

# LIVING WITH CLIMATE-RELATED HAZARDS

Impacts and community responses among refugees and hosts  
in Nyumanzi settlement (Adjumani, Uganda)





## About U-Learn

**U-Learn (Uganda Learning, Evidence, Accountability, and Research Network)** is dedicated to enhancing outcomes for both refugees and host communities in Uganda. Through collaboration with the Government of Uganda and various implementing partners and stakeholders, U-Learn focuses on promoting learning, conducting assessments, and amplifying the voices and choices of refugees in the protracted refugee crisis. To access its products, see the U-Learn Resource centre<sup>1</sup>.

This consortium is financially supported by UK Aid under the BRAER (Building Resilience and an Effective Emergency Refugee Response) programme and is implemented by the Response Innovation Lab (hosted by Save the Children), in conjunction with IMPACT Initiatives and the International Rescue Committee.

## About IMPACT Initiatives

**IMPACT Initiatives** is a non-governmental organisation (NGO) established in 2010 and based in Geneva. It is the largest independent data provider in crisis contexts. It advocates for the development of research that is centred around people in contexts ranging from conflict and disasters to regions affected by displacement and migration. The work of IMPACT Initiatives is carried out through its two initiatives – REACH and AGORA and through the provision of direct support to partners regarding Project Appraisals and Assessments (PANDA). IMPACT Initiatives is a sister organisation of ACTED, a non-governmental organisation with headquarters in Paris.

IMPACT leads the research component of U-Learn, under which this assessment was conducted. For more information regarding IMPACT Initiatives' work in Uganda and elsewhere, see the IMPACT Resource Centre<sup>2</sup>.

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**For enquiries or to connect with U-Learn, please contact [info@ulearn-uganda.org](mailto:info@ulearn-uganda.org) or visit the the U-Learn Website.<sup>3</sup>**

1 U-Learn resource centre, <https://ulearn-uganda.org/u-learn-resource-centre/>.

2 IMPACT Initiatives resource centre, <https://www.impact-initiatives.org/resource-centre/>

3 U-Learn Uganda website, <https://ulearn-uganda.org/>.

# EXECUTIVE SUMMARY

## Introduction

Uganda, hosting over 1.8 million refugees as of January 2025, is the largest refugee-hosting country in Africa. Refugees from South Sudan and the Democratic Republic of Congo reside in settlements across Uganda, with Nyumanzi Settlement in Adjumani district hosting 47,342 refugees. Uganda's vulnerability to climate change is ranked among the highest globally. The country's agricultural dependency and inadequate preparedness amplify its climate risks.

Nyumanzi, established in 2014, faces considerable climate-related challenges, particularly extreme heat and prolonged dry spells and flooding, compounded by a heavy reliance on agriculture and constrained infrastructure capacity. In 2023, floods temporarily displaced over 4,000 people, and the region is projected to experience severe heat risks by the end of the century. The refugee population, nearly all from South Sudan, is predominantly Dinka, while the host community is mainly Madi. A large majority of refugees (82%) have lived in Nyumanzi for nine to ten years or more, with 96% engaged in agriculture and 57% involved in animal husbandry.

## Identified Information Gaps

The Intergovernmental Panel on Climate Change (IPCC)'s Sixth Assessment Report highlights significant data gaps regarding the granular climate impacts on vulnerable groups and the effectiveness of local adaptation measures. The report calls for more localised, context-specific data to improve adaptation strategies. It emphasises the increasing recognition of sectors such as health, education, and the broader food system as essential components of comprehensive climate adaptation. While agriculture is frequently studied, it is essential to consider the entire food chain (e.g., storage, transportation and processing) rather than focusing solely on crop production. These gaps were further confirmed in Uganda during U-Learn's extensive scoping exercise conducted with various refugee response actors between April and June 2024.

## Objectives of the Assessment

The U-Learn assessment, funded by UK Aid, examines climate change response strategies in Nyumanzi Settlement's refugee and host communities (Adjumani district). It aims to provide detailed data on the perceived local climate impacts, enhance understanding of vulnerable populations' responses and equip humanitarian actors with actionable insights for more effective adaptation. By focusing on the lived experiences on the ground, beyond statistics, the assessment highlights the realities faced by communities. The findings can also be used to advocate for local climate action and for climate funding, with a particular focus on health, shelter and livelihoods (including markets, agriculture and household labour).

## Methodology

The methodology approach is that of an Area-Based Assessment, which provides a comprehensive understanding of climate-related challenges in Nyumanzi Settlement by considering the entire geographic area and various sectors and groups. It also applies the Community-Based Adaptation (CBA) approach which empowers communities to develop and implement their own strategies to adapt to climate change. It focuses on utilising local knowledge, addressing vulnerabilities and strengthening resilience through community-led solutions.

The assessment adopts a mixed-method approach, combining **quantitative and qualitative** data collection, including **877 individual interviews, 29 key informant interviews, 16 participatory workshops, and 2 focus group discussions**. The geographical scope covers Nyumanzi and surrounding areas, with a focus on understanding the experiences of both refugees and host community members. **Data were analysed through stratified sampling by gender and displacement status** and remote sensing was employed to assess climate-related hazards such as flooding, heat and drought. Whenever possible, individuals with disabilities and elderly people were included to capture their unique perspectives and experiences.

## Key Findings

Given the similarities in the setup of settlements in the northern and northwestern districts and their shared exposure to climate-related hazards, the following findings were seen as indicative of the challenges faced by communities in other settlements.

Over the past five years, the population of Nyumanzi faced important climate-related impacts, with 99% experiencing extreme heat, 84% enduring prolonged dry spells and 82% affected by heavy rains and flooding. While these climate events affected both refugees and host communities, they were particularly pronounced among refugees, exacerbating their vulnerabilities. These environmental challenges had wide-reaching consequences for various aspects of daily life, including education, shelter, health, household chores, livelihoods, and social and cultural practices.

In terms of education, flooding and extreme heat disrupted school attendance and teaching conditions. The heat caused physical discomfort for both students and teachers, leading to a reluctance to attend and difficulty focusing on learning. Additionally, heavy rainfall and flooding hindered students' ability to walk to school, while others went home for water and did not return due to the oppressive heat. These disruptions contributed to diminished educational outcomes and perpetuated a cycle of vulnerability.

Climate-related events also impacted shelter adequacy, particularly among refugees, among which were women who are primarily responsible for shelter construction and maintenance. Challenges were mostly related to flooding and compounded by a lack of sufficient building materials. This often forced families to relocate temporarily or sleep outside. Sleeping outside due to unbearable heat disrupted sleep quality, which likely impacted both labour productivity and mental health. While some took steps to protect their homes by digging trenches or elevating structures, financial and material constraints – such as limited access to grass, wood, and roofing materials – restricted the effectiveness of these measures.

Health was another area considerably impacted by climate hazards. Flooding exacerbated waterborne diseases, while extreme heat increased dehydration, exhaustion and respiratory issues, all of which contributed to reduced labour productivity and school attendance. Vulnerable groups, such as children, the elderly, pregnant women and persons with disabilities, faced heightened health risks. Access to healthcare was further impeded by flooded roads and the difficulty of reaching clinics during extreme heat. The mental health toll was also substantial, particularly among women and farmers, who experienced increased stress and anxiety due to economic losses, home destruction and exacerbated vulnerability to gender-based violence.

Women, in particular, faced limited options for coping with extreme weather events. Many woke up before dawn to fetch water, a task that led to sleep deprivation, exhaustion, and long-term health issues. For some women, the pressure to secure essential resources may have led to unsafe coping strategies, such as transactional sex. These practices further entrenched their vulnerability, particularly as they balanced

household duties with economic challenges exacerbated by climate impacts. Persons with disabilities, including those with less visible or mental impairments, were disproportionately affected by these challenges.

Livelihoods in Nyumanzi were deeply affected by climate-related events, such as in agriculture and markets. Extreme heat and flooding caused important losses in agricultural productivity, with crop yields declining and livestock health suffering from water scarcity and extreme temperatures. Farmers reported difficulty storing crops due to high temperatures and flooding, leading to post-harvest losses. These losses contributed to food insecurity, which in turn adversely affected both physical and mental well-being, likely reducing labour productivity, hindering educational outcomes, and exacerbating health issues. In the market, vendors faced supply chain disruptions as flooding and extreme heat increased transportation costs, delayed deliveries and spoiled perishable goods. This, in turn, affected their income and ability to sustain their businesses. Many market vendors and farmers adopted coping strategies such as changing working hours or shifting to alternative sources of income. However, these adaptations were often insufficient to fully mitigate the economic losses.

Finally, cultural practices were increasingly disrupted by climate-related hazards. Extreme heat, drought and flooding led to reduced participation in traditional ceremonies and cultural gatherings. In response, communities adjusted by rescheduling events, relocating ceremonies, or simplifying rituals. However, these changes contributed to the erosion of cultural practices, weakening social cohesion and the transmission of cultural knowledge, which are vital for maintaining community identity and resilience.

## Response Strategies and Support Requested

In response, communities have developed strategies such as altering work hours, reinforcing shelters, and relocating to safer areas, but these efforts are hindered by financial and material constraints. Key support needs include enhanced water access, improved infrastructure to withstand extreme weather (trenches, heat resistant buildings, improved shelters), climate-resilient agricultural practices, and strengthened healthcare services. There is also a need for targeted support for women, small-scale vendors, farmers, and persons with disabilities, including mental health services, disaster risk management training, and financial assistance to build long-term resilience.

## Conclusion

This assessment provides valuable insights into the climate-related challenges faced by both refugees and host communities in Nyumanzi settlement, with insights indicative of the situation in the broader region. The findings underline the urgent need for tailored climate response strategies that address the unique vulnerabilities of these populations. The data will help inform future interventions, enabling more effective and localized climate resilience efforts in refugee settings. **For the recommendations, please see the section below.**





# RECOMMENDATIONS

This section outlines initial recommendations based on the response mechanisms identified by the community and the support they have requested. These ideas serve as starting points for further development and refinement in collaboration with stakeholders and community members. For detailed information on the response mechanisms identified and the support requested by the communities, please refer to the findings in section 1.15 of this report

## 1. Infrastructure & Environmental Resilience

- **Flood & Drainage Management:** Strengthened embankments, improved drainage systems for markets, schools, and residential areas, flood-resistant latrines, and elevated roads to maintain access.
- **Climate-Resilient Buildings & Shelters:** Elevated and reinforced homes, flood-resistant school infrastructure, insulated market stalls, shaded areas for vendors, and shelter reinforcement programs through capacity building.
- **Water Access & Storage:** Additional boreholes, improved household and community water storage, rainwater harvesting, and water treatment solutions such as chlorine tablets and portable filters.
- **Cooling & Heat Reduction Measures:** Tree planting around homes, markets, schools, and health facilities, improved ventilation in shelters and classrooms, and public cooling areas.

## 2. Livelihood & Economic Stability

- **Agricultural & Livestock Adaptation:** Improved irrigation systems, drought-resistant crops and livestock breeds, shade structures for livestock, and veterinary care for heat-related diseases.
- **Market & Business Support:** Upgrade road infrastructure to reduce transport disruptions from floods and extreme heat.<sup>4</sup> Complementary support should include financial assistance to small-scale vendors and business training to enhance financial resilience.
- **Post-Harvest Storage & Cold Chains:** Access to cold storage facilities to prevent spoilage of perishable goods (meat, dairy, fresh produce), improved storage for agricultural products, and better transport logistics.
- **Vocational Training & Alternative Livelihoods:** Skill-building programs in tailoring, soap-making, and hairdressing, as well as small-scale business development to create financial resilience.

## 3. Health & Well-Being

- **Heat Adaptation & Medical Support:** Increased access to drinking water, mobile clinics for heat-related illnesses, expanded maternity wards, shaded and ventilated waiting areas, and improved storage for essential medicines.
- **Drought & Food Security:** School feeding programs, community-based food security initiatives (e.g., home gardens), and expanded food assistance programs to address malnutrition.
- **Flood & Disease Prevention:** Strengthened sanitation systems, improved waste management, rapid medical response for flood-affected communities, and hygiene education.
- **Mental Health & Trauma Support:** Community-based counselling, mental health services for disaster-affected populations, and training for healthcare staff to manage climate-related trauma.

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<sup>4</sup> Heavy rains make roads impassable and cause potholes and corrugation (wavy patterns) that can rattle vehicles and lead to mechanical damage. During extreme heat and drought, roads become rockier and dustier, increasing the risk of tire punctures and internal wear.

## 4. Education & Child Protection

- **Climate-Resilient Schools & Infrastructure:** Heat-resistant classrooms with improved ventilation, shaded outdoor learning areas, flood-resistant buildings with raised floors and sturdy roofing, and windows with shutters to prevent rain from entering classrooms.
- **Student Well-Being & Dignity:** Access to additional uniforms to help students feel comfortable and confident despite hot conditions, shoes to protect against hot roads, and protective wear such as hats for sun exposure.
- **Water, Food & Sanitation:** Free drinking water stations, school-based food assistance, community gardens, and improved sanitation facilities to prevent disease.
- **Disaster Preparedness & Support:** Emergency education plans, disaster preparedness training for students and teachers, and financial/material support for school supplies and affected families.

## 5. Social & Cultural Resilience

- **Protection of Cultural Spaces:** Shaded permanent gathering spaces for events, cooling measures such as fans and water stations, and flood-resistant infrastructure for cultural ceremonies.
- **Preservation of Traditions & Knowledge:** Documentation of cultural practices, community education on climate adaptation strategies, and government/NGO support for maintaining traditional activities.
- **Community Resource Hubs:** Emergency support for social and cultural events, particularly during extreme weather.
- **Support Groups for Persons with Disabilities:** Establish groups to promote mutual aid, inclusion, and resilience-building in disaster response and adaptation efforts.

## 6. Security & Governance

- **Public Safety & Protection:** Strengthened security at markets, water points, and latrines through solar-powered lighting, fencing, and community policing to reduce theft and gender-based violence risks.
- **Gender-Based Violence Prevention & Awareness:** Sensitisation programs for men on gender-based violence, strengthened reporting mechanisms, and improved access to survivor support services.
- **Disaster Preparedness & Early Warning Systems:** Improved early warning systems for floods and other extreme weather events, emergency relocation planning, and community awareness campaigns on disaster response.
- **Policy Advocacy & Government Engagement:** Strengthen policies on climate adaptation, water, sanitation, and disaster risk reduction with active community participation. Ensure persons with disabilities are consulted in policy development and disaster planning to create inclusive solutions.



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# REFERENCE MATERIALS

## Section 1.01 List of Acronyms

<b>ABA</b>	-----	Area-Based Assessment
<b>CBA</b>	-----	Community-Based Adaptation
<b>CBO</b>	-----	Community Based Organisation
<b>CS</b>	-----	Climate Services
<b>DRR</b>	-----	Disaster Risk Reduction
<b>DSAG</b>	-----	Data Saturation and Analysis Grid
<b>FDG</b>	-----	Focus Group Discussion
<b>GHG</b>	-----	Greenhouse Gas
<b>GIS</b>	-----	Geographic Information System
<b>GoU</b>	-----	Government of Uganda
<b>GPS</b>	-----	Global Positioning System
<b>HLP</b>	-----	Housing, land and property
<b>II</b>	-----	Individual Interview
<b>IPCC</b>	-----	Intergovernmental Panel on Climate Change
<b>KII</b>	-----	Key Informant Interview
<b>L&amp;D</b>	-----	Loss & Damage
<b>MSNA</b>	-----	Multi-Sector Needs Assessment
<b>MWE</b>	-----	Ministry of Water and Environment
<b>ND-GAIN</b>	---	Notre Dame Global Adaptation Initiative
<b>NEL</b>	-----	Non-Economic Losses
<b>NGO</b>	-----	Non-Governmental Organisation
<b>OPM</b>	-----	Office of the Prime Minister
<b>PW</b>	-----	Participatory Workshop
<b>PWD</b>	-----	Persons with Disabilities
<b>SDR</b>	-----	Secondary Desk Review
<b>U-Learn</b>	----	Uganda Learning, Evidence, Accountability, and Research Network
<b>UNFCCC</b>	----	United Nations Framework Convention on Climate Change
<b>UNHCR</b>	----	United Nations High Commissioner for Refugees

## Section 1.02 Geographic Classifications for Uganda

<b>Region:</b>	Uganda is officially divided into four regions: Northern, Central, Eastern, and Western Region. However, for practical purposes, unofficial regional distinctions are also commonly used, such as West Nile in the northwestern part of the country and Southwest near the borders with Rwanda and the DRC.
<b>District:</b>	A district is the highest local government administrative unit in Uganda. It is responsible for governance, public services, and development within its boundaries. Uganda is divided into 146 districts.
<b>County:</b>	A county is a subdivision of a district, mainly used for electoral and administrative purposes. However, counties do not function as independent administrative units—they serve as groupings of sub-counties. Sub-counties are further divided into parishes and villages.
<b>Settlement:</b>	Refugee settlements are not officially classified as administrative units in Uganda's government structure. However, they function as distinct humanitarian governance units under the management of Uganda's Office of the Prime Minister (OPM) and the United Nations High Commissioner for Refugees (UNHCR). Settlements are further divided into zones, which are then divided into blocks.



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# INTRODUCTION

## 1.04 Uganda's Refugee Response and Nyumanzi Settlement

Uganda, a low-income country in East Africa, is home to 1.8 million refugees as of January 2025, making it the largest refugee-hosting country on the continent.<sup>5,6</sup> The majority of refugees originate from South Sudan (54%) and the Democratic Republic of the Congo (31%).<sup>7</sup> Most refugees reside in 12 districts across West Nile, Northern, and Southwest Uganda, where they live alongside host communities in open villages known as settlements.<sup>8</sup>

Nyumanzi Settlement, established in 2014, is densely populated and the largest of 19 individual settlements that together are commonly referred to as the Adjumani Settlement in Northern Uganda.<sup>9</sup> Nyumanzi is located 40km from Adjumani town and 17km from the South Sudan border. As of January 2025, Nyumanzi hosts 47,342 refugees, primarily from South Sudan.<sup>10</sup>

## 1.05 Climate Vulnerability and Climate-Related Hazards in Uganda and Nyumanzi

Despite Africa's minimal contribution to global greenhouse gas (GHG) emissions, Uganda remains highly vulnerable to climate change.<sup>11,12</sup> The Notre Dame Global Adaptation Initiative (ND-GAIN) ranked Uganda as the 14th most vulnerable country and one of the least prepared (163rd out of 182) to respond to climate-related challenges.<sup>13</sup> Uganda's vulnerability is heightened by widespread poverty and a strong reliance on climate-sensitive sectors, including agriculture, water, fisheries, tourism and forestry.<sup>14</sup>

Since the 1960s, average temperatures in Uganda have risen by 1.3°C. Daily temperature records from that period indicate a noteworthy increase in the frequency of hot days, with an even more pronounced rise in the occurrence of hot nights.<sup>15</sup> Although defining trends in extreme rainfall conditions is challenging due to data limitations and seasonal variability, droughts in Uganda have become more frequent over the past 60 years. In particular, the western, northern, and northeastern districts have experienced increasingly frequent and prolonged drought conditions over the past two decades.<sup>16</sup> At the same time, flooding has become more common, largely due to the intensification of rainfall events.<sup>17</sup>

5 UNHCR, Uganda Comprehensive Refugee Response Portal, n.d., <https://data.unhcr.org/en/country/uga>. Accessed on 06 February 2025

6 World Bank Group, World Bank Country Classifications by Income Level (Uganda), 2022. <https://www.worldbank.org/en/news/factsheet/2022/07/07/world-bank-country-classifications-by-income-level-uganda>

7 UNHCR, Uganda Comprehensive Refugee Response Portal

8 Unlike traditional refugee camps, which are enclosed and often have strict movement restrictions, Uganda's refugee settlements function as open villages. Refugees are allocated plots of land for shelter and subsistence farming and can move freely, integrate with host communities, and engage in economic activities. For more information on the Ugandan model, please visit UNHCR's case study Comprehensive Refugee Response Framework: The Uganda Model.

9 There are 47,342 refugees (as of January 2025) living on 4.879 km<sup>2</sup>, which is a population density of 9,703 people/km<sup>2</sup>.

10 UNHCR, Uganda - Refugee Statistics January 2025 - Settlement & Urban Profiles. <https://data.unhcr.org/en/documents/details/114184>. Accessed on 04 February 2025

11 Our World in Data, Uganda: CO<sub>2</sub> Country Profile, 2023. <https://ourworldindata.org/co2/country/uganda>

12 IPCC, Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, 2022. <https://www.cambridge.org/core/books/climate-change-2022-impacts-adaptation-and-vulnerability/161F238F406D530891AAAE1FC76651BD>

13 ND-GAIN, Uganda, 2021. <https://gain-new.crc.nd.edu/country/uganda#readiness>

14 World Bank Group, Climate Risk Country Profile: Uganda, 2021. [https://climateknowledgeportal.worldbank.org/sites/default/files/2021-05/15464-WB\\_Uganda%20Country%20Profile-WEB%20%281%29](https://climateknowledgeportal.worldbank.org/sites/default/files/2021-05/15464-WB_Uganda%20Country%20Profile-WEB%20%281%29).

