medicine storage).
Only 15 per cent of health facilities in climate-affected regions provide comprehensive SRH services.	NGP advocates gender-responsive health care, but does not specify climate-related SRH access barriers.	Implementation failure – climate policies do not prioritize SRH in response planning.
Water shortages disrupt maternal health care during droughts.	NAP highlights drought risks, but fails to integrate water infrastructure with maternal health.	Disconnect – no strategies for linking drought mitigation with SRH access.
Displacement increases risks of sexual violence and limits SRH access.	NGP and Minimum Initial Service Package discuss SRH needs in emergencies, but lack long-term integration in climate policies.	Fragmented approach – SRH is treated as a short-term humanitarian need, not a long-term priority.

Policy enhancement needs:

- Integrate SRH into climate adaptation funding for maternal health, contraception and post-rape care.
- Improve climate-resilient health-care infrastructure (cooling systems and mobile clinics).
- Ensure water security in maternal health-care facilities in drought-prone areas.

3.5.3 Gender inequality and climate stressors: Key findings vs. secondary data evaluation

Key Finding	Secondary Data (NAP, NDC, NGP, Gender Reports)	Evaluation
Women's participation in climate decision-making remains low.	NAP sets a 35 per cent gender inclusion target, but lacks enforcement mechanisms.	Implementation failure – no enforcement mechanism, lack of monitoring and/or accountability.
Climate stressors increase women's economic burdens and unpaid labour.	NAP mentions gender disparities, but lacks concrete economic empowerment programmes.	Weak intervention – no economic empowerment support systems for climate-affected women.
Cultural barriers prevent women from accessing SRH services.	NGP promotes gender equality, but ignores cultural stigma around SRH and family planning.	Cultural sensitivity gap – no community-driven behaviour change strategies.
Education disruptions and early marriages are worsening due to climate stressors.	NAP does not explicitly link early marriage to climate change.	Missed policy link – climate-induced poverty as a driver of early marriage is not addressed.

Policy enhancement needs:

- Enforce gender quotas in climate decision-making, with penalties for non-compliance.
- Expand financial inclusion programmes for women in climate-stressed regions.
- Integrate community-led campaigns to reduce SRH stigma and early marriages.

3.5.4 Climate-induced displacement and gender-based violence risks: Key findings vs. secondary data evaluation

Key Finding	Secondary Data (NAP, GBV Safety Audit Reports, UNHCR Reports)	Evaluation
Displacement camps are unsafe for women (lack of lighting, gang violence and insecure shelters).	NAP mentions displacement risks, but does not mandate security measures.	Protection failure – no safety patrols, secure shelters or lighting.
Sexual exploitation and transactional sex are rising in displacement settings.	NGP acknowledges survival-driven GBV, but lacks alternative livelihood programmes.	Economic gap – no financial aid or job programmes to prevent exploitation.
Early marriages are used as a coping mechanism for climate-induced poverty.	NAP does not explicitly address climate change as a driver of child marriage.	Policy blind spot – no strategies to prevent early marriages linked to climate stress.

Policy enhancement needs:

- Mandate safe shelters, police patrols and lighting in displacement camps.
- Provide cash-based assistance and economic programmes for displaced women.
- Enforce stronger laws against early marriages caused by climate-induced poverty.

4 CONCLUSION AND POLICY PRIORITIES



The secondary data (NAP, NDC, NGP and GBV reports) acknowledges gender disparities, but fails to fully integrate climate-related GBV and SRH challenges into adaptation policies. Findings from research highlight urgent gaps that need data-driven, actionable solutions.

Key policy priorities:

- Strengthen GBV protection in climate adaptation through risk assessments, legal protections and security measures in displacement settings.
- Expand SRH services in climate-vulnerable areas by ensuring mobile clinics, heat-resistant infrastructure and SRH integration into disaster response.
- Empower women economically through financial inclusion, cash transfers and alternative livelihood programmes to reduce GBV risks.
- Enforce gender-responsive policies by tracking progress, holding decision-makers accountable and ensuring real gender inclusion in climate governance.

By aligning policies with empirical evidence, South Sudan can develop gender-inclusive, climate-resilient strategies that protect vulnerable populations and promote equitable adaptation measures.

4.1 Stakeholder-specific recommendations for addressing gender-based violence, sexual and reproductive health and gender inequality in climate adaptation

To ensure effective implementation of gender-responsive climate policies, different stakeholders must take on specific roles in addressing GBV, SRH and gender inequality amplified by climate stressors. Below is a breakdown of responsibilities for **government agencies, international organizations, community-based organizations (CBOs) and the private sector.**

4.1.1 Gender-based violence and climate-induced vulnerability

Recommendation	Government (National and Local)	International Organizations and NGOs	CBOs and Civil Society	Private Sector
Integrate GBV risk mapping into climate adaptation plans	Incorporate GBV vulnerability data into NAPs and disaster response strategies.	Provide technical assistance and funding for risk mapping.	Conduct community-driven GBV risk assessments.	Support tech-driven data collection (e.g. mobile reporting tools).
Expand GBV services in displacement settings	Fund and establish safe shelters and response units in internally displaced persons'/refugee camps.	Ensure humanitarian aid includes GBV prevention and response mechanisms.	Train local women as community advocates for GBV prevention.	Provide infrastructure support (lighting and secure spaces).
Strengthen legal frameworks to address GBV in climate-vulnerable areas	Enforce stricter GBV laws in climate-affected areas and integrate them into national policies.	Support legal aid programmes for GBV survivors.	Mobilize communities for policy advocacy and awareness campaigns.	Fund legal assistance programmes and survivor support services.

4.1.2 Sexual and reproductive health in climate strategies

Recommendation	Government (National and Local)	International Organizations and NGOs	CBOs and Civil Society	Private Sector
Integrate SRH into climate adaptation funding	Allocate budget for climate-resilient maternal health services.	Provide funding and expertise for SRH services in vulnerable regions.	Train community health workers to improve local SRH services.	Develop affordable health-care solutions for climate-vulnerable populations.
Improve climate-resilient health-care infrastructure	Build heat-resistant hospitals and mobile clinics in climate-affected areas.	Offer financial support for infrastructure upgrades.	Support local capacity-building programmes for SRH services.	Invest in sustainable energy solutions for health-care facilities.
Ensure water security in maternal health-care facilities	Prioritize water access in health facilities.	Support water security projects linked to maternal health.	Mobilize communities for safe water advocacy.	Develop innovative water storage and filtration technologies.

4.1.3 Gender inequality and climate stressors

Recommendation	Government (National and Local)	International Organizations and NGOs	CBOs and Civil Society	Private Sector
Enforce gender quotas in climate decision-making	Implement and monitor a 35 per cent gender inclusion target with penalties for non-compliance.	Advocate for gender-responsive governance and provide technical support.	Organize awareness campaigns to promote women's leadership.	Offer leadership training for women in climate governance.
Expand financial inclusion programmes for women in climate-stressed regions	Develop climate-smart microfinance initiatives for women.	Fund women-led businesses in climate-vulnerable areas.	Train women in financial literacy and entrepreneurship.	Create investment opportunities for women in climate adaptation sectors.
Integrate community-led campaigns to reduce SRH stigma and early marriages	Implement school-based programmes on SRH awareness.	Provide technical and financial support for SRH behaviour change initiatives.	Lead grassroots education initiatives targeting cultural barriers.	Support media campaigns addressing SRH stigma.

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