15 World Bank Group, Climate Risk Profile: Uganda, 2021

16 World Bank Group, Climate Risk Profile: Uganda, 2021

17 World Bank Group, Climate Risk Profile: Uganda, 2021



These climate trends have had severe localised impacts, including in refugee-hosting areas such as Nyumanzi Settlement. In September 2023, rain induced floods displaced over 4,000 refugees and host community members.<sup>18</sup> The following month, in October 2023, authorities in Dzaipi sub-county, where the settlement is located, urged the government to relocate the settlement due to recurring severe flooding, which had persisted for three consecutive years.<sup>19</sup>

Adjumani district, where Nyumanzi is located, experiences temperatures reaching 33°C (with anecdotal evidence pointing at 36.6°C), based on data from the ERA5-Land Daily Aggregated Climate Reanalysis dataset.<sup>20</sup> The district is projected to face the highest category of compounded heat risk between 2080 and 2099, making it highly vulnerable to extreme heat.<sup>21,22,23,24</sup>

Prolonged dry spells and resulting water scarcity were highlighted by the population during the August 2024 scoping exercise and subsequent data collection. Projected precipitation and temperature trends, combined with existing infrastructure limitations and population growth, indicate a high likelihood of increasing water stress across much of Uganda. Forecasts suggest declines in both surface and groundwater supplies, along with reduced groundwater recharge due to decreasing precipitation.<sup>25</sup>

## 1.06 Identified Information Gaps

The IPCC Sixth Assessment Report underscores a critical lack of research on how climate change affects vulnerable groups in Africa, particularly regarding gender, disability, youth, and elderly populations, and how they respond at the local level. Refugees are notably absent from the report, highlighting a gap in information that requires targeted study.<sup>26</sup> It emphasises the scarcity of data on local adaptation efforts and the inadequacy of current evaluation frameworks, which are often insufficiently detailed to capture the effectiveness of these measures.<sup>27</sup>

The report further stresses that most climate adaptation studies focus on the food sector, while the health sector receives the least attention. Within the food sector, research often overlooks areas like food processing, storage, distribution, consumption, and wild-harvested food availability. From 2014 to 2018, agriculture and water supply/sanitation accounted for half of Africa's total adaptation finance, with little change in funding distribution over time. This indicates that adaptation planners and funders maintain a relatively narrow view of where support is needed to build climate resilience.

Additionally, the report points out that vulnerability and adaptation assessments in Africa require more granular, localised data to better understand the differential impacts of climate change across various social and demographic groups. Most studies focus on broad-scale impacts (national or regional), rather than specific, localised data that could inform targeted adaptation strategies. The report calls for urgent capacity-building efforts to incorporate intersectionality lenses into vulnerability and adaptation assessments.

18 Monitor, *Over 4,000 refugees hit by floods in Adjumani*, 2023. <https://www.monitor.co.ug/uganda/news/national/over-4-000-refugees-hit-by-floods-in-adjumani-4381834>

19 The Ankole Times, *West Nile – Government Urged to Relocate Nyumanzi Refugee Settlement Due to Flooding*, October 2023

20 ERA5-Land, *Daily aggregated climate reanalysis dataset*. [https://developers.google.com/earth-engine/datasets/catalog/ECMWF\\_ERA5\\_LAND\\_DAILY\\_AGGR](https://developers.google.com/earth-engine/datasets/catalog/ECMWF_ERA5_LAND_DAILY_AGGR). Accessed on 03 April 2025

21 Compounded heat risk refers to the cumulative and intensifying effects of extreme heat due to multiple contributing factors.

22 There is no meteorological station in Adjumani district, therefore there is limited primary data accessible online. The nearest official stations are in Arua, Gulu, and Moyo, which can provide approximations. The current dataset used to assess peak temperatures is the ERA5-Land daily aggregated climate reanalysis dataset.

23 World Bank Climate Change Knowledge Portal, *High-level Summary: Compound Heat Risk - Uganda*. <https://climateknowledgeportal.worldbank.org/country/uganda/heat-risk/#country-map>. Accessed on 03 April 2025

24 World Bank Climate Change Knowledge Portal, *High-level Summary: Compound Heat Risk - Uganda*

25 World Bank Group, *Climate Risk Profile: Uganda, 2021*

26 IPCC, *Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, 2022*

27 IPCC, *Sixth Assessment Report: Climate Change 2021: The Physical Science Basis, Section 15.3.3 & Section 16.4.2*. <https://www.ipcc.ch/report/ar6/wg1/>

Building on the gaps identified by the IPCC at the broader African level, U-Learn conducted a Secondary Desk Review (SDR) and a scoping exercise with relevant stakeholders in Uganda, confirming that these gaps are also present in the Ugandan context. Building these as well as on the findings from the previous U-Learn assessment (2023) on climate change, energy, and the environment in the settlements.<sup>28</sup> U-Learn posits that incorporating shelter, physical and mental health, education, market/production infrastructure, and vulnerable groups into intentionally granular adaptation research could provide a more comprehensive understanding of climate impacts and adaptation strategies.

## 1.07 Key Stakeholders in Uganda

In Uganda, several key stakeholders are engaged in addressing the challenges posed by climate change, with government ministries playing a pivotal role. The **Ministry of Water and Environment (MWE)**<sup>29</sup> leads national efforts in climate change policy and action. The Ministry houses the **Department of Climate Change**<sup>30</sup> and the **Uganda National Meteorological Authority (UNMA)**<sup>31</sup>, which are responsible for climate monitoring, policy development, and the creation of adaptation strategies. The **Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF)**<sup>32</sup> is another important player, focusing on climate-smart agriculture to build resilience in Uganda's agricultural sector, which is particularly vulnerable to climate change impacts. Similarly, the **Ministry of Local Government (MLG)** supports local governments in integrating climate change adaptation into district development plans (DDPs), ensuring that climate resilience becomes a key component of local governance. Additionally, the **Office of the Prime Minister (OPM)**<sup>33</sup> coordinates **disaster risk management** and plays a significant role in refugee management, acknowledging that climate change is an increasing driver of displacement in the country.<sup>34</sup>

Uganda has a proactive stance on climate change and is committed to addressing its impacts through national policies like the **Uganda National Climate Change Policy (2015)**<sup>35</sup> and the **National Climate Change Act (2021)**.<sup>36</sup> These frameworks emphasise the importance of climate adaptation and mitigation strategies, particularly in the sectors of agriculture, water and energy, with a focus on enhancing resilience. It supports international climate agreements, particularly **the Paris Agreement**, and is actively working towards achieving its **Nationally Determined Contributions (NDCs)**.<sup>37</sup> These commitments underscore the government's intention to address both the impacts of climate change and contribute to global climate action.

To further support climate action and integrate climate change into local development planning, District Climate Change Action Plans (DCCAPs) are being developed as mandated by the National Climate Change Act of 2021.<sup>38</sup>

28 U-Learn, *Energy practices in Ugandan settlements Amid Environmental Challenges*, 2024. [https://ulearn-uganda.org/wp-content/uploads/2024/04/Energy-Practices-in-Ugandan-Settlements-Amid-Environmental-Challenges\\_compressed-1.pdf](https://ulearn-uganda.org/wp-content/uploads/2024/04/Energy-Practices-in-Ugandan-Settlements-Amid-Environmental-Challenges_compressed-1.pdf)

29 <https://www.mwe.go.ug/>

30 <https://ccd.go.ug/>

31 <https://meteo.mwe.go.ug/>

32 <https://www.agriculture.go.ug/>

33 <https://opm.go.ug/>

34 OPM's Department for Disaster Preparedness and Management (DDPM) established the National Emergency Coordination and Operations Centre (NECOC) in 2014 with UNDP support. Operating 24/7, NECOC serves as Uganda's central hub for early warning, emergency coordination, and disaster recovery. Established under the National Policy for Disaster Preparedness and Management, it promotes an integrated, multi-sectoral approach to disaster planning and response. Its core functions include disseminating early warning information, coordinating emergency assets, and supporting preparedness activities to protect lives and property.

35 Ministry of Water and Environment, *Uganda National Climate Change Policy*, 2015. <https://www.mwe.go.ug/sites/default/files/library/National%20Climate%20Change%20Policy%20April%202015%20final.pdf>

36 Republic of Uganda, *National Climate Change Act*, 2021. [https://disasterlaw.ifrc.org/sites/default/files/media/disaster\\_law/2022-05/National%20Climate%20Change%20Act%2C%202021.pdf](https://disasterlaw.ifrc.org/sites/default/files/media/disaster_law/2022-05/National%20Climate%20Change%20Act%2C%202021.pdf)

37 United Nations Framework Convention on Climate Change (UNFCCC), *Uganda's Updated NDC*, 2022. <https://unfccc.int/documents/613827>

38 Government of Uganda, *Uganda National Climate Change Act, Part II, Point 8*, 2021. <https://ulii.org/akn/ug/act/2021/nn/eng@2021-12-31>



These plans are instrumental in helping local governments identify vulnerabilities, assess climate risks, and design tailored strategies for building climate resilience. Districts use DCAPs to ensure that climate action aligns with local priorities. This localised approach integrates climate resilience into community development, guiding service delivery and development interventions in these regions, where climate impacts are felt most acutely.<sup>39,40</sup>

In parallel to these efforts, the **Working Group on Energy and Environment (WorkGrEEEn)**<sup>41</sup> plays a critical role in addressing the climate challenges faced by both refugees and host communities. Co-led by **UNHCR** and **OPM**, WorkGrEEEn is a multi-stakeholder platform that brings together government agencies, humanitarian organisations and development partners. The group focuses on energy access and environmental sustainability in refugee settlements, coordinating efforts to provide refugees with **clean energy** solutions while minimising environmental degradation. WorkGrEEEn ensures that energy solutions are closely aligned with **climate adaptation** needs, supporting collaboration between energy providers, NGOs and donors to develop **climate-sensitive energy solutions** for displaced communities.

## 1.08 Objectives of this Assessment

U-Learn conducts one in-depth assessment per year based on primary data collection, with this being the fifth edition. Building on last year's focus, the overarching theme continues to centre on climate change and the environment. This assessment is funded by UK Aid.

It aims to identify and analyse community-based coping and adaptation strategies to climate-related hazards and climate variability among refugee and host communities in Nyumanzi Settlement. More specifically, it aims to:

- **Generate granular data to capture localised, multisectoral climate impacts**, including **lesser-studied sectors** such as health, gender, shelter and education, while illustrating the **lived experiences** of affected communities, including vulnerable groups, beyond broad statistics.
- Equip humanitarian and development actors with **context-specific, actionable insights to enhance the effectiveness** of climate adaptation strategies in refugee and host communities.
- Support local actors by providing evidence-based data to strengthen their advocacy efforts and improve access to climate funding.

Key external contributors to the research design include the refugee-led organisations (RLOs) Safe Home Africa, Donriin Foundation, Refugee Youth Action Network (RYAN), and Women Activists, and refugee and host community leaders, who actively participated in extensive scoping discussions in Nyumanzi in August, 2024. Their insights helped U-Learn gain a deeper understanding of the local context, gather initial perspectives on the impacts of climate-related hazards, and identify key information to design the methodology accordingly. Additionally, external response partners conducted a review of both the qualitative and quantitative analyses by assessing whether the findings aligned with their knowledge and experience on the ground.<sup>42</sup>

39 Monitor, *Districts tasked on climate change plans*, 2023.

<https://www.monitor.co.ug/uganda/news/national/districts-tasked-on-climate-change-plans-4228270>

40 Okaka W.T., and Rwakijuma L.K., *Building Capacity for Local Government District Community Climate Change Action Plan for Climate Justice in Uganda*, 2021. [https://www.researchgate.net/publication/355809164\\_Building\\_Capacity\\_for\\_Local\\_Government\\_District\\_Community\\_Climate\\_Change\\_Action\\_Plan\\_for\\_Climate\\_Justice\\_in\\_Uganda](https://www.researchgate.net/publication/355809164_Building_Capacity_for_Local_Government_District_Community_Climate_Change_Action_Plan_for_Climate_Justice_in_Uganda)

41 CRRF, *Terms of Reference: Working Group on Energy and Environment – National Level Uganda Refugee Response*, 2018.

<https://www.bing.com/ck/a?!&&p=109209441ef6b0564b677e3d84b77f2a08a1751d63b23537b15055e97e0e2d2fJmldHM9MTc0MDk2MDAwMA&ptn=3&ver=2&hsh=4&fclid=110df513-02a3-66e7-3942-e1ed03e6670f&psq=workgreen+uganda&u=a1aHR0cHM6Ly9kYXRhLnVuaGNyLm9yZy9lbi9kb2N1bWVudHMvZG93bmxxvYWQvNjQyMDc&ntb=1>

42 Twelve partners were consulted during an online Joint Analysis Workshop on December 10, 2024, where the preliminary quantitative findings were discussed. Additionally, two partners reviewed the qualitative analyses.

# METHODOLOGY

## 1.09 Assessment approaches

- An **Area-Based Assessment (ABA)** is an approach used to analyse the needs, vulnerabilities, and resources within a specific geographic area, rather than focusing on specific population groups alone. By considering all people and services within a defined area, ABAs provide a holistic, place-based understanding of an area. They often combine multiple data collection methods, such as household surveys, key informant interviews, focus group discussions, and spatial analysis, to ensure a comprehensive picture of local conditions.
- This assessment applies a **local lens**, focusing on how communities perceive, experience, and respond to climate-related hazards, offering insights beyond broad statistical analyses. A **Community-Based Adaptation (CBA)** approach was chosen to identify existing adaptation practices that could be strengthened through the response, as well as to anticipate and mitigate potential maladaptation.
- To ensure a comprehensive understanding of the climate-related findings within their broader environmental and geographical context, the assessment incorporates a **robust remote sensing and GIS component**. This analysis spans across Adjumani district, providing insights into landscape changes, climate patterns, and environmental stressors. Where data availability and methodological precision permit, this approach is further refined to capture granular details at the level of Nyumanzi settlement, enhancing the accuracy and relevance of localised climate impact assessments.

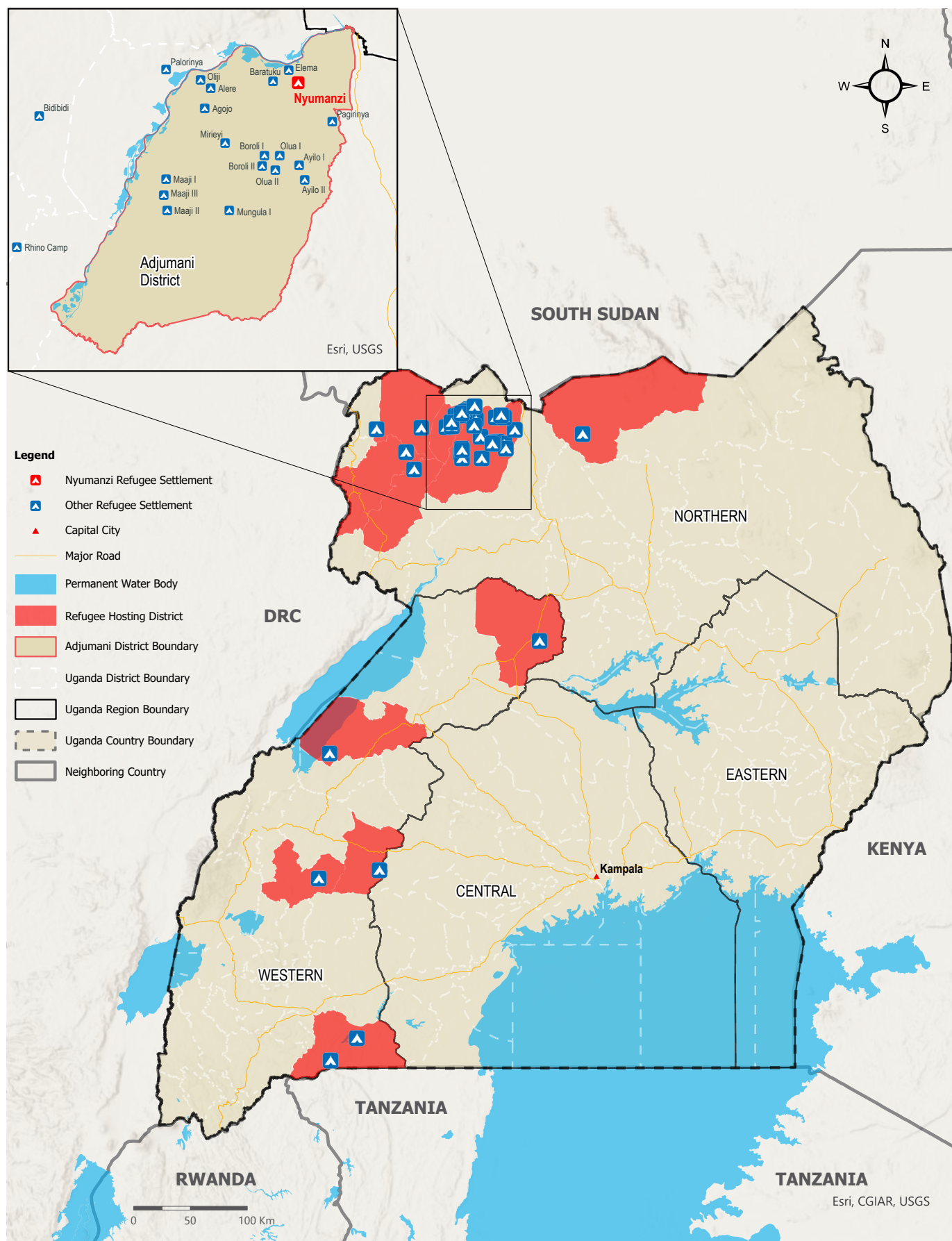
## 1.10 Geographical scope

- The assessment focuses on Nyumanzi settlement in Adjumani district, Uganda, located 17km from the South Sudan border. To capture the experiences of both refugees and nearby host communities, the scope includes a 10 km radius around the settlement.<sup>43</sup>
- Nyumanzi Settlement was selected as the optimal site for this research based on a scoping exercise conducted by IMPACT in June 2024 and a Secondary Desk Review (SDR). The settlement faces multiple climate-related hazards, including frequent rain-induced flooding, extreme temperatures, and prolonged dry spells, all of which have been reported by the local population during the data collection.
- As the largest settlement in the Adjumani settlement cluster and given the similarity between settlements and their environments, Nyumanzi settlement can be considered indicative of conditions across the North and West Nile regions. This suggests the findings will have broader relevance, offering insights applicable to similar refugee contexts in the region.

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<sup>43</sup> This radius was chosen based on the assumption that climate-related challenges and their impacts remain comparable within this proximity.





Map of the geographical scope covering Nyumanzi and surroundings, February 2025

## 1.11 Sampling strategy (Planned Approach)

This section outlines the planned approach to achieve representativeness, including the targeted sample size, statistical assumptions, and strategies used to ensure a balanced gender representation. It provides a comprehensive view of the sampling targets and the rationale behind them. For the real data collection outcomes, please refer to Section 1.13: Data Collection Methods.

### Planned Quantitative Sampling

■ The population of interest for this assessment includes refugees and host community members living in and around Nyumanzi settlement. To ensure statistically reliable results, the sampling approach was designed to achieve:

- 95% confidence level with a 5% margin of error for both refugees and host community members separately.
- 95% confidence level with a 7% margin of error for women and men individually.
- The same 95%-7% parameters for subgroups combining refugee/host status and gender: refugee women, refugee men, host community women, and host community men.
- To account for potential data loss, an additional 10% buffer was added to each calculated sample size.
- Due to the lack of gender-disaggregated data specific to Nyumanzi Settlement (with such data only available for the broader Adjumani Settlement group), the sampling strategy was designed to approximate the gender distribution and ensure representativeness. To avoid underrepresenting either gender, it was assumed that both women and men each represented 80% of the total settlement population. The sample size was then calculated based on these assumptions for each gender.

Sample targets	Women	Men	Total
Refugees	195 (215) 95%-7%	195 (215) 95%-7%	381 (420) 95%-5%
Host community	196 (216) 95%-7%	196 (216) 95%-7%	385 (424) 95%-5%
Total	196 (216) 95%-7%	196 (216) 95%-7%	782 (862) 95%-5%

*This table shows the targeted sample size for each group, not the actual number of interviews conducted during data collection. For the actual number of interviews completed, please refer to the next section.*

■ Households were selected using a randomized approach, with GIS-generated geopoints assigned to enumerators, who then located and surveyed the selected households. Within each household, individual respondents were randomly chosen using the Kish grid method<sup>44</sup>

44 Statistics How To, Kish Grid: What It Is and How to Use It, n.d. <https://www.statisticshowto.com/kish-grid/>

## Planned Qualitative Sampling

For qualitative data collection, individuals are selected using a combination of purposive sampling (targeting specific individuals based on their relevance to the study), snowball sampling (recruiting participants through referrals from initial respondents), and availability-based selection (choosing individuals based on their accessibility at the time of data collection).

**A total of 190-220 individuals** were targeted for participation, with 160 individuals across 10 Participatory Workshops (8-10 participants each), 10-20 individuals through 2 Focus Group Discussions (FGDs), and 20-40 individuals through Key Informant Interviews (KIIs), all in and around Nyumanzi settlement.

Participants were chosen from the following groups/sectors:

- **Agriculture:** Individuals representing agricultural groups were selected with the help of a community leader and through snowballing.
- **Health:** Registered health facility staff, including nurses and outreach teams, were chosen based on their roles in the health sector.
- **Markets:** Market vendors were selected based on their presence at local markets, as well as their availability and willingness to participate.
- **Education:** School teachers and headmasters were invited to participate when IMPACT staff visited the schools.
- **Persons with disabilities:** Identified with the assistance of community leaders and through snowballing.
- **Elders/Elderly people:** Elders are generally considered individuals aged 60 and above. However, cultural perceptions can vary, with some communities recognizing people as elders at a younger age due to factors like lower life expectancy and different social roles. They were selected with the support of a community leader.

## Planned Remote Sensing and GIS

The GIS and remote sensing methodology in this assessment integrates multiple geospatial datasets and analytical techniques to contextualize climate-related hazards and their impacts in Nyumanzi settlement and Adjumani district. For a comprehensive overview of the methodology and full analysis, please refer to [this link](#), while this report highlights the key findings. Key components include:

**Flood Assessment** – This section analyses flood patterns in Nyumanzi Settlement using Sentinel-1 Synthetic Aperture Radar (SAR) data and the UN-SPIDER methodology to assess flood extent and frequency from 2019 to 2023. It identifies high-risk zones, evaluates flood impacts on settlements and agricultural lands, and estimates affected populations using geospatial analysis.

**Drought Assessment** – This section evaluates drought severity and vegetation stress across Nyumanzi using the Vegetation Health Index (VHI) and Vegetation Condition Index (VCI) for the driest year, 2022, identified through CHIRPS Daily Precipitation data (2014–2024). It also incorporates the Standardized Precipitation Index (SPI) to analyse precipitation deficits within the same year. The analysis provides insights into drought impacts on agriculture, water availability, and livelihoods.

**Land Surface Temperature (LST) Analysis** – This section examines LST variations for January to March 2024 using Landsat 8 data, highlighting extreme heat zones across Nyumanzi Settlement and surrounding areas. It identifies temperature hotspots in built-up areas and assesses heat stress risks affecting refugees and host communities.

**Climate Projections** – This section models historical (1970–2000) and future (2041–2060) climate trends using WorldClim data under two scenarios: SSP1-2.6 (low emissions, strong climate action) and SSP3-7.0 (high emissions, weaker climate policies). The projections indicate rising temperatures, declining precipitation, and increased climate risks such as water scarcity, agricultural stress, and extreme heat exposure.



## 1.12 Data collection methods (Realised Sample Sizes)

This section details the actual execution of the data collection process. It presents the real numbers and methods used during the fieldwork, reflecting the outcomes of data collection rather than the initial targets. It covers the specific quantitative and qualitative data collected, how participants were chosen in practice, and any adjustments made during the process to address challenges encountered in the field.

### Quantitative data collection

In total, 877 Individual Interviews (IIs) were collected in and around Nyumanzi settlement between 19 October and 8 November, 2024.

Finale sample size	Women	Men	Total
Refugees	379	67*	446
Host community	216	215	431
Total	595	282*	877

\* Statistical representation was not achieved for the refugee men and total men samples; all other categories are statistically representative

- KIIs are structured one-on-one interviews conducted with randomly sampled individuals. They focus on personal experiences, opinions, or behaviours, but can still provide insights into household-level dynamics.
- During data collection, it became evident that refugee men were largely unavailable, which may be due to several factors.<sup>45</sup> These factors made achieving statistical representation for refugee men and, consequently, for the overall male category, unattainable. However, male host community members remained adequately represented based on the established sampling parameters.

For more information on the data cleaning processes, please see the TOR.<sup>46</sup>

### Qualitative data collection

- A total of 211 individuals took part in various type of qualitative data collection exercises conducted between 19 October and 8 November 2024:
  - **31 Key Informant Interviews (KIIs)** with healthcare staff (6), education staff (4), market vendors (7), persons with disabilities (4), and farmers' associations (8),
  - **16 Participatory Workshops (PWs)** with refugee women (4), refugee men (4), host community women (4), and host community men (4) – 10 participants per PW,
  - **2 Focus Group Discussions (FGDs)** with refugee (2) and host community (2) elderly people – 10 participants per FGD.
- KIIs are semi-structured interviews, ideally around 40 minutes, conducted with individuals who have specialized knowledge or expertise on a specific topic. KIIs provide in-depth insights, expert opinions, and contextual understanding of issues such as climate adaptation and livelihoods. They are particularly useful for gathering background information and validating findings from other data sources.
- PWs are full-day interactive sessions where community members actively engage in discussions and are designed with clear objectives and specific outputs to be achieved by the end of the session. They provide a structured and inclusive space for participants to share experiences, collaboratively analyse challenges, and propose locally relevant solutions.
- FGDs involve groups of participants discussing a specific topic under the guidance of a facilitator and are usually one to two hours. They are useful for understanding community-level perceptions, decision-making processes, and social norms that influence behaviours and adaptation strategies.

<sup>45</sup> In many refugee contexts, men are often less present in settlements, as some may have remained in their home countries rather than fleeing. Others may be engaged in cattle-related migrations or cross-border movements (pendulum migration), leading to intermittent presence in the settlement. Additionally, many men were simply away from home during data collection, occupied with livelihood activities, social gatherings, or leisure pursuits. In some cases, men may have also chosen not to participate in the survey.

<sup>46</sup> IMPACT Initiatives, Area-Based Assessment (ABA) on Community-Based Adaptation (CBA) to climate-related hazards and climate variability among refugees and the host community in Nyumanzi Settlement, TOR 2024. [https://repository.impact-initiatives.org/document/impact/acaf35d9/UGA2406\\_ABACBA\\_ToR\\_HQ-validated\\_external-1.pdf](https://repository.impact-initiatives.org/document/impact/acaf35d9/UGA2406_ABACBA_ToR_HQ-validated_external-1.pdf)

## 1.13 Analysis

### Quantitative analysis

- The study applied stratification based on three different criteria:
  - Gender (women vs. men)
  - Displacement status (refugees vs. host community)
  - A combination of gender and displacement status
- These strata were used to allow for comparative analysis within Nyumanzi but did not require adjustments for aggregation beyond this level. Because of this localized focus, no weighting procedures or design effect calculations were necessary in the analysis.
- Data was cleaned and analysed using pre-developed R scripts. For further details on the analysis process, please refer to the TOR.<sup>47</sup>
- The preliminary results were reviewed with 12 external partners during a Joint Analysis Workshop in December 2024 to discuss whether the findings aligned with their knowledge and experience on the ground.
- The analysis, including the clean dataset, logbook and survey tool, is publicly available from the IMPACT Resource Centre. For a user-friendly overview, please refer to the results tables, also publicly available from the IMPACT Resource Centre.

### Qualitative analysis

Three analytical products were developed based on the results of the KIIs, PWs, and FGDs.

- A **Data Saturation and Analysis Grid (DSAG)** is an analysis tool used to comprehensively capture key themes and patterns. It systematically organizes responses from the KIIs and FGDs into thematic categories, allowing to track whether new data continues to provide additional insights or if recurring themes indicate saturation.
- A **Problem Tree** is a visual tool used to analyse the root causes, effects, and interconnected factors of a specific issue. It maps out the core problem in the centre, with root causes branching downward and the consequences or impacts branching upward. This structured approach helps identify underlying drivers of challenges, visualize cause-and-effect relationships, and support discussions on potential interventions or solutions. Problem trees were developed based on the information collected during the 16 participatory workshops.
- A **Seasonal Calendar** is a participatory tool used to document seasonal variations in livelihoods, climate patterns, resource availability, and social activities within a community. It visually represents changes across different months of the year, helping to identify critical periods for food security, income generation, climate hazards, or health risks. The seasonal calendar was developed based on the information collected during the 16 participatory workshops.

The qualitative analyses were reviewed by external partners (Last Mile Climate and Humanity & Inclusion) to collect feedback on whether the findings aligned with their knowledge and experience on the ground. Their input was limited to thematic alignment and does not imply endorsement of the full methodology, analysis, or conclusions presented in the report.

The qualitative analyses from these outputs are publicly available from the IMPACT Resource Centre.

<sup>47</sup> IMPACT Initiatives, Area-Based Assessment (ABA) on Community-Based Adaptation (CBA) to climate-related hazards and climate variability among refugees and the host community in Nyumanzi Settlement, TOR 2024.

## 1.14 Challenges and Limitations

### Persons with disabilities:

No participants with cognitive or hidden disabilities were interviewed. This limitation is partly due to the stigma surrounding cognitive disabilities, which complicates the identification of individuals for participation. Additionally, persons with cognitive disabilities themselves may have been hesitant to take part due to shyness or societal perceptions. To ensure transparency, the findings will be carefully framed to clarify that the insights represent only individuals with physical disabilities.

The analyses were reviewed by Humanity & Inclusion to verify that the findings align with their knowledge of disability inclusion perspectives.

### Probing for solutions:

When asked to suggest potential solutions to their challenges, interview participants often responded in ways that reflect the influence of external narratives, ingrained perceptions, and systemic constraints rather than independent problem-solving. One common tendency was to echo NGO jargon, repeating solutions they have been exposed to through humanitarian and development programs (e.g., trainings, funding, and sensitization). In some cases, participants suggested these likely because they are familiar interventions rather than because they genuinely see them as the most effective responses. It may also be due to some issues being so complex (e.g., the complexity of hydrological planning) that they require technical expertise to address, making it difficult for respondents to propose concrete solutions. This suggests a degree of reliance on established NGO approaches, where solutions are accepted at face value without necessarily linking them to the specific challenges at hand.

To mitigate for these, U-Learn aims to differentiate between community-driven priorities and externally reinforced narratives. The analysis will avoid taking these at face value and instead contextualize them within actual community challenges. The interpretation will aim to consider hidden vulnerabilities that may not be explicitly raised potentially due to the normalization of certain issues.

### Seasonal bias:

Seasonal bias occurs when data collection takes place during a specific time of year, potentially skewing perceptions and responses. For instance, the interviews were conducted during the rainy season, therefore flooding and its impacts may seem more prominent, even if they are not the most pressing long-term concerns. This limitation could affect the interview response by overrepresenting season-specific hazards while potentially overlooking climate stressors that emerge in different periods.

To mitigate this, findings are contextualized and triangulated with the seasonal calendar and secondary sources.

### Root causes:

When conducting Problem Tree exercises, participants often struggled to articulate the root causes of challenges, particularly when the connections seemed self-evident to them. For example, when asked why flood-damaged shelters are a concern, they did not always specify reasons such as lack of money for repairs or fear of collapse, as these were implicitly understood rather than explicitly stated.

To mitigate this, staff were trained in probing techniques or scenario-based questioning to encourage participants to reflect beyond immediate effects and articulate the structural challenges underlying their experiences.



# FINDINGS

## 1.15 Key Demographic Characteristics

This subsection outlines the key characteristics of the 877 participants interviewed during the quantitative data collection. **The results are statistically significant and can be considered representative of the broader population in Nyumanzi and its surrounding areas, up to 15km.** Differences between refugees and host community members, as well as men and women, are noted where observed. If no difference was identified in the analysis, it is not referenced in the report.

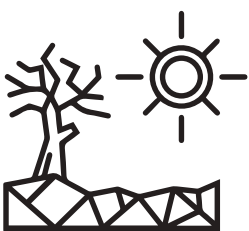
**Of the respondents, 49% were refugees, while 51% were from the host community.** The majority were women (68%), while 31% were men. Respondents were predominantly aged 25 to 59 years (76%), with an average age of 37 for women and 38 for men. 73% of all respondents were heads of household. **Among the host community, only 18% of households were headed by women, compared to 77% among refugee households.** The average age of heads of household was 46, with no notable variation across groups. No households were recorded as having a minor as the head. However, 17% of all households were headed by someone over 60 years old.

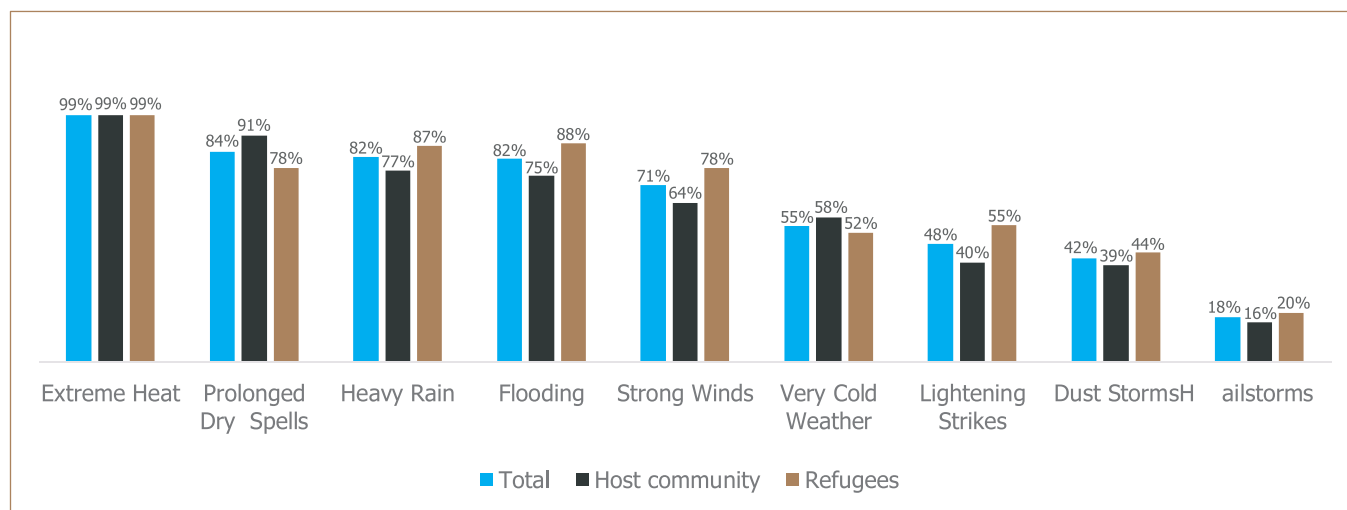
**Among refugees, 78% had lived in Nyumanzi for 9 to 10 years,** while 77% of host community respondents had lived in Dzaipi/Arinyapi sub-county for over 10 years. Refugees are 99% South Sudanese, with the remainder from Sudan. All refugee respondents identified as Dinka. In the host community, 98% identified as Madi, while the remaining 2% identified as Acholi or Lugbara. Of the interviewed households, 90% of children aged 5 to 17 were enrolled in school or an early childhood education programme during 2023–2024. However, this figure does not indicate actual attendance rates. **Only 4% of children attended secondary school, with no children enrolled beyond S4** (Senior Four, the fourth year of secondary school in Uganda).

**Over the past 12 months, the main livelihood activities were agriculture (96%) and animal husbandry (57%).** Engagement in animal husbandry was more common in the host community (71%) compared to refugees (44%). Among the host community, more men (78%) than women (64%) engaged in animal husbandry, whereas among refugees, there was no notable gender difference.

## 1.16 Overview of Identified Climate-Related Hazards

This section presents findings on climate-related hazards identified and perceived by the population in **Nyumanzi settlement and Arinyapi and Dzaipi subcounties** over the past five years. While granular remote sensing data for Nyumanzi is largely unavailable, the findings are triangulated with remote sensing conducted by IMPACT Initiatives and contextualised within broader trends from Adjumani district or Northern Region when possible. The section covers **extreme heat, prolonged dry spells, heavy rainfall, flooding, along with other hazards such as strong winds, lightning, cold weather, dust storms, and hailstorms.**





**Figure 1: Climate-related hazards reportedly experienced in/around Nyumanzi in the past five years, by % of the population**

## Extreme heat

While there is no universally agreed-upon definition and threshold for extreme heat, most definitions emphasise its unusual nature.<sup>48</sup> For this assessment, the population's perception of heat and thermal comfort served as the primary criterion, rather than the degree of exceptionality, and was then contextualised through Remote Sensing analyses.<sup>49</sup> Thermal comfort can vary according to seven determinants, including radiant heat sources (e.g., sun, buildings, ground surfaces) and environmental conditions (wind speed and humidity).<sup>50,51</sup> For instance, individuals in buildings with iron sheet roofs, such as schools, shops, or health centres, may experience higher indoor temperatures. Similarly, those working in open fields under direct sunlight are exposed to greater heat stress.<sup>52</sup>

In and around Nyumanzi Settlement, **99% of respondents reported experiencing episodes of very hot temperatures lasting several days in the five years** preceding data collection. Of those, 98% believed such heat events had become **more frequent** compared to the previous five-year period, reflecting a widely perceived increase in prolonged heat exposure.

According to ERA5-Land Daily Aggregated Data (ECMWF), the Annual Average Mean Surface Air Temperature (SAT) in Nyumanzi for 2024 was approximately 28°C, measured in well-ventilated, shaded areas. On several days throughout the year, SATs reached 33°C.<sup>53</sup>

Although Land Surface Temperature (LST) and SAT are often reported together, they measure different things and should not be directly compared. LST refers to the radiative "skin" temperature of the Earth's surface – whether soil, vegetation, or built structures – and is typically higher than air temperature, particularly in exposed or densely built environments.

48 CDC, *Climate Change and Extreme Heat Events*, n.d., p3.

<https://www.cdc.gov/climate-health/media/pdfs/ClimateChangeandExtremeHeatEvents.pdf>

49 There are multiple metrics used to assess heat, including daytime maximum temperatures, nighttime minimum temperatures, the Temperature-Humidity Index (THI), the Wet-Bulb Temperature (WBT), the Mean Radiant Temperature (MRT), the Heat Wave Duration Index (HWDI), etc. In this assessment, the quantitative survey aimed to capture perceived experiences of extreme heat, focusing on subjective sentiment rather than empirically measured data.

50 The seven factors are metabolic rate, clothing insulation, air temperature, mean radiant temperature, air speed, relative humidity, psychological state, and personal aspects such as age, gender, and level of health.

51 Ariva Sugandi Permana, Sholihin As'ad, *Progress in Sustainable Development*, 2023.

<https://www.sciencedirect.com/book/9780323992077/progress-in-sustainable-development>

52 Ariva Sugandi Permana, Sholihin As'ad, *Progress in Sustainable Development*, 2023

53 Surface Air Temperature is typically measured at a standard height of 1.25 to 2 meters above the ground. This is in line with the World Meteorological Organization (WMO) standards. For more information, please see the World Meteorological Organisation's Guide to Instruments and Methods of Observation, 2023, p.94.

<https://library.wmo.int/records/item/68695-guide-to-instruments-and-methods-of-observation>

In Nyumanzi, LST data from 2024 revealed much higher surface temperatures than air temperature readings. The median LST across the settlement was 31°C, with peak values exceeding 45°C on multiple occasions, especially in areas with metal roofing, bare soil, or compacted ground. Historical records show similar extremes, with LSTs reaching 52–59°C in 2016 and 53–63°C in 2021.

There are no globally agreed thresholds for dangerous LST. However, for perspective, NASA's Earth Observatory notes that in areas with dense vegetation, LSTs rarely exceed 35°C, as plants cool the surface through shade and evapotranspiration.

In early 2024 (January–March), LSTs varied considerably across the region, with southern and central villages such as Paoko, Mbere, Pasia, Maiaciko and Ege recording values as high as 66°C. These areas are characterised by bare soil, compacted ground, and metal-roofed buildings, all of which contribute to greater heat absorption and retention.

In contrast, northern villages such as Lire, Ovuvo, Ilolo, and Gweri recorded the lowest LST values, around 30°C, likely due to greater vegetation cover and proximity to water bodies, which help cool the surrounding environment through evapotranspiration. Mid-range LSTs were observed in villages like Mudjopele and Origo, where mixed land cover creates moderate thermal conditions.

Within Nyumanzi Settlement, distinct heat hotspots emerged. The WFP Relief Food Centre and surrounding blocks recorded LSTs up to 60°C, attributed to dense clusters of metal-roofed shelters and compacted soils. Similarly, the WFP Warehouse registered 58°C, while the Market Centre showed 56°C. Notably, even agricultural lands and some swamp areas reached 60°C and 55°C respectively, likely due to seasonal drying and reduced vegetation cover.

According to a GIZ report, as mean annual temperatures rise, Uganda is expected to experience a major increase in very hot days (>35°C) with high confidence. Under the medium/high emissions scenario (RCP6.0), northern Uganda, where Nyumanzi is located, could face up to 150 very hot days per year by 2080.<sup>54</sup> In a World Bank report, nights that are considered "hot" (>26°C) are expected to increase more quickly than hot days throughout the country.<sup>55</sup> Hot nights were a recurring concern in qualitative interviews. In the quantitative survey, 91% of the population in/around Nyumanzi reportedly experienced at least one night in the past 12 months when it was too hot to sleep indoors. Among them, 91% indicated that they always or at least sometimes chose to sleep outside during such conditions, with 21% reporting that they spent more than a month in total sleeping outdoors as a direct consequence.

*"We think that the sun has been getting closer to the earth and that is why the heat is more dizzying now."*

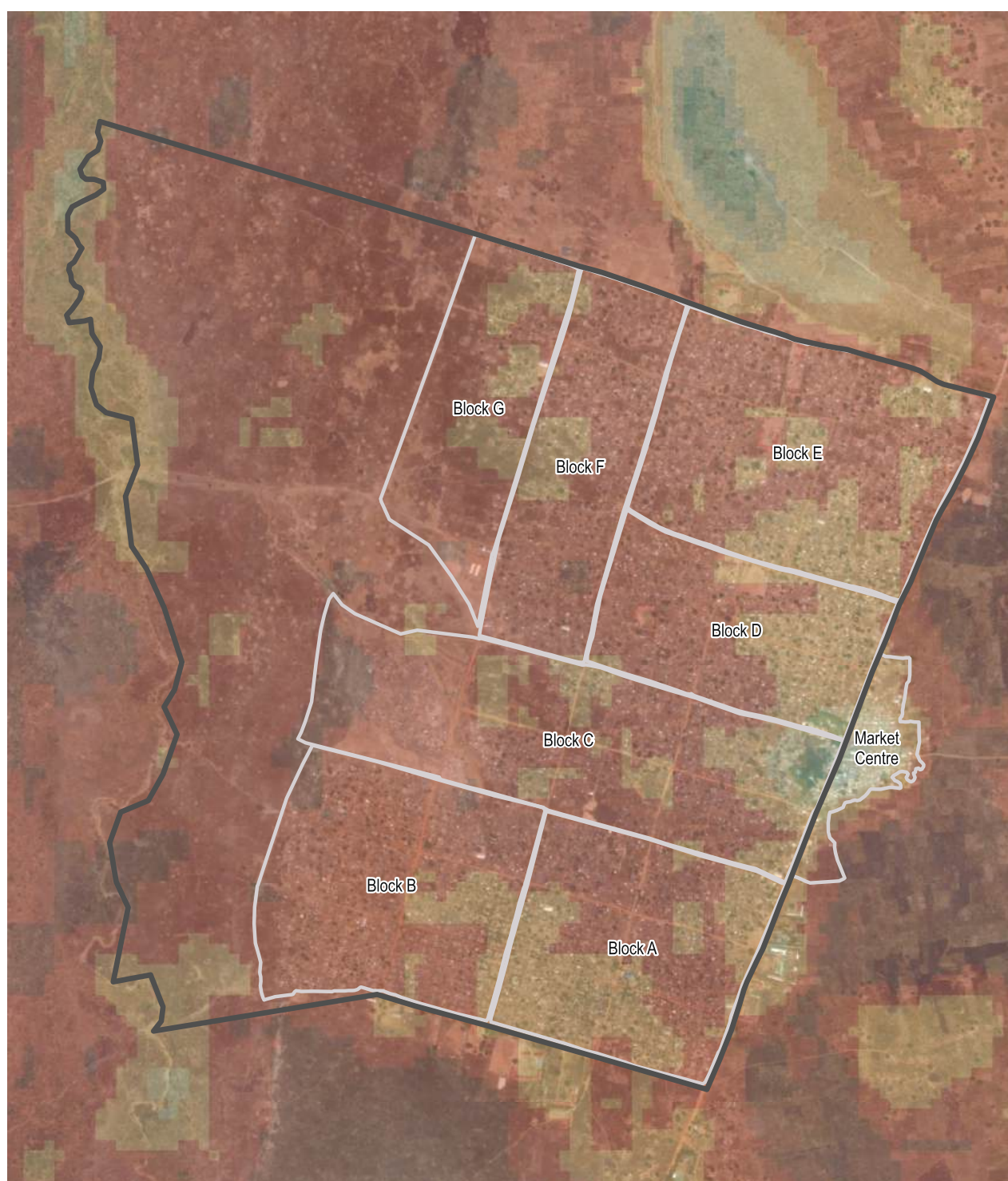
*Host Community leader, Nyumanzi, August 2024*

<sup>54</sup> GIZ, *Climate Risk Profile: Uganda*, February 2021, p.4

<sup>55</sup> World Bank Group, *Climate Risk Country Profile – Uganda*, May 2021, p.8



Figure 2. Land Surface Temperature Map for Nyumanzi and surroundings between January and March, 2024



Land Surface Temperature, °C  
January - March 2024

49,8 - 50  
50,1 - 52  
52,1 - 54  
54,1 - 57  
57,1 - 59  
59,1 - 61  
61,1 - 65,5

Nyumanzi Blocks  
Nyumanzi Settlement Boundary

0 0,25 0,5 1 km N

Data source:  
LST: Landsat 8 Collection 2 Level 2 Surface Reflectance data,  
averaged over the hottest period, from January to March 2024,  
using Google Earth Engine  
Background image: Esri

## Prolonged dry spells

While there is no universally agreed-upon definition of drought, the IPCC defines it as “a period of abnormally dry weather long enough to cause a serious hydrological imbalance,” considering it a relative term that depends on the precipitation-related activity that is under discussion. It can be categorised as meteorological, agricultural, hydrological, or socioeconomic drought based on its effects, and it is typically considered a slow onset disaster.<sup>56</sup> Droughts are a natural part of the climate system and can occur in any environment worldwide, including deserts and rainforests. However, climate change is expected to increase their frequency and intensity in certain regions.<sup>57</sup>

Droughts are a more severe form of dry spells, but not all dry spells escalate into droughts. While the terms appear to be often used interchangeably in Uganda, this assessment used “prolonged dry spells” when presenting findings from its primary data collection in/around Nyumanzi, even when participants referred to “drought.” In this context, a “prolonged dry spell” is defined based on participants’ perceptions but is broadly understood as an extended period with little or no rainfall, resulting in water scarcity.

From 1900 to 2022, Uganda has encountered 10 droughts recognised as such by the World Bank, though none officially recorded in Adjumani district.<sup>58,59</sup> However, 84% of the population reportedly experienced prolonged dry spells in the past five years in/around Nyumanzi, with slightly more host community members (91%) reporting this compared to refugees (78%). According to the Adjumani District Local Government, some areas of the district experienced prolonged dry spells with low and unpredictable annual rainfall. The most affected areas were the sub-counties of Adropi, Ciforo and Dzaipi, in which Nyumanzi Settlement is located.<sup>60</sup>

In 2022, Nyumanzi Settlement and its surroundings experienced notable drought conditions, as indicated by key remote sensing indicators: the Vegetation Health Index (VHI), Vegetation Condition Index (VCI), and the Standardised Precipitation Index (SPI). These tools consistently pointed to widespread vegetation stress and water scarcity throughout the year.

The western areas of the settlement’s surroundings, particularly the villages of Mudjopele, Origo and Paoko, were affected by extreme drought and severe vegetation degradation in 2022, raising the risk of crop failure. Villages like Ege and Mbere faced moderate to severe drought, while northern areas such as Lire, Ovuvu and Iloho experienced milder drought, suggesting relatively better vegetation resilience. In the south, villages including Pasia, Maiaciko and Makolombgili were impacted by mild to moderate drought, reflecting varying levels of vegetation stress.

The VCI specifically confirmed moderate to severe stress across vegetation cover within Nyumanzi Settlement and nearby agricultural zones in 2022, highlighting direct implications for local food security (see map). In addition, Angwarapi and Adjugopi, situated in the southwest, experienced moderate drought, which likely reduced pasture availability for livestock.

The SPI analysis for 2022 reinforced these findings, indicating severely dry conditions in Nyumanzi, consistent with significant water shortages and prolonged dry spells. Meanwhile, areas near Laropi, Adjumani town, and Nimule experienced moderate dryness – less extreme – but still likely disruptive to agricultural productivity and water access.

56 IPCC, *Glossary of terms*. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, 2012. [https://archive.ipcc.ch/pdf/special-reports/srex/SREX-Annex\\_Glossary.pdf](https://archive.ipcc.ch/pdf/special-reports/srex/SREX-Annex_Glossary.pdf)

57 WMO, *Drought*, n.d. <https://wmo.int/topics/drought>

58 World Bank Group, *Uganda, Risk - Historical Hazards*, n.d. <https://climateknowledgeportal.worldbank.org/country/uganda/vulnerability>

59 CERF, *Uganda Rapid Response Drought 2022*, 2022. [https://cerf.un.org/sites/default/files/resources/22-RR-UGA-53777\\_Uganda\\_CERF\\_Report.pdf](https://cerf.un.org/sites/default/files/resources/22-RR-UGA-53777_Uganda_CERF_Report.pdf)

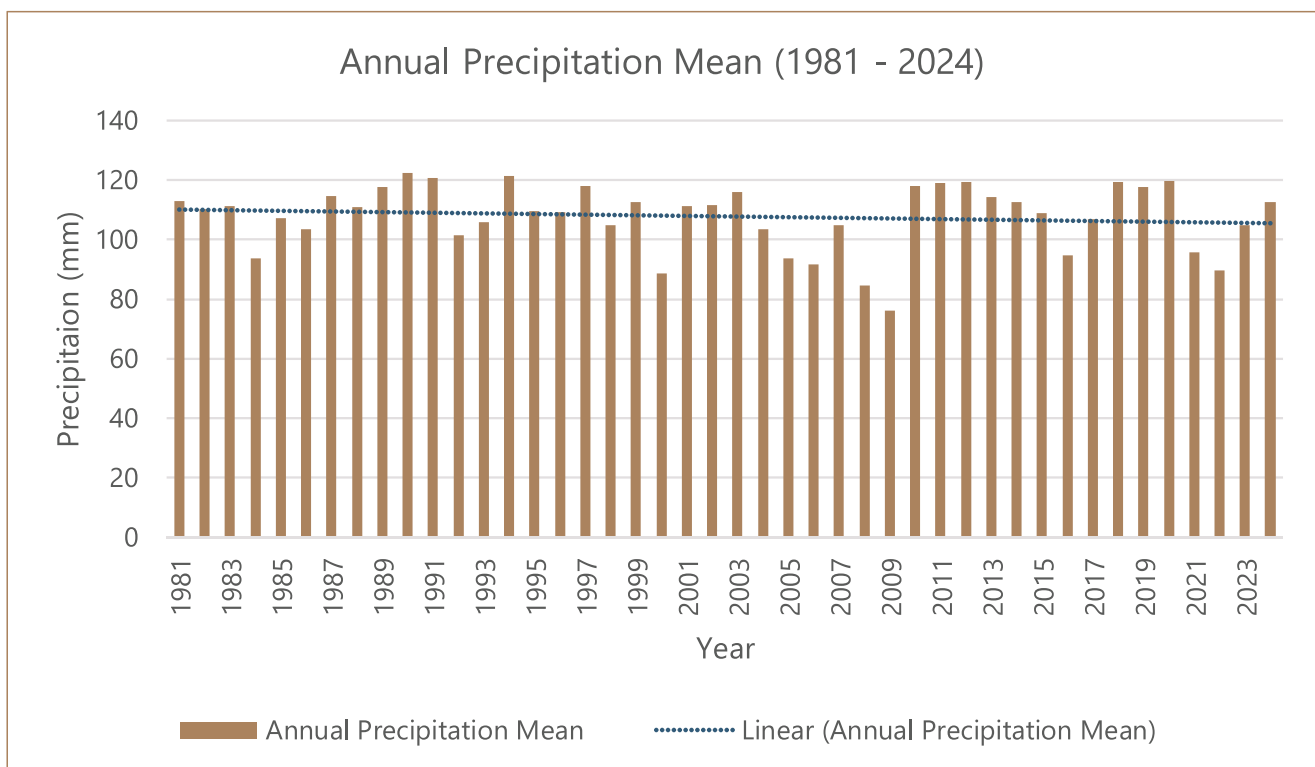
60 Adjumani District Local Government, *District Profile*, n.d. <https://www.adjumani.go.ug/about-us/district-profile>

## Heavy rain and floods

Flooding poses a major risk, particularly in low-lying areas of Uganda. Each year, floods affect nearly 50,000 people and cause over \$62 million in damages. Uganda experiences both flash floods and slow-onset floods, which are common in urban centres, riverbanks, swamplands and low-lying areas. The most flood-prone regions include Kampala, as well as eastern and northern Uganda, where Nyumanzi is located. In arid areas, heavy rainfall often triggers flash floods, leading to infrastructure damage.<sup>61</sup>

82% of respondents reported experiencing heavy rainfall in the past five years, and an equal proportion (82%) also experienced flooding. Interestingly, more refugees (88%) reported flooding compared to the host community (75%). While both populations experience similar rainfall levels due to their proximity, flooding severity can vary based on local terrain and infrastructure.

For example, during the scoping exercise, refugees noted that the settlement is slightly sloped, with certain blocks prone to submersion during heavy rains. Additionally, some residential and grazing areas are located near seasonal streams and swamp areas, further increasing their exposure to water accumulation. In qualitative interviews, participants frequently emphasised the need for drainage channels to be dug, completed, or improved to mitigate flooding.



**Figure 3: Adjumani District Annual Precipitation Mean (1981 - 2024)**

Please note that variations in precipitation do not always directly correlate with flooding. In some cases, drier years may still experience notable flooding, particularly when the rains follow prolonged drought conditions. This is because dry, compacted soils have reduced absorption capacity, causing rainwater to run off more quickly and increasing the risk of surface flooding.

61 World Bank Group, *Climate Risk Country Profile – Uganda, 2021*



Nyumanzi and its surrounding areas frequently experience flooding, significantly impacting both refugees and host communities. In 2023, 4,000 refugees were displaced due to flooding caused by heavy rainfall.<sup>62</sup> Severe flooding has reportedly affected the area for three consecutive years.<sup>63</sup> In 2022, 340 host community households were displaced by floods in Arinyapi County, which borders Nyumanzi Settlement.<sup>64</sup>

Flooding remains an important risk in Nyumanzi Settlement and its surrounding areas, affecting both refugee and host communities. Between 2019 and 2023, flood patterns varied considerably, with some years experiencing more widespread impacts than others.

The most severe flooding of agricultural and rangeland areas occurred in 2022, when 16% of these lands were affected. In contrast, 2020 recorded the lowest impact, with only 8% of agricultural and rangeland areas flooded.

Settlement areas also experienced variable levels of flood exposure. The highest extent of flooding between 2019 and 2023 within the settlement was observed in 2022, when 31% of the area was affected. The lowest level was recorded in 2019 at less than 1%, while 2020 and 2023 saw moderate impacts, affecting 15% of the settlement area.

Flood exposure was also unevenly distributed across settlement blocks. In 2022, Block A and Block B recorded the highest impacts, with 1.2 hectares (41%) and 0.8 hectares (31%) of their respective areas affected. Block G experienced the lowest flood exposure, with only 0.4 hectares (7%) impacted. The Market Centre saw minor flooding, with 0.5 hectare affected, representing 6% of its total area.

In terms of population exposure, 2022 saw the highest estimated number of affected individuals, with approximately 23,000 people impacted. This was measured by multiplying the number of shelters visible on the imager with the average household size. Even in years with lower spatial flood extent, such as 2020, impacts remained significant – around 11,000 individuals were likely affected. Block A consistently had the highest estimated number of affected individuals between 2019 and 2023, while Block G reported the lowest across the entire study period.

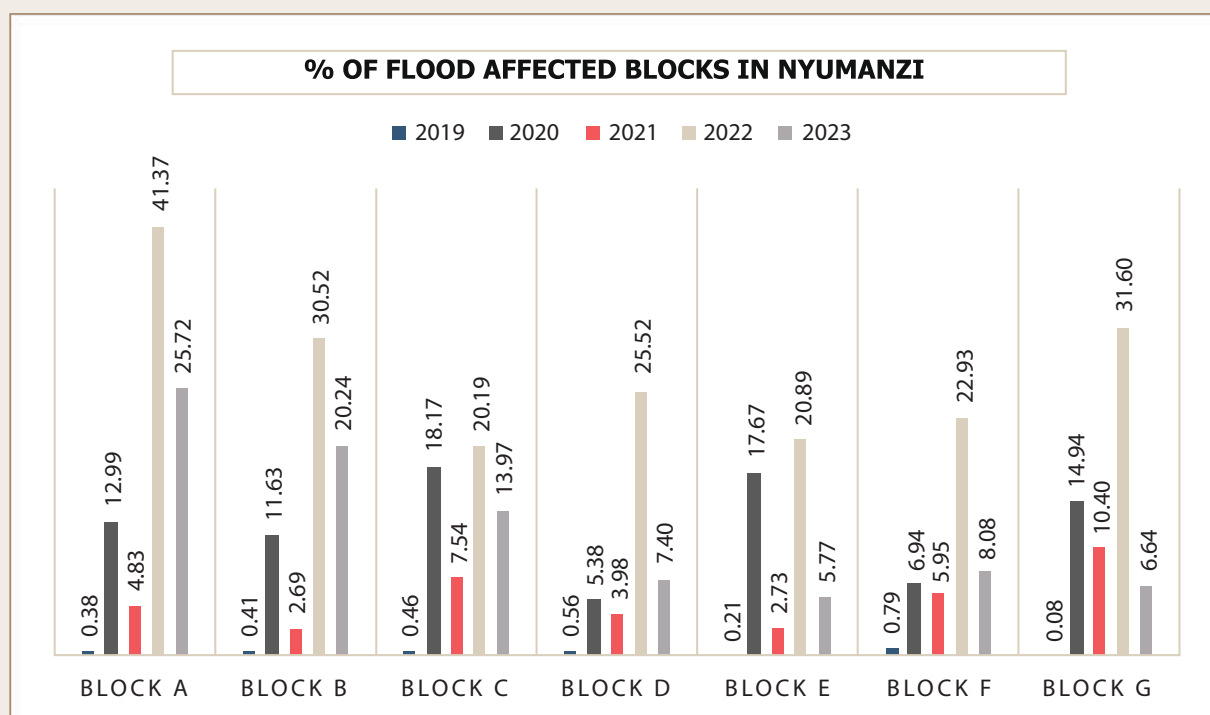


Figure 4. Percentage of flood-affected in/around Nyumanzi (2019–2023)

62 Monitor, *Over 4,000 refugees hit by floods in Adjumani*, 2023

63 The Ankole Times, *West Nile – Government Urged to Relocate Nyumanzi Refugee Settlement Due to Flooding*, 2023

64 Uganda Radio Network, *340 Displaced as Floods Hit Adjumani District*, 2022. <https://ugandaradionetwork.net/story/340-displaced-as-floods-hit-adjumani-district->

Figure 5. Annual Flood Occurrence in/around Nyumanzi (2020–2023)



Years flooded, 2020-2023

- 1
- 2
- 3
- 4

Nyumanzi Blocks

Nyumanzi Settlement Boundary

0 0,25 0,5 1 km N

Data source:  
LST: Sentinel-1 Synthetic Aperture Radar (SAR) data processed in Google Earth Engine (GEE), according to UN-SPIDER flood mapping methodology, <https://www.un-spider.org/advisory-support/recommended-practices/recommended-practice-google-earth-engine-flood-mapping/step-by-step>  
Background image: Esri

## Others

Other climate-related hazards identified by the population include strong winds (71%), very cold weather (55%), lightning strikes (48%), dust storms (42%), and hailstorms (18%).

**Refugees reported strong winds (78%) more frequently than the host community (64%), which may be linked to differences in housing materials and repair capacity.** Unlike the host community, refugees are not permitted to cut grass for thatched roofs and must purchase it instead, making them more vulnerable to wind damage and likely more observant of strong winds due to limited resources for roof repairs.

**Similarly, refugees reported lightning strikes more often (55% vs. 40%). This discrepancy could potentially be influenced by environmental and psychological factors.** Data suggests that South Sudan experiences a higher frequency of lightning strikes than Uganda, which could make refugees more attuned to lightning events.<sup>65</sup> Additionally, the trauma of fleeing conflict zones, where sudden loud noises may be associated with danger, could heighten perceptions of lightning as a threat, contributing to its higher reporting among refugees.

Similar to extreme heat, very cold weather is not defined by a specific temperature threshold but rather by how the population experiences it. **Over half of the respondents reported experiencing very cold weather, for example at night or during/after rainfall.** While such temperatures are unlikely to pose an immediate life-threatening risk the way that winter temperatures would, participants in qualitative interviews described perceived negative health impacts, including increased colds and joint pain.<sup>66</sup> Some also expressed the need for additional bedding and warm clothing to cope with the cold.

## 1.17 Impacts and Community Responses – Livelihoods

This section examines the perceived impacts of climate-related hazards on livelihoods in and around Nyumanzi settlement and the self-reported community's response strategies. It covers how extreme heat, prolonged dry spells, flooding, and other climate events affect labour productivity, with a zoom in on markets, agriculture, and household labour. The specific challenges and responses among market vendors, farmers, and those performing domestic chores are discussed, along with their requests for support to mitigate these impacts and enhance their resilience.

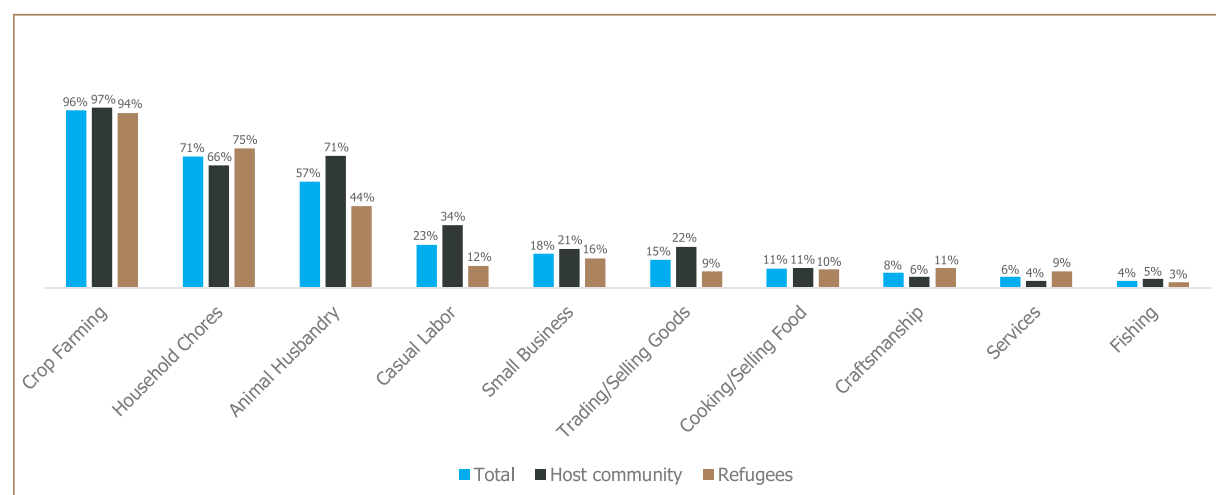


Figure 5. Livelihood activities engaged in over the past 12 months, by % of the population

65 Vaisala, 2021 Annual Lightning Report, 2021. <https://www.vaisala.com/sites/default/files/documents/WEA-MET-2021-Annual-Lightning-Report-B212465EN-A.pdf>

66 To note, that cold weather itself does not directly cause colds, but it can increase susceptibility to infections caused by viruses. During colder periods, individuals tend to spend more time indoors, possibly in poorly ventilated spaces. This increases the risk of inhaling airborne aerosols from individuals with common colds, potentially leading to higher transmission rates.



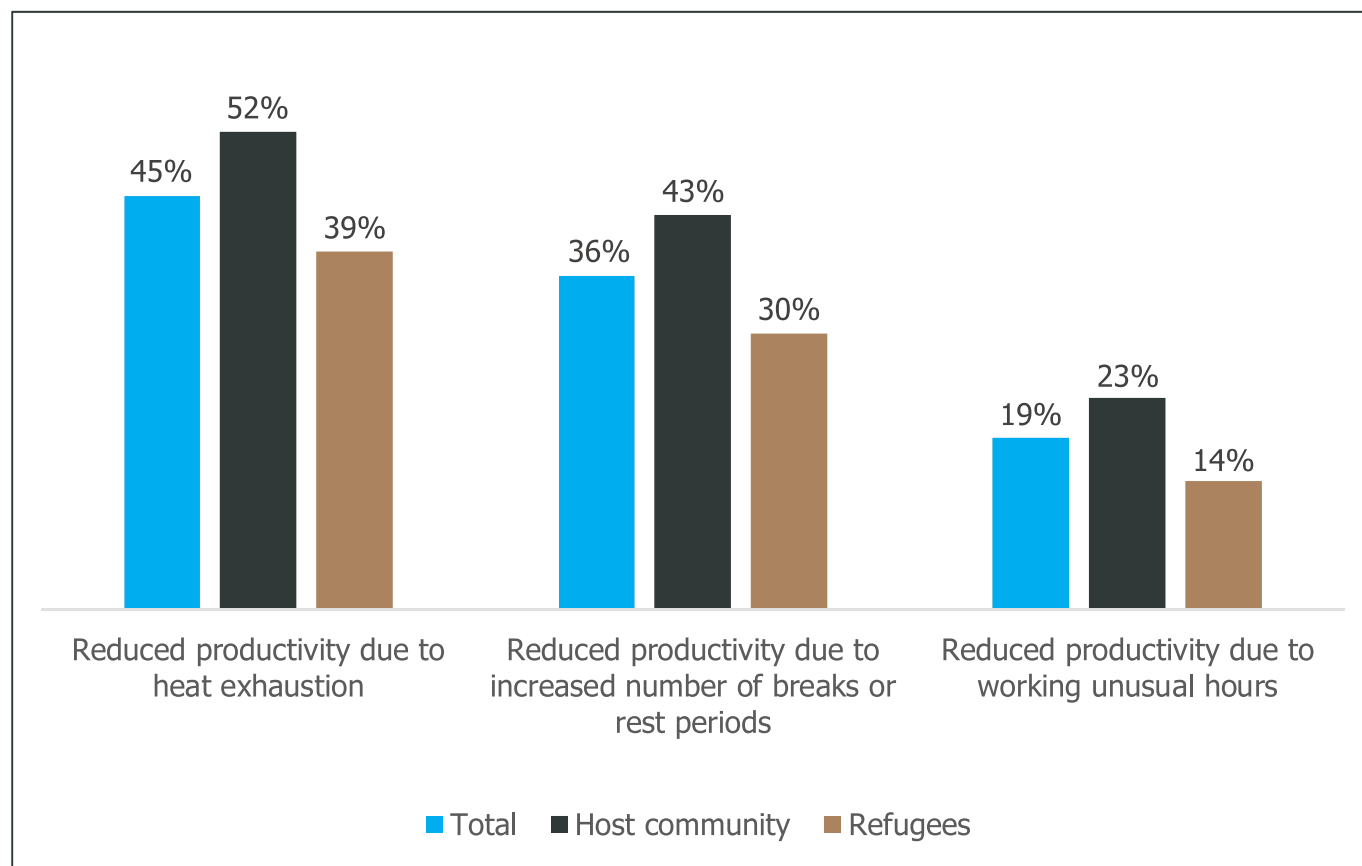
## a) Productivity

Research across the world shows that extreme heat negatively affects labour productivity, labour supply, and worker safety, a trend reflected in the reported experiences of workers in and around Nyumanzi.<sup>67,68</sup> Over half of the population reported negative impacts from prolonged high temperatures on their work. **In terms of productivity decline, 45% of respondents reported reduced efficiency due to heat exhaustion**, 36% experienced productivity losses due to the need for more frequent breaks, and 19% struggled with reduced output as a result of working during unconventional hours.

When asked about the health impacts of working in high heat, **78% of respondents reported experiencing headaches, 77% reported tiredness, and 60% reported dehydration** as direct consequences of prolonged exposure. These symptoms suggest an increased risk of heat stress and exhaustion, which can, in severe cases, lead to more serious heat-related illnesses.

Working during or immediately after a flood also carries health risks. **Between 53% and 62% of respondents reported experiencing fever or feeling unwell, skin infections, breathing difficulties, and diarrhoea** – all of which are associated with exposure to contaminated floodwaters, damp environments, and poor sanitation conditions. Additionally, **47% of respondents reported injuries, including cuts, bruises and falls**, due to slippery surfaces, submerged hazards, and unstable ground in flooded areas. These impacts on health highlight the poor working conditions in and around Nyumanzi, which are further decreased by climate-related hazards.

Figure 6. Reported impacts of heat on labour productivity in the past 12 months in/around Nyumanzi, by % of the population



67 ILO, *Working on a warmer planet: The impact of heat stress on labour productivity and decent work*, 2019. [https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms\\_711919.pdf](https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_711919.pdf)

68 World Bank Blogs, *The heat is on: How high temperatures are impacting workers and the global economy*, 2023. <https://blogs.worldbank.org/en/developmenttalk/heat-how-high-temperatures-are-impacting-workers-and-global-economy>

## b) Response Strategies

To mitigate heat exposure in the context of livelihoods in the 12 months prior to data collection, 88% of individuals in/around Nyumanzi who reported extreme heat started work earlier, 65% reduced their working hours, and 58% extended their work into the evening. However, these coping mechanisms may have had unintended consequences, such as sleep deprivation and increased time spent away from home while commuting in the dark. During the scoping mission, interview participants reported waking up as early as 5am to go to the fields or fetch water, which they explained heightened their exposure to crime and road accidents due to the lack of street lighting and poor visibility for pedestrians.

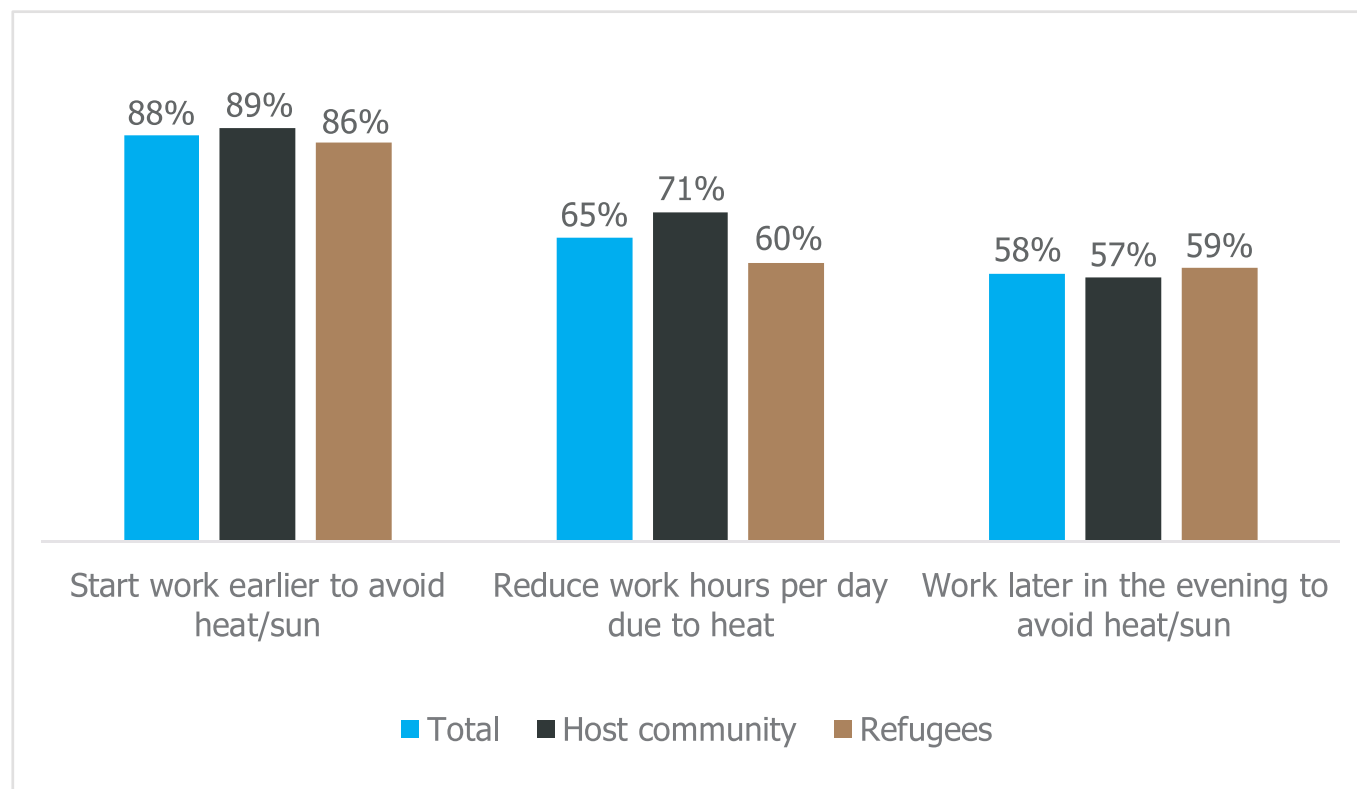


Figure 7: Reported impacts of heat on work hours in the past 12 months in/around Nyumanzi, by % of the population

## c) Zoom: Markets

### i) Market Disruptions Due to Extreme Weather

According to qualitative interviews with market vendors in Nyumanzi Settlement, extreme weather disrupted supply chains, impacting both the availability and affordability of essential goods. Prolonged dry spells reduced vegetable yields, forcing vendors to source produce from distant locations such as Gulu, Pabo, or Kampala. This increased transport costs and drives up prices, particularly for perishable goods, which are prone to spoilage due to long journeys and extreme heat. Vendors also reported increased competition for scarce resources, further straining small businesses.

Extreme heat also affected transport infrastructure, increasing the likelihood of vehicle breakdowns and transport delays. Vendors reported that road conditions deteriorated due to high temperatures, making it difficult for vehicles to reach the market on time, further disrupting supply chains. During floods – which key informants reported often reach knee-high levels at the market in Nyumanzi – damaged roads delayed deliveries, sometimes for weeks, forcing vendors to seek alternative suppliers in places like Mbale and Kabale. Similarly, 34% of respondents who experienced heavy rains or flooding in the 12 months prior to data collection reported missing market days or losing trading opportunities.

Storage remained a major challenge, as most vendors reportedly lacked access to modern facilities and were forced to rely on makeshift solutions. Poor storage infrastructure leads to frequent spoilage of goods, particularly perishable items such as vegetables, meat and dairy. Few vendors reported using **cool storage solutions such as ice boxes and shaded areas** to slow spoilage, but these methods were often insufficient.

Satellite-based analysis supports some of these insights, showing that during dry spells, the Normalised Difference Vegetation Index (NDVI) dropped notably, aligning with reports of reduced vegetable yields and higher transport costs. Land Surface Temperature (LST) data indicated surface temperatures often exceeding 40°C in recent years, possibly contributing to infrastructure deterioration and spoilage of perishable goods. The LST findings also identified temperatures of up to 56°C specifically in the market centre in recent years. Flood frequency analysis further revealed that the market centre remained largely unaffected between 2019 and 2023, except in 2022, when about 6% of its total area was inundated. This, however, does not corroborate with reports from interview participants who frequently cited the market area as being subjected to flooding. The discrepancy between remote flood analysis and community reports of flooding in the Nyumanzi Market area may be explained by the localised and short-term nature of flood events, poor drainage infrastructure, and the high sensitivity of daily market activities to even minor water accumulation – factors which may not be captured by standard flood detection methods.

## ii) Impact on Vendors' Working Conditions

Market vendors explained that extreme weather conditions also affected their health, productivity and income. High temperatures caused dehydration and fatigue, with elderly vendors particularly vulnerable to heat-related illnesses. Some traders reported experiencing dizziness, heat exhaustion, and other health complications while working in open-air markets.

During heavy rains, poor drainage at the Nyumanzi market reportedly leads to sanitation issues, increasing the spread of diseases with market vendors evoking malaria, cholera and typhoid due to stagnant water and poor waste management. Floodwaters contaminated goods, particularly fresh produce, believed to further increase the risk of waterborne diseases for both vendors and customers.

Market stalls made of timber and iron sheets were frequently damaged by strong winds and floods, forcing vendors to relocate or make costly repairs. Dust storms during the dry season also damaged temporary stalls, making it harder for traders to conduct business. Some vendors reported that dust exposure led to eye infections and increased vulnerability to theft due to limited visibility.<sup>69</sup>

Security concerns also rose, as weak fencing and poor lighting allegedly increased theft, particularly during the rainy season when vendors struggled to access their stalls. Some vendors reported that money was frequently stolen during windy conditions when distractions made them more vulnerable.

Reduced operating hours due to extreme weather further impacted vendors' earnings, with some adjusting their market hours to operate during cooler times of the day to avoid extreme heat exposure.

<sup>69</sup> For more information on the potential impacts of dust storms on eye health, please refer to the following sources: Haosheng et al, *Health effects of dust storms: subjective eye and respiratory system symptoms in inhabitants in Mongolia, 2011*. <https://pubmed.ncbi.nlm.nih.gov/21488467/> and Prevent Blindness, *Conjunctivitis (Pink Eye)*, n.d. <https://preventblindness.org/conjunctivitis-pink-eye/>

### iii) Seasonal Price Fluctuations and Customer Demand

Prices fluctuated with seasonal changes. During dry periods, the limited supply of vegetables and fruits led to higher prices due to increased transport costs. For example, maize prices rose from 200 to 1,000 shillings per cup. In contrast, the rainy season lowered vegetable prices due to local abundance but increased costs for cassava and maize flour due to flooding and supply chain disruptions. Poor road conditions also drove up transport costs for essential goods like soda and cooking oil. Inflation and currency fluctuations further worsened price volatility.

Customer demand also shifted with the seasons. During the rainy season, flooded roads prevented customers from accessing the market, reducing sales. In contrast, in the dry season, there was higher demand for cold drinks and fresh produce, although extreme heat discouraged customers from spending extended time at the market. Vendors also reported that customers often avoided markets during extreme weather, further affecting sales.

Should climate conditions deteriorate, as is expected due to climate change, these fluctuations could become even more severe and unpredictable.

### iv) Coping Strategies

To cope with extreme weather, vendors adopted various adaptation strategies to protect their businesses and maintain market operations. Many upgraded from temporary stalls to more durable brick and cement structures, installed drainage systems, and raised their selling stands to prevent flood damage. Some relocated to more stable markets outside Nyumanzi, such as Pakelle and Adjumani (town), where infrastructure was more resilient. Others took proactive measures to reduce heat exposure by planting trees around market areas and setting up tarps and umbrellas for shade.

Storage solutions varied by season, requiring continuous adjustments. During the dry season, vendors used temporary timber stalls to improve airflow, while perishable produce was stored on raised wooden stands or under damp sacks to retain moisture and prevent drying out. Those who could afford it invested in improved storage facilities to reduce spoilage, while vendors with fewer resources shared shaded spaces, moved to better locations, or, in some cases, exited the market entirely due to ongoing losses. In the rainy season, vendors placed green vegetables on elevated stands and stored goods in well-ventilated areas to prevent flood damage. However, these makeshift methods required constant maintenance and were often inadequate during heavy rains. Wholesalers with greater financial capacity invested in permanent storage with cement floors and shelves, which provided better protection against extreme weather conditions.

Vendors also adjusted their business practices to minimise weather-related losses. Some traders altered their market hours, choosing to sell early in the morning or later in the evening to avoid peak heat exposure. Others increased their water intake to stay hydrated throughout the day. When floods disrupted access to the market, some vendors switched to mobile vending, selling their goods in unaffected areas to maintain a source of income. In response to drought and fluctuating supplies, vendors participated in community food-sharing initiatives to manage shortages and imported goods from other regions when local production declined.

Despite these efforts, informants reported that many vendors – particularly small-scale traders – remained highly vulnerable, as financial constraints prevented them from upgrading their stalls, storage facilities, and transport networks.



## d) Support Requested by Market Vendors

- **Improved security**, including fencing and solar-powered lighting to reduce theft.
- **Upgraded infrastructure**, such as flood-resistant stalls and shaded areas to protect against heat and rain.
- **Better sanitation**, including latrines, drainage systems, and waste management to prevent disease outbreaks.
- **Access to electricity and water** to preserve perishable goods and support daily operations.
- **Financial support**, especially for small-scale vendors, alongside business training to improve stability.
- **Improved roads** to lower transport costs and ensure timely deliveries.
- **Climate-adaptive measures**, such as better drainage and tree planting for heat and rain protection.
- **Health outreach**, including seasonal medical support for vendors exposed to harsh conditions.
- **Cold storage facilities** to reduce spoilage of perishable goods such as meat, dairy, and fresh produce.
- **Alternative trade routes** to improve supply chain resilience during droughts.
- **Early warning systems for floods**, allowing vendors to prepare in advance for extreme weather events.

## e) Zoom: Agriculture

Crop farming is the primary livelihood activity in and around Nyumanzi, engaging 96% of the population. Animal husbandry is practised by 57% of the population, with higher participation among host community members (71%) compared to refugees (44%). A notable gender difference exists, with 70% of men involved in animal husbandry compared to 51% of women. This gender disparity is more pronounced within the host community, where men participate 14 percentage points more than women, whereas among refugees, the difference is only 2 percentage points.

Farmers in Nyumanzi and Dzaipi/Arinyapi reported that extreme weather conditions, including drought, excessive heat, heavy rainfall, and floods, have had profound effects on crop farming, fishing, and livestock management. These challenges impact not only food production but also financial stability, storage and processing capacities, physical and mental health, and overall coping strategies.

### i) Crop Farming: Financial, Storage, and Processing Challenges

According to qualitative interview participants, both drought and floods resulted in substantial financial losses for farmers. During dry periods, high temperatures reduced crop yields, increased some pest infestations, and caused seed stocks to deteriorate. The lack of rainfall delayed planting, forced farmers to purchase costly drought-resistant seeds, and raised transportation costs due to poor road conditions. Excessive heat reportedly damaged vehicle tyres, delaying deliveries and disrupting market supply chains. Respondents indicated that some farmers allegedly abandoned agriculture entirely, turning to alternative livelihoods for survival.

Flooding presented a different set of challenges, with waterlogging making land uncultivable and washing away crops such as beans, cassava and maize. Soil erosion reportedly depleted nutrients, and wet conditions encouraged the spread of crop diseases and pests. Farmers noted that flooded roads increased transport costs, making it difficult to deliver produce to markets. The combined effects of drought and flooding were thought to have contributed to food shortages, lower nutrition levels, and declining labour productivity.

Storage remained a major concern, as both excessive heat and flooding damaged harvested crops. High temperatures accelerated spoilage, particularly for legumes like sesame and beans, while storage facilities – especially those with iron sheet roofs – became overheated, creating humidity that deteriorated grains such as maize and sorghum. Interview participants reported that traditional granaries made from local materials, though often built on raised platforms, were vulnerable to collapse during floods, leaving stored crops exposed to water damage. Strong winds also destroyed storage structures, removing roofs and destabilising support poles. Farmers described challenges in storing their harvests in their homes, where humidity and pest infestations further accelerated spoilage, but also exposed them to vermin such as rats whose urine, faeces, saliva, and fur could spread bacteria, viruses and parasites.<sup>70</sup>

Post-harvest processing was also notably disrupted. Dry conditions benefitted the drying of crops like sorghum and sesame but created difficulties for cassava processing, which requires water for fermentation and washing. In contrast, prolonged rains hindered the drying of maize, beans and groundnuts, leaving them overly moist and prone to rot. Farmers expressed concerns about the lack of modern drying equipment, relying instead on labour-intensive manual techniques that became ineffective during wet periods. Poultry and goats were also reported to consume crops left outside to dry, leading to further losses.

#### Physical and Mental Health Impacts on Farmers

According to interview participants, extreme heat directly affected farmers' health, causing dehydration, excessive sweating, fatigue, headaches and skin irritation. Farmers also reported suffering from eye problems and respiratory issues due to dust exposure during dry periods. The physical strain of working in high temperatures reduced productivity, while long journeys to distant grazing areas or farms under harsh conditions increased exhaustion. Heavy rainfall worsened these challenges, making roads muddy and nearly impassable.

Farmers, particularly women, often carried small quantities of produce on their heads, a labour-intensive and time-consuming task that became even more difficult when dealing with wet and therefore even heavier crops. The increased weight made transportation more demanding, further affecting productivity and income. The combination of financial strain, reduced yields, and physical exhaustion was reported to contribute to stress and emotional distress, with some participants describing feelings of discouragement and hopelessness during prolonged dry spells. For more information on the impact of climate-related hazards on physical and mental health, please see [Section 1.18: Impacts and community responses – Physical and mental health](#).

## **ii) Livestock and Animal Husbandry**

Farmers reported that extreme heat and prolonged droughts severely affected livestock health, with water scarcity and poor pasture conditions leading to weight loss, reduced milk production, and increased mortality rates. Many herders were forced to travel long distances in search of water and grazing land, isolating them from their families and increasing the cost of living. The shortage of pasture also led to tensions between host and refugee communities as herders encroached on restricted grazing areas.

Veterinary costs rose due to an increase in livestock diseases, with diarrhoea, foot-and-mouth disease, and tick infestations being commonly reported by the farmers. Chickens also allegedly suffered from respiratory issues and infections, affecting their productivity. While some herders adopted zero-grazing practices to cope, this allegedly led to an increase in conflict. It is possible that the zero-grazing policies increased the demand for land to grow fodder and house livestock. In already crowded or contested areas, this shift could have intensified disputes over land use

<sup>70</sup> For instance, rats can transmit *Leptospira* (leptospirosis), *Salmonella* (salmonellosis), *Yersinia pestis* (plague), *Streptobacillus moniliformis* (rat-bite fever), *Francisella tularensis* (tularemia), *Hantavirus* (hantavirus pulmonary syndrome), *Lymphocytic choriomeningitis virus* (LCMV), *Lassa virus* (Lassa fever), *Rickettsia typhi* (murine typhus), *Mpox virus* (formerly monkeypox), and *Angiostrongylus cantonensis* (rat lungworm disease). For more information, please visit: Centers for Disease Control and Prevention, *Controlling Wild Rodent Infestations*, 2024. <https://www.cdc.gov/healthy-pets/rodent-control/>

and sparked tensions with crop farmers, particularly if land rights are unclear or unequally enforced. Others relocated livestock to areas such as Acholi land or Maburu Settlement through agreements facilitated by local leaders.

Flooding further complicated livestock management, as submerged grazing areas forced animals into confined spaces, increasing the risk of disease transmission and drowning. Farmers reported that flooded shelters and waterlogged pathways made relocation difficult. Poor hygiene in flooded conditions was said to contribute to respiratory infections and foot diseases among livestock. Additionally, the scarcity of grazing land throughout the year and water during the dry season led to nutritional stress, further reducing milk production and raising the price of dairy products.

Farmers explained that grazing cattle on dewy grass can pose health risks, for example in the early morning when pastures are wet or during the rainy season. This limits herders' ability to graze their cattle earlier in the day to minimise exposure to extreme heat.<sup>71</sup> The flood analysis indicated the presence of waterlogged areas, especially during peak flood years like 2022. The analysis showed that 16% of agricultural and rangeland areas were affected by flooding in 2022, which would likely result in waterlogging, particularly in flat and poorly drained regions, impacting crop growth and pasture availability.

While not explicitly mentioned by farmers for this assessment, heat stress is a major challenge for livestock globally and a key factor influencing growth, development, and productivity. It has been identified by CGIAR as one of the effects of climate change that farmers need to adapt to. It is particularly problematic in the tropical belt and arid regions, where high temperatures constrain animal productivity. When exposed to heat stress, livestock struggle to regulate their body temperature, leading to impaired cooling mechanisms, reduced feed intake, and lower metabolic heat production as a protective response. This ultimately reduces productivity, affecting both growth rates and milk yields.<sup>72</sup>

### iii) Fishing and Aquatic Resources

According to those engaged in fishing in the streams and rivers, excessive heat and reduced rainfall have substantially affected fish populations, leading to lower catches, reduced species diversity, and declining reproduction rates. Interview participants noted that high temperatures cause fish to hide in the mud or die, disrupting supply chains and increasing fish prices in local markets.

Flooding, on the other hand, creates both risks and opportunities. Fishermen reported that contaminated water leads to high fish mortality, particularly affecting species such as perch. Strong currents increase the risk of boat losses, accidents, and drowning. Heavy rains and winds raise maintenance costs for fishing equipment, while poor sanitation practices near water bodies during floods spread diseases such as cholera and diarrhoea, further reducing productivity. However, some participants noted that flooding can temporarily improve fishing conditions by raising water levels and increasing species diversity, making certain types of fish easier to catch.

71 Indeed, wet conditions increase the risk of bloat (frothy bloat), especially when cattle graze rapidly on lush, high-protein forages like legumes (e.g., cowpea, groundnut, and soybean). Additionally, dewy grass in low-lying, waterlogged areas can expose cattle to liver fluke infections (*Fasciolosis*), a common issue in tropical regions with poor drainage. Foot rot is another risk, as prolonged moisture softens hooves, making cattle more vulnerable to bacterial infections. Furthermore, grazing on magnesium-deficient pastures, particularly during the wet season, can contribute to grass tetany (hypomagnesemia), a metabolic disorder that affects lactating cows and can cause muscle tremors or even death. In cooler early mornings, wet grass may also contribute to respiratory illnesses like pneumonia, particularly in young or weak cattle. Given these risks, many herders prefer to delay grazing until the grass has dried, reducing the likelihood of disease and digestive issues.

72 John Mutua, et al, Heat Stress Assessment for Dairy Cattle and Pig in Uganda, 2020, <https://www.bing.com/ck/a?!&p=d32b3246b86d2406ba74cca69f2db7361188ce80ac6983b9494f04bd e475aa1fJmldtHM9MTczOTkyMzIwMA&ptn=3&ver=2&hsh=4&fclid=110df513-02a3-66e7-3942->

These findings align with climate-related assessments on the impact of heat on fish, which have been well documented. Heat stress is a major threat to fish in East Africa, particularly in freshwater systems like Lake Victoria and the Nile Basin. Rising water temperatures reduce oxygen levels, causing hypoxia, slower growth, and higher mortality in species like Nile tilapia and African catfish. Warmer waters also trigger harmful algal blooms, further depleting oxygen and poisoning fish. In aquaculture, excessive heat increases metabolic demands, leading to higher mortality and economic losses. Additionally, fish may alter migration patterns, forcing fishing communities to travel further for viable catches.<sup>73</sup>

#### iv) Coping Strategies

Farmers reported several strategies to cope with climate-related challenges. Though not quantifiable, some farmers adjusted their planting seasons to align with changing weather patterns, with refugees and host community members shifting towards drought-resistant crops such as sorghum, cassava, groundnuts, sweet potatoes and yams. Some farmers adopted food storage strategies to protect against potential shortages and income loss by storing surplus food for later sale at higher prices, thereby compensating for reduced earnings during lean periods.

To protect their livestock, some herders grew pasture and dug wells to ensure water availability during dry periods. Some constructed drainage channels to divert flood waters away from fields and granaries, while others elevated storage structures to keep crops safe from water damage.

Despite these efforts, interview participants reported that poor road conditions continued to hinder transportation, with slippery roads increasing accident risks and limiting the movement of goods. Some farmers used three-wheeled motorcycles to transport crops, though this method remained ineffective under severe weather conditions.

### f) Support Requested by Farmers

#### i) Coping strategies

- Improved irrigation infrastructure to sustain crop production during droughts.
- Access to drought-resistant crops and livestock breeds suited to dry conditions to maintain food security.
- Shade structures for livestock to reduce heat stress and prevent mortality.
- Increased veterinary support to manage heat-related livestock diseases.
- Flood-resistant agriculture to protect crops from waterlogging and erosion.
- Strengthened embankments and drainage systems to mitigate flood damage.
- Raised planting techniques to prevent crop loss in flood-prone areas.

#### ii) Financial and market support

- Emergency financial aid to help recover from crop and livestock losses due to extreme weather.
- Increased access to alternative income opportunities such as vocational training and small-scale businesses.
- Better transport infrastructure to improve market access and reduce delays caused by flood-damaged roads and heat-related vehicle breakdowns.
- Improved storage facilities to prevent post-harvest losses and maintain food quality.

<sup>73</sup> World Fish Center, *Impacts of Climate Change and Variability on Fish Value Chains in Uganda*, 2018. <https://digitalarchive.worldfishcenter.org/server/api/core/bitstreams/ae9c3cb9-a6bf-461f-bded-7ea58569f0b3/content>



### iii) Gender-specific needs

- Water storage solutions to ease the burden of water collection, especially for women.
- Support for home gardens to improve food security and self-sufficiency.
- Vocational training programs for women in areas such as tailoring, soap-making, and hairdressing to provide alternative sources of income.

### iv) Long-term climate adaptation strategies

- Mechanised irrigation systems to reduce dependency on rainfall.
- Reforestation initiatives to restore soil fertility and improve agricultural sustainability.

## g) Zoom: Household labour and Domestic Responsibilities

Household labour, which remains unpaid when performed within one's own household, typically includes water collection, cooking, fetching firewood, cleaning, and caregiving responsibilities. Despite being essential for household and community well-being, this work is largely invisible in economic and livelihood measures and disproportionately carried out by women and girls.<sup>74</sup>

The issue of unpaid care work is a recognised development concern and is embedded in the Global Agenda 2030, specifically under Sustainable Development Goal (SDG) 5, Target 5.4, which calls for the recognition, reduction, and redistribution of unpaid domestic work.<sup>75</sup> According to UN Women, women and girls aged 15 and older in Uganda spend 14.6% of their time on unpaid care and domestic work, compared to 6.7% for men.<sup>76</sup> This disparity limits women's opportunities for paid employment, often forcing them to work longer hours as they balance both paid and unpaid labour. Women's unpaid work subsidises the cost of care, sustaining families and economies while compensating for the lack of formal social services.<sup>77</sup>

Structural inequalities intersect with climate change, further worsening the burden on women. A 2019 study by the Uganda Bureau of Statistics (UBOS) identified gender-based violence, low asset ownership, and limited employment opportunities for women as key gender inequalities in the country.<sup>78</sup> These disparities shape how different groups experience economic stressors, weather shocks, and climate change. UN Women has emphasised that climate change will continue to exacerbate the burden of unpaid household labour, as women face increasing challenges in water collection, firewood access, food preparation, and caregiving due to droughts, floods, and extreme heat events.<sup>79</sup>

The effects of these climate hazards are already evident in communities like Nyumanzi, where household labour is becoming increasingly difficult to sustain. 66% of the population in and around Nyumanzi Settlement saw their household chores affected by extreme heat, 69% by prolonged dry spells and water scarcity, and 63% by floods in the 12 months preceding data collection.

<sup>74</sup> UN Women, *Landscape of Care Work in Uganda*, 2024. [https://africa.unwomen.org/sites/default/files/2024-06/landscape\\_of\\_care\\_-\\_uganda.pdf](https://africa.unwomen.org/sites/default/files/2024-06/landscape_of_care_-_uganda.pdf)

<sup>75</sup> UNSD, *The Sustainable Development Goals Report 2016*, 2016. <https://unstats.un.org/sdgs/report/2016/The%20Sustainable%20Development%20Goals%20Report%202016.pdf>

<sup>76</sup> UN Women, *Uganda*, 2024. <https://data.unwomen.org/country/uganda>. Accessed on 20 February 2025

<sup>77</sup> UN Women, *Landscape of Care Work in Uganda*, 2024

<sup>78</sup> UBOS, *Gender Issues in Uganda: An Analysis of Gender Based Violence, Asset Ownership and Employment*, 2019. [https://www.ubos.org/wp-content/uploads/publications/03\\_2019UBOS\\_Gender\\_Issues\\_Report\\_2019.pdf](https://www.ubos.org/wp-content/uploads/publications/03_2019UBOS_Gender_Issues_Report_2019.pdf)

<sup>79</sup> UN Women, *Landscape of Care Work in Uganda*, 2024

## i) Water Collection and Household Chores

The association between water insecurity and gender-based violence in the region is well documented across the globe. Women face physical abuse by men when they do not bring back enough water, when asking men for help with fetching water, or when they take too long at water points, leaving insufficient time for other domestic tasks. Sexual violence is also a major risk, with reports of men committing sexual assault, rape, attempted rape, and issuing threats of rape against women and children at water points or along the routes to fetch water.<sup>80</sup>

Women interviewees reported that fetching water had become increasingly difficult, particularly during dry spells, when water sources become less reliable. Wells allegedly often dried up temporarily during the hottest hours of the day, leading to overuse of water pumps and mechanical breakdowns. Women and girls often rose as early as 4am to fetch water before wells dried up, leading to sleep deprivation. One woman noted that to be able to go and fetch water, she had to ask her neighbour to watch over her kids. In exchange, she had to bring back additional water for that neighbour, adding to the physical labour and reducing the water she could bring back for her own household.

Water scarcity forced women and girls to travel longer distances in search of alternative water sources, increasing the time and physical effort required for this essential task, and exposing them to even more security risks. Some women reported having to wait by the well for extended periods, even overnight, to secure water for their households, all while fearing the risk of sexual and other forms of violence by men. Additionally, women returning home late from water collection faced suspicions from their husbands, sometimes leading to household disputes and, in some cases, gender-based violence. Returning home late also increased their exposure to security risks, including theft and harassment by men and accidents on poorly lit roads.

In Uganda, a study found that women, fearing intimate male partner violence due to insufficient household water, placed excessive water collection demands on their children.<sup>81</sup> Another study in Uganda further highlighted these dynamics, noting that children who took too long to fetch water often faced physical violence. Additionally, conflicts over water within households were found to contribute to intergenerational cycles of violence, perpetuated in part by water scarcity and collection challenges.<sup>82,83</sup>

Some respondents noted that boreholes and wells produced lower yields, while others reported issues of salinisation, making the available water unsuitable for drinking and domestic use.<sup>84</sup> Interview participants explained that in dry periods, water scarcity also limited the ability to maintain hygiene practices. Households often had to prioritise drinking and cooking water, reducing the amount available for washing clothes, cleaning homes, and maintaining sanitation facilities.

Flooding events damaged sanitation infrastructure, making it harder to maintain clean water, latrines, and washing facilities. Respondents noted that repairing household infrastructure after floods was a significant challenge, as trenches and drainage systems struggled to manage excess water. Households often experienced difficulties in keeping their living spaces clean, particularly when mud and debris accumulated. These conditions created unsanitary environments, requiring additional labour and time to restore hygiene, a burden often falling on women and girls.

80 Tallman et al., *Water insecurity and gender-based violence: A global review of the evidence*, 2022. <https://wires.onlinelibrary.wiley.com/doi/full/10.1002/wat2.1619>

81 Mushavi et al., "When you have no water, it means you have no peace": A mixed-method, whole-population study of water insecurity and depression in rural Uganda, 2020. <https://pmc.ncbi.nlm.nih.gov/articles/PMC6936324/>

82 Pommells et al., *Gender Violence as a Water, Sanitation, and Hygiene Risk: Uncovering Violence Against Women and Girls as It Pertains to Poor WaSH Access*, 2018. <https://pubmed.ncbi.nlm.nih.gov/29546802/>

83 For more information on water insecurity and the ensuing violence committed by men against women and girls, please see the Tallman, et al., *Water insecurity and gender-based violence: A global review of the evidence*, 2022.

84 Salinisation can occur due to hydrogeological changes driven by water table depletion, increased evaporation, and mineral concentration in underground aquifers. Shallow wells and boreholes are particularly vulnerable to these hydrogeological changes.

## ii) Impact of Climate on Cooking and Food Preparation

Climate-related hazards, particularly flooding and extreme heat, reportedly disrupted food preparation and access to cooking fuel in affected communities in and around Nyumanzi Settlement. This disruption affected households' ability to prepare meals, often forcing families to adjust their cooking habits or reduce the number of meals they prepared.

Flooding made it harder to store and use firewood, as wet conditions rendered it unusable for cooking. Respondents noted that in some cases, efforts to dry firewood were unsuccessful, leading to disruptions in meal preparation. This concern was equally noted in the 2023 U-Learn assessment<sup>85</sup> on Knowledge, Attitudes and Practices (KAP) on energy, environment and climate in the settlements.

Extreme heat conditions also affect food preparation. Respondents noted that high temperatures influenced the time spent cooking, as heat exposure made cooking more physically demanding. Additionally, heat contributed to food spoilage, requiring households to adjust their meal preparation routines to avoid wasting ingredients.

Some women respondents highlighted difficulties in maintaining cooking spaces during floods. The presence of excess water and muddy conditions affected where and how food is prepared, making the cooking process more challenging. In some cases, these conditions reduced the efficiency of food preparation, forcing women to adapt their methods based on available resources.

## iii) Health and Care Work

The burden of care work is intensified by Uganda's demographic structure. As of 2023, 44% of the population was under 14 years old, and 2% was aged 65 years or older, resulting in a high number of dependents requiring care.<sup>86,87</sup> Additionally, according to the 2017 Functional Disability Survey, 16.5% of adults over 18 years, 7.5% of children aged 5-17, and 3.5% of children aged 2-4 have a disability, further increasing the demand for caregiving responsibilities.<sup>88</sup>

The effects of extreme heat, flooding, and disease outbreaks increased care responsibilities within households in and around Nyumanzi as well. Respondents noted an increase in heat-related illnesses, respiratory infections, and sanitation-related diseases, which required more effort to manage. Women, who are often the primary caregivers, bore the brunt of this additional labour, taking care of children, the elderly, and the sick. Flooding further exacerbated sanitation-related health issues, forcing caregivers to spend more time ensuring household hygiene and managing illness. For more information on the impact of climate-related hazards on health, see Section 1.18: Impacts and Community Responses - Physical and Mental Health.

## iv) Coping Strategies

No positive coping strategies were reported, suggesting that women had little choice but to endure these challenges. This was likely due to limited access to services that could reduce their household labour, compounded by socioeconomic vulnerabilities and structural barriers, such as restrictive social norms, which severely limited their options.

85 U-Learn, *Energy Practices in Ugandan Settlements Amid Environmental Challenges*, 2024.

86 World Bank Group, *Population ages 0-14 (% of total population) – Uganda*, 2024. <https://data.worldbank.org/indicator/SP.POP.0014.TO.ZS>

87 World Bank Group, *Population ages 65 and above (% of total population) – Uganda*, 2024. <https://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS>

88 UBOS, *Uganda Functional Difficulties Survey*, 2017. [https://www.ubos.org/wp-content/uploads/publications/07\\_2019Uganda\\_Functional\\_Difficulties\\_Survey\\_2017.pdf](https://www.ubos.org/wp-content/uploads/publications/07_2019Uganda_Functional_Difficulties_Survey_2017.pdf)

Some women adjusted their cooking schedules, choosing to prepare meals at different times of the day to accommodate environmental conditions. Others attempted to store firewood in rain-protected areas to keep it dry, though this was not always successful.

The absence of positive coping strategies in and around Nyumanzi Settlement raises concerns about the potential reliance on negative coping mechanisms. For instance, women frequently woke up before dawn to fetch water during the dry season, reducing their sleep. While this allowed them to secure water, it is an unsustainable strategy with potentially serious consequences for their mental and physical well-being. Sleep deprivation, combined with the physically demanding nature of household labour, could lead to exhaustion, chronic stress, and long-term health impacts.

Though not explicitly mentioned by interview participants in this assessment, research in Uganda highlights transactional sex as a negative coping strategy that women and girls may be forced into to access basic resources like water. This practice exposes them to physical violence, trauma, disease and social stigma, reinforcing cycles of vulnerability.<sup>89,90</sup> The lack of alternative coping options may leave some women with no safe or sustainable way to navigate resource scarcity, further entrenching the unequal burden they bear.

## v) Support requested by women

- **Promote rainwater harvesting:** Encourage communities to store rainwater during the rainy season for dry periods.
- **Enhance water treatment:** Distribute chlorine tablets, portable filters, and other water treatment solutions.
- **Support policy development:** Advocate for government policies prioritizing water and sanitation in climate adaptation.
- **Expand water access:** Install additional boreholes and provide safe water storage containers.
- **Develop drainage systems:** Improve drainage infrastructure to control flooding and reduce contamination.
- **Improve water collection systems:** Reduce long-distance water collection by increasing nearby boreholes.
- **Strengthen security measures:** Improve safety around water points and latrines to reduce gender-based violence risks.

89 Tallman et al., *Water insecurity and gender-based violence: A global review of the evidence*, 2022. <https://wires.onlinelibrary.wiley.com/doi/full/10.1002/wat2.1619>

90 Logie et al., *Water and food insecurity and linkages with physical and sexual intimate partner violence among urban refugee youth in Kampala, Uganda: cross-sectional survey findings*, 2024. <https://iwaponline.com/washdev/article/14/3/261/100835/Water-and-food-insecurity-and-linkages-with>



## 1.18 Impacts and Community Responses - Physical and Mental Health

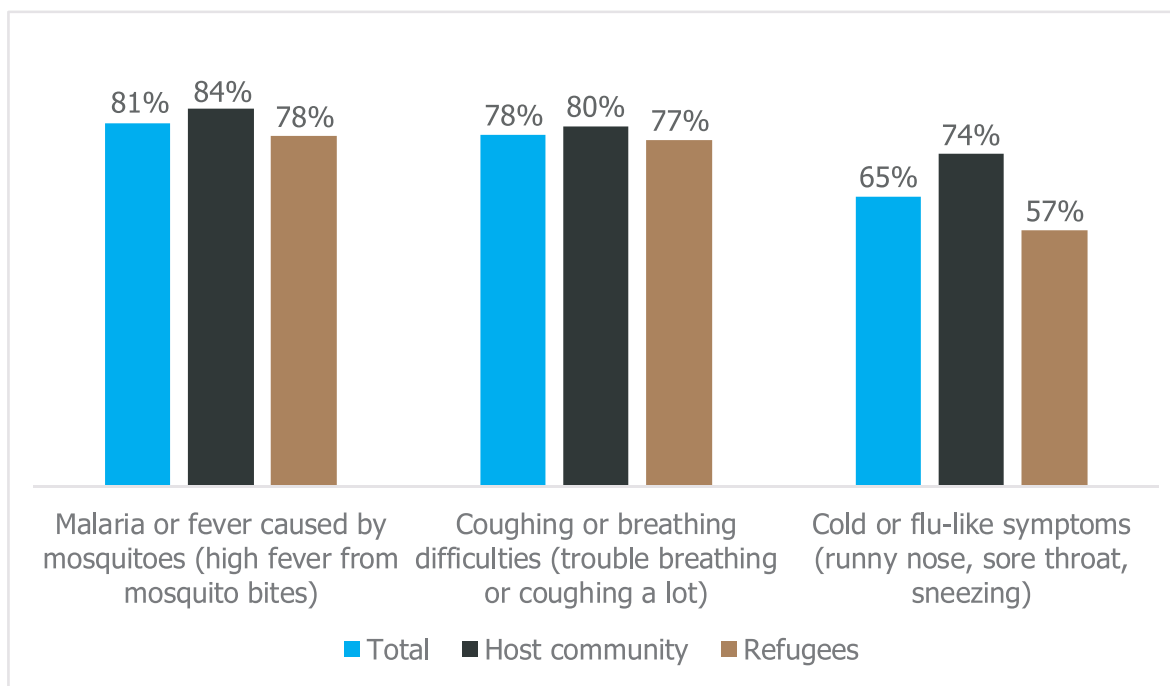
This section explores the health impacts of climate-related hazards in Nyumanzi Settlement, highlighting the severe effects on public health, especially for vulnerable groups such as women, children, the elderly and persons with disabilities. It discusses the immediate health consequences, including increased disease prevalence due to flooding and extreme heat, as well as the rise in mental health challenges like stress, depression and anxiety. The section also examines disruptions to healthcare access, with flooding and heatwaves making it difficult for people to reach medical services. It concludes with response strategies adopted by the community to mitigate these health risks, as well as the support requested by healthcare professionals and community members.

### a) Immediate Health Impact and Safety Risks

Climate-related hazards reportedly led to a surge in diseases in Nyumanzi.

**Among interviewed households in and around Nyumanzi that experienced flooding, 46% reported at least one household member feeling unwell or sick allegedly due to the flooding and its health consequences between three to five times in the 12 months preceding data collection.** The most commonly affected groups were infants and young children, reported by 90% of affected households, followed by elderly individuals at 46%. The primary health conditions reported by affected households included malaria (reported by 81% of households, though the method of diagnosis – self-reported or medical – was not specified), coughing or breathing difficulties (78%), cold or flu-like symptoms (65%), and fever (52%).

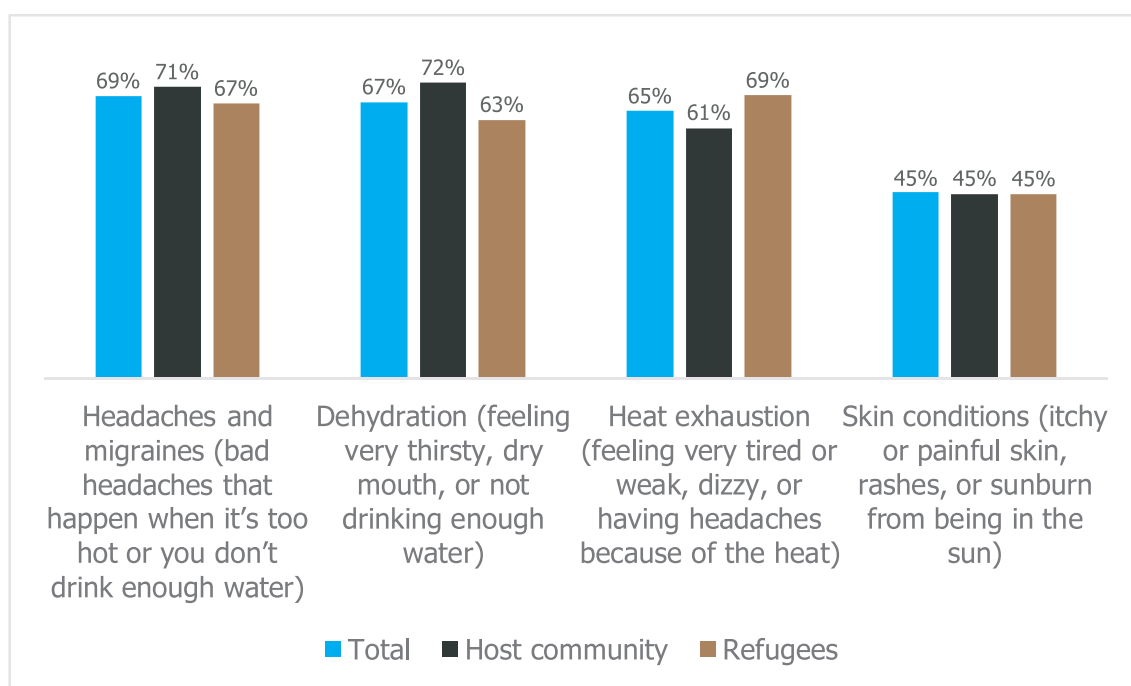
Interviewed healthcare staff explained that flooding increased the prevalence of cholera, typhoid, diarrhoea, pneumonia, skin infections, and malaria due to heightened mosquito activity. Children, pregnant women, and the elderly were particularly susceptible to these diseases. Inadequate food availability caused by floods allegedly resulted in malnutrition and undernutrition, leading to diseases such as kwashiorkor and anaemia.



**Figure 8.** Top 3 symptoms reportedly experienced following floods, by % of households with at least one member feeling ill following floods in the past 12 months

**Among interviewed households in and around Nyumanzi that experienced extreme heat, 47% reported at least one household member feeling unwell or sick due to heat between three to five times in the 12 months preceding data collection.** The most commonly affected groups were infants and young children, reported by 83% of affected households, followed by elderly individuals at 44%. The primary symptoms experienced by at least one unwell household member included headaches and migraines (reported by 69% of affected households), dehydration (67%), heat exhaustion (65%), and skin conditions (45%). The main cooling strategies were to stay in the shade during the day (reported by 90% of affected households), drink more water (78%), sleep outside at night (73%), and bathe frequently (72%).

These findings align with the feedback from healthcare professionals in Nyumanzi, according to whom **drought and extreme heat exacerbated dehydration, headaches, respiratory illnesses, and eye infections.** Schoolchildren commonly suffered from heat rashes and fatigue, while elderly individuals experienced exhaustion and joint pain when forced to walk long distances. The destruction of crops due to extreme heat led to food shortages, compounding malnutrition risks. Pregnant women were particularly at risk, experiencing unconsciousness, miscarriages, and preterm births due to extreme heat exposure.



**Figure 9.** *Top 4 symptoms reportedly experienced due to extreme heat, by % of households with at least one member feeling ill during extreme heat in the past 12 months*

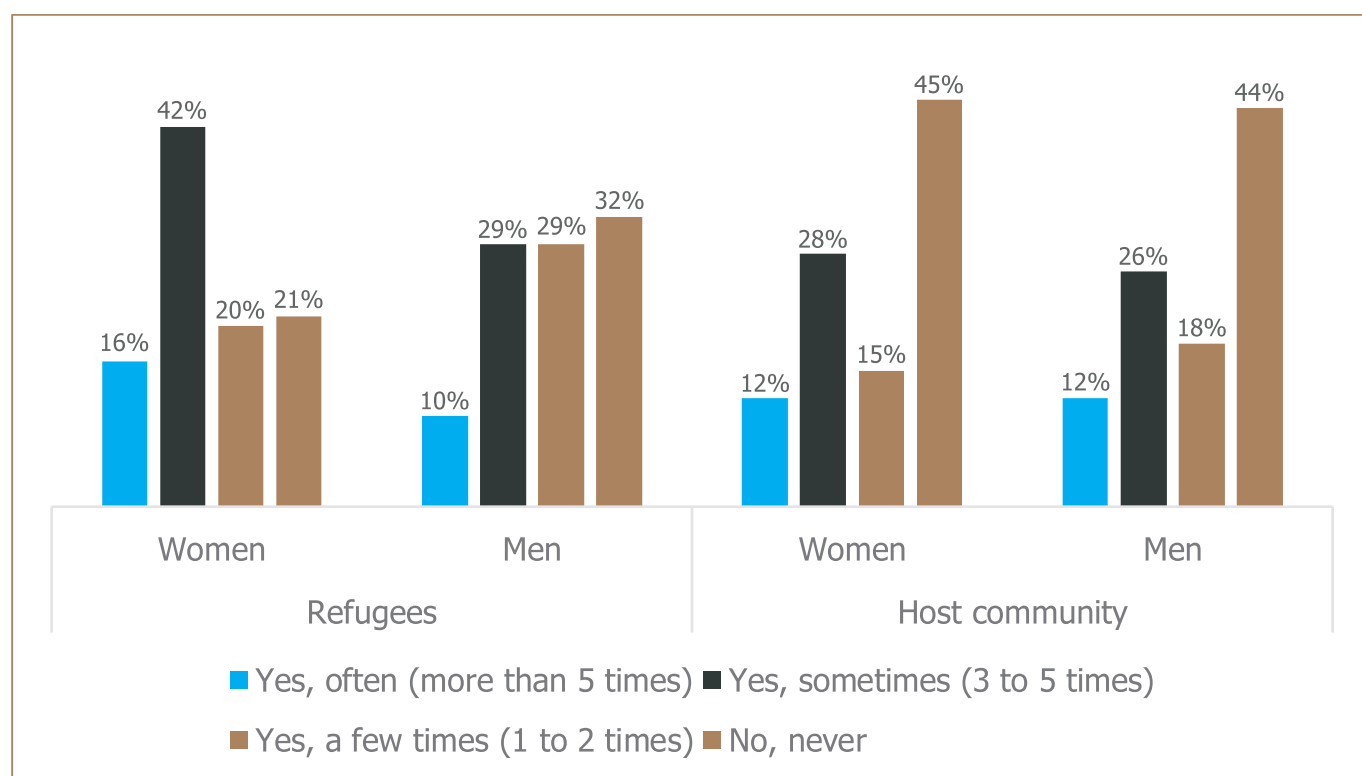
**Healthcare professionals explained that mental health has also been affected, with stress, depression, and suicidal ideation reportedly increasing, especially among women, youth, and farmers who face economic losses due to climate impacts.** The destruction of homes and businesses during floods has further contributed to mental distress, anxiety, and financial insecurity. This corroborates with the qualitative feedback from refugees and host community members who pointed at the mental burden of food shortages leading to increased anxiety, depression, and household tensions.

Healthcare professionals highlighted that flooding increases drowning risks, particularly for children, while the **rise in snake activity in waterlogged areas** has resulted in fatal bites, a concern echoed by farmers. Additionally, both refugees and host community members reported during qualitative discussions that **snake bites are a recurring concern also during extreme heat** when snakes seek refuge in human shelters. They explained that dry spells lead to **heightened insect activity, with biting flies and scorpions causing painful stings, secondary infections, and allergic reactions,** particularly among children. During dry conditions, house fires have led to property destruction, while dusty roads contribute to vision problems and traffic accidents.

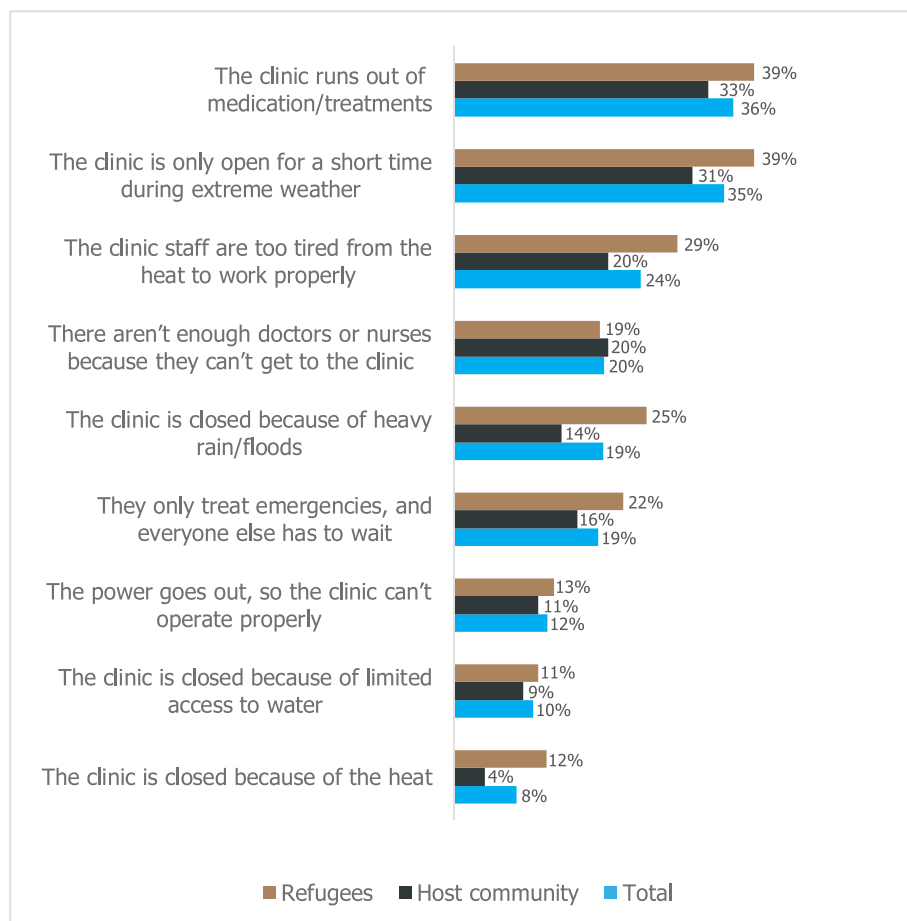
## b) Access and Service Disruptions

**Healthcare professionals in Nyumanzi reported that flooding and heatwaves severely disrupted access to healthcare services.** Flooded roads cut off entire populations from health centres, leaving pregnant women, the elderly, and breastfeeding mothers without access to care. This resulted in missed antenatal visits, untreated infections, and increased infant morbidity and maternal complications. Patients with chronic conditions such as tuberculosis struggled to adhere to their treatment schedules due to displacement or access barriers. **28% of the population reported that flooding had made access to healthcare services difficult three to five times in the 12 months preceding data collection.** Among those affected by floods, the impact varied: 40% of flood-affected refugees reported difficulties accessing healthcare, compared to 27% of flood-affected host community members. The disparity was even more pronounced among refugee women, 42% of whom experienced access challenges, compared to 29% of refugee men.

*Figure 10. Frequency of difficulties accessing a healthcare facility (clinic, hospital, pharmacy) in the past 12 months due to floods or heavy rains, by % of households having reportedly experienced floods or heavy rains*



Survey data further supports these access disruptions, with 36% of respondents affected by extreme weather events reporting that clinics ran out of medication or treatments specifically due to extreme weather in the 12 months prior to data collection. Additionally, 35% noted that clinics operated for only short periods during extreme conditions, further limiting access. Staff exhaustion was also a key perceived barrier, with 24% reporting that they thought healthcare workers were too fatigued from the heat to work properly, and 20% noting that doctors and nurses allegedly could not reach clinics due to impassable roads. Clinic closures due to flooding were reported by 19% of respondents, while 8% cited closures due to extreme heat.



*Figure 11. Impacts of extreme temperature, flooding, and prolonged dry spells on healthcare access in the past 12 months, by % of respondents who agreed with the statements.*

Healthcare professionals pointed out that flooding could force the closure of clinics for several days, particularly those near the market in Nyumanzi, and contribute to overcrowding when facilities remained open. Healthcare professionals struggled to meet demand due to delayed service hours, often prioritising life-threatening cases at the expense of routine care. This aligns with the quantitative survey findings according to which 19% of respondents noted that clinics prioritised emergency cases only, leading to longer wait times for other conditions.

**Extreme heat discouraged patients from travelling to health centres, particularly those with chronic illnesses like hypertension.** Some patients turned to traditional remedies, which may not provide adequate treatment. Survey results reinforce this finding, with 41% of respondents reporting that they relied on traditional medicine or home remedies when access to formal healthcare was unavailable due to extreme weather events. Additionally, 49% of respondents stated that they called medical structures such as Village Health Teams to receive care at home, highlighting the importance of mobile healthcare services in extreme weather conditions. A further 31% travelled to different areas where healthcare services were available, while 24% waited until access was restored, increasing the risk of delayed treatment and complications.

**Flooding and extreme heat damaged medical infrastructure, including screening points, storage facilities, and medicines.** Poor drainage and a lack of flood-resistant structures left health facilities vulnerable to repeated disruptions. Healthcare workers also experienced delays in delivering services due to extreme weather, further complicating patient care. Survey data suggests that power outages also affected service provision, with 12% of respondents reporting that clinics allegedly could not operate properly due to electricity failures.



### c) Population-Specific Health Vulnerabilities

Climate-related hazards pose unique risks to different groups within the community. According to the interviewed healthcare professionals, children are highly vulnerable to waterborne diseases such as diarrhoea, giardiasis, and malaria during and just after floods, as they frequently play in unsanitary water. Drought and extreme heat contribute to malnutrition, dehydration, and heat-related illnesses such as heat rashes and fever. Limited healthcare access during floods further worsens their health risks, and some children have drowned in floodwaters.

According to healthcare professionals, women in and around Nyumanzi, and particularly **pregnant women and breastfeeding mothers, face heightened risks of malaria, anaemia, and urinary infections due to flooding**. Poor road conditions and healthcare access barriers lead to increased complications such as miscarriages and untreated infections. Food insecurity, alongside rising cases of gender-based violence and harassment by men during floods exacerbate their vulnerability.

**Farmers** also experience climate-related health risks, including snake bites and waterborne diseases during floods and heat stress and dehydration during droughts. The economic strain caused by crop failures contributes to increased mental health challenges, with some farmers experiencing severe distress due to their inability to provide for their families.

**Elderly individuals** reportedly struggle with limited mobility (e.g. in the case of debris, waterlogged roads, or damaged infrastructure), making it difficult for them to access healthcare or escape hazardous conditions. They are at higher risk of malaria, pneumonia, exhaustion, joint pain, and dehydration, particularly during extreme heat and floods.

According to IMPACT's 2024 Multi-Sector Needs Assessment (MSNA), **24% of refugee households reported having at least one member with a Level 3 disability**. The Washington Group Short Set (WGSS) Level 3 criteria means that they experience "a lot of physical or cognitive difficulties." **Persons with physical disabilities** — which in some cases included elderly individuals — were reported to face severe challenges during floods and heatwaves. (Cognitive disabilities were not mentioned during interviews.) Flood-related shelter collapses leave them without adequate support, increasing their vulnerability to health risks. Intense heat causes fatigue, joint pain, and heat exhaustion, especially for those who cannot afford or wear protective footwear. Floods expose persons with disabilities to waterborne diseases and cold-related illnesses due to inadequate drainage and poorly constructed shelters, while water scarcity during droughts increases hygiene-related infections. Limited mobility, impassable roads, and a lack of outreach services further restrict access to healthcare, leaving many unable to receive timely medical attention. Overcrowded health centres with inaccessible waiting areas force persons with physical disabilities to endure long hours in extreme weather.

While not explicitly mentioned during the quantitative and qualitative interviews, **persons with disabilities other than physical (vision, auditory, cognitive, chronic diseases) are likely also severely affected by climate-related hazard**. Ad-hoc interviews with humanitarian workers specialising in disability inclusion emphasized the need to consider all forms of disabilities rather than focusing solely on physical disabilities. For example, those with mental health conditions or neurological impairments may struggle to regulate body temperature or understand the need to hydrate, leading to dehydration, confusion, or heatstroke. Emergency alerts are often radio-based or rely on sirens, which do not accommodate those with hearing impairments. Persons with vision impairments may struggle to navigate flooded areas or receive crucial hazard information. Floods can destroy or wash away assistive aids, such as white canes, hearing aids, crutches, and wheelchairs. Drought conditions lead to longer distances to water points, particularly affecting persons with disabilities who depend on others to fetch water. In some cases, they may be left without access to adequate hydration, worsening dehydration and related health conditions. Those with psycho-social disabilities, are highly vulnerable to trauma caused by displacement, food insecurity, and lack of specialised support services after extreme weather events.

## d) Response Strategies

Communities in Nyumanzi and surrounding areas developed various strategies to mitigate health risks from climate-related hazards. **In response to frequent flooding, residents dug drainage channels, raised roads, and filled sacks with soil to control water flow.** Some households reinforced their homes with stronger materials or raised doorsteps to prevent water intrusion. Village Health Teams (VHTs) conducted community education campaigns on sanitation, disease prevention, and proper hygiene practices to reduce risks associated with waterborne diseases. When flooding occurred, people relocated to higher ground or community shelters and sought medical assistance at health centres for flood-related illnesses.

**To cope with extreme heat, community members prioritised hydration, wore light clothing, and sought shade under trees or sheltered areas.** Some adjusted their daily schedules to avoid working during peak heat hours. Some households increased ventilation in their shelters and, when necessary, individuals slept outside at night to stay cool. Additionally, some started planting trees to create shaded areas and storing water in clay pots to keep it cooler for drinking.

During periods of drought, families **rationed water by prioritising drinking needs over other uses.** Many sought treatment at health centres when dehydration or malnutrition-related illnesses worsened. Some relied on neighbours or humanitarian aid for additional food and water. Refugee and host community members stored water in large containers during the wet season for use during dry periods and modified their diets by incorporating more drought-resistant crops. Others dug shallow wells near seasonal water sources to increase availability or collect rainwater during the wet season for household use.

Health education and sensitisation efforts involved religious leaders and community influencers who promoted modern healthcare practices and disease prevention. **Campaigns focused on reducing harmful traditional treatments,** such as chest cutting for pneumonia, which reportedly led to a decline in severe infections, including gastrointestinal diseases and eye infections. Traditional remedies remain widely used, with neem tree leaves and other herbs treating malaria, diarrhoea and stomach pain. Caregivers frequently prepared salt and water solutions for rehydration, and elderly individuals administered herbal treatments for common ailments. While traditional medicine remained prevalent, many households sought formal healthcare when these remedies proved ineffective, possibly indicating a gradual shift toward modern medical practices.

Despite some successful adaptations, health professionals highlighted the **absence of a formal disaster preparedness plan.** Most responses remained informal, focusing on community awareness and medical outreach programs. As a result, populations remained vulnerable to recurring health crises linked to extreme weather events.

## e) Support Requested by Healthcare Professionals and Community Members

### 1. Heat

- Increase access to clean drinking water to prevent heat-related illnesses.
- Improve shelter ventilation to reduce indoor heat buildup.
- Provide community health support through clinics for managing heat-related illnesses.
- Implement government-supported cooling measures, such as public cooling areas and improved access to shade.
- Plant trees to mitigate deforestation, cool health facilities, and conserve the environment.

## 2. Drought

- Improve access to clean water by investing in water storage and distribution systems.
- Expand food assistance programs to address malnutrition and hunger.
- Promote hygiene education to prevent infections despite limited water availability.
- Strengthen government intervention in resource allocation to support sustainable water and food access.
- Adapt outreach activities to account for extreme weather conditions, such as conducting services in cooler morning hours instead of afternoon heat.

## 3. Floods

- Enhance drainage and sanitation systems to reduce disease transmission.
- Strengthen emergency healthcare response through mobile clinics and rapid medical support.
- Distribute protective supplies, including mosquito nets, clean drinking water, and sanitation kits.
- Provide mental health support services such as counselling and community programs to help individuals cope with trauma.
- Build weather-resistant latrines, flood-proof roads, and proper drainage systems to enhance healthcare access.
- Provide training to equip healthcare staff in managing climate-related hazards.

## 4. General Healthcare and Infrastructure Improvements

- Invest in solar power and hydroelectric connectivity to prevent power blackouts, particularly during medical emergencies.
- Expand maternity wards, increase oxygen equipment for pneumonia patients, and improve medicine storage to prevent spoilage.

To address issues caused by climate-related hazards, **persons with physical disabilities proposed several measures.** They emphasised the need for permanent, flood-resistant housing and accessible latrines to improve hygiene and safety. Some called for tap water access within households of persons with disabilities, especially during droughts, to reduce dependence on distant boreholes. Expanding medical outreach services and designating accessible waiting areas at health centres would also enhance their ability to seek treatment. Additionally, financial support – including cash grants, business opportunities, and scholarships for children with disabilities – could help mitigate economic hardships caused by climate-related hazards.

Community-based initiatives remained a critical lifeline for persons with disabilities. Groups dedicated to income-generating skills training – such as tailoring, shoemaking, and hairdressing – could provide economic independence while fostering social support networks. Local governments were also encouraged to increase the representation of persons with disabilities in leadership roles and integrate their specific needs into disaster preparedness and climate adaptation policies to ensure no one is left behind.

Implementing these measures would benefit not only persons with disabilities but the entire community. Improved healthcare, climate-adaptive infrastructure, and sanitation would support other vulnerable groups, reduce strain on health services, and enhance overall resilience to climate-related hazards.

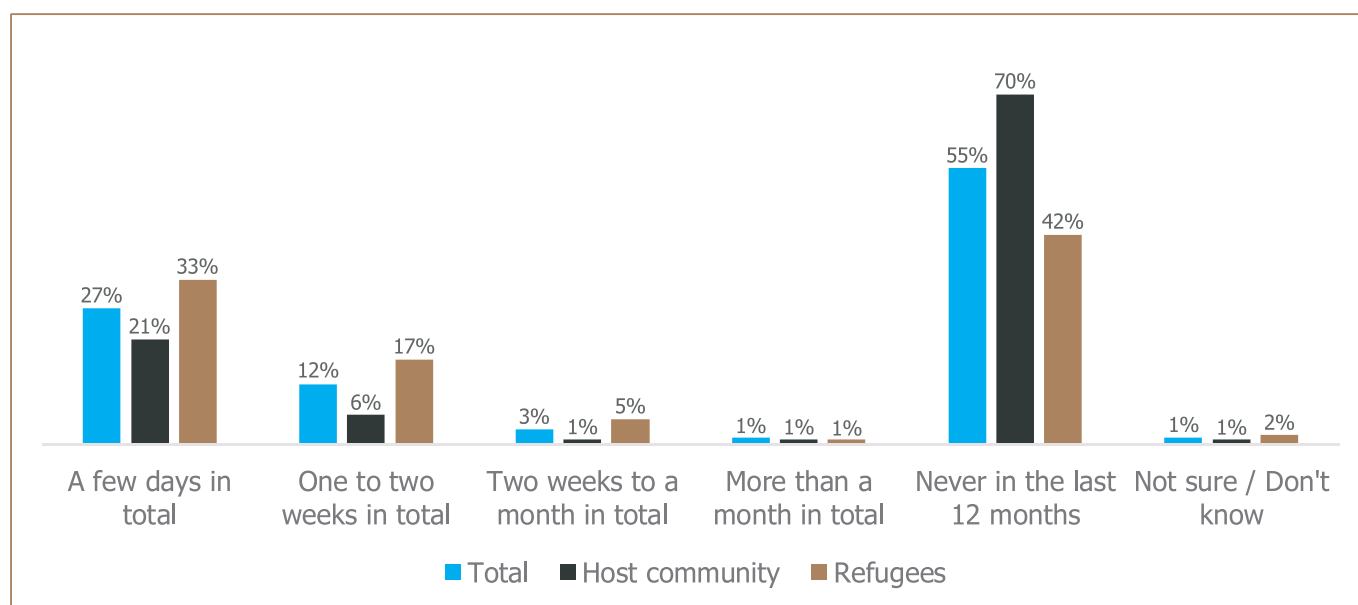
## 1.19 Impacts and Community Responses - Education and Schools

This section explores the impacts of climate-related hazards on education in Nyumanzi Settlement. It highlights how extreme weather events, including flooding, extreme heat, drought, strong winds, and lightning, disrupt student attendance, teaching conditions, and school infrastructure, leading to increased dropout rates, missed instructional time, and worsened learning outcomes. The section also examines how students' performance is affected, with many missing school due to weather-related challenges, and how teachers struggle with unsafe, uncomfortable working conditions. Finally, it covers the response strategies employed by the community and schools to cope with these disruptions, as well as the support requested to improve educational resilience to climate impacts.

### a) Student Attendance, Performance, and Quality of Education Received

Survey results indicate that for 44% of respondents with school-aged children in the household, at least one child experienced an official or unofficial school closure due to extreme weather events in the 12 months preceding data collection. This was especially true for refugee respondents (56%) compared to host communities (29%).

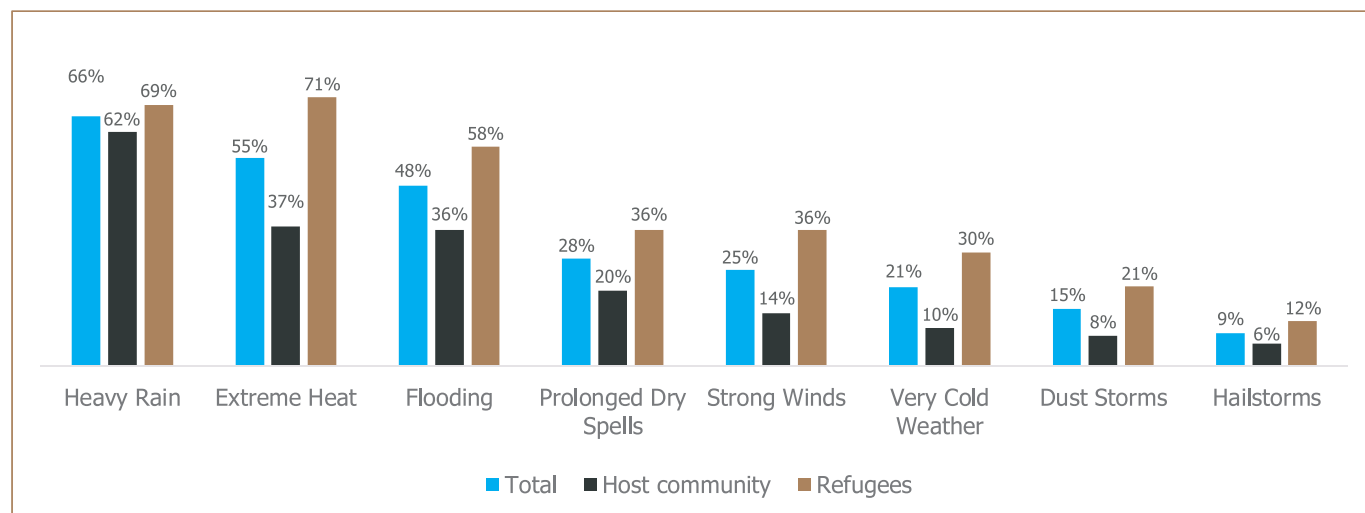
Qualitative interviews with teachers revealed that children sometimes missed school due to flooded roads, posing a risk of drowning, and the challenges of walking in extreme heat. Survey results confirmed that **91% of households with school-aged children had at least one child miss school at least once due to physical access issues caused by extreme weather** in the 12 months preceding data collection. Further, 27% of households reported that their children's schools had to close due to weather events such as extreme heat, with some closures adding up to several weeks in total. Teachers explained that, while schools had never officially been ordered to close due to heat, **the community would decide to keep children home if schools in South Sudan closed for the same reason**, effectively following South Sudan's closure patterns.



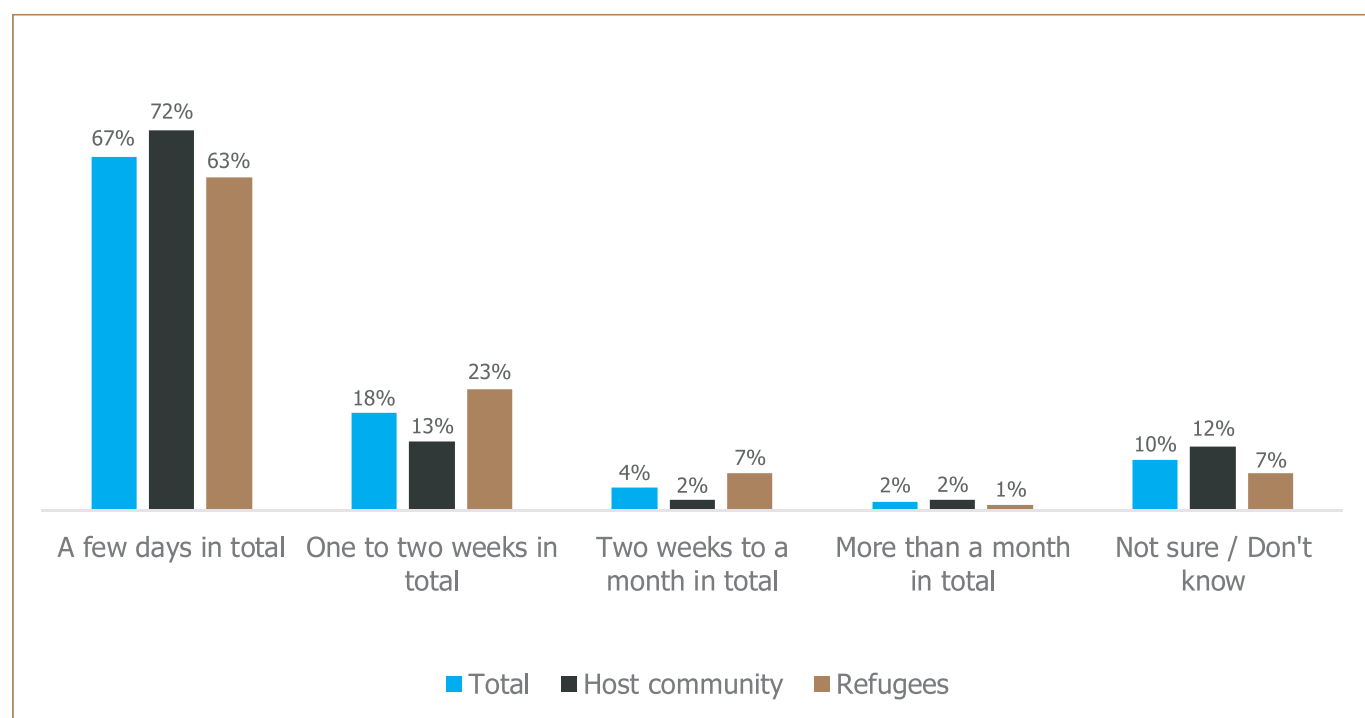
**Figure 12.** Total duration of both official and unofficial school closures due to extreme weather events in the past 12 months, by % of households with school aged children enrolled in school



66% of respondents reported heavy rainfall preventing their children from attending school, while 55% cited extreme heat, and 48% mentioned flooding as barriers. Drought and strong winds were also reported as contributing factors by 28% and 25% of respondents, respectively. A notable disparity existed between refugees and host communities, with refugees consistently reporting that weather events prevented at least one child from attending school in the past 12 months. The difference is particularly pronounced for extreme heat (34 percentage points), flooding (22 percentage points), drought (16 percentage points), strong winds (22 percentage points), and very cold weather (20 percentage points).



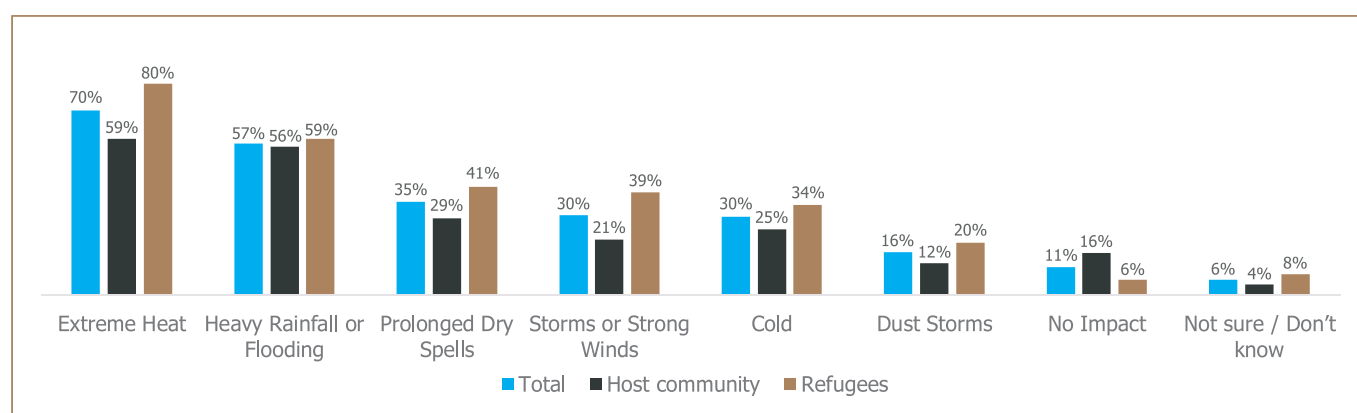
**Figure 13.** *Climate-related hazards preventing children's physical access to school/school attendance (while open and running) at least once in the past 12 months, by % of households with school-aged children enrolled in school*



**Figure 14.** *Total days of school missed by at least one child due to climate-related hazards preventing physical access in the past 12 months, by % of households with school-aged children enrolled in school*

Some parents **prioritised household responsibilities over education during climate-related crises**. In the 12 months preceding data collection, 42% of respondents (48% of refugees and 36% of host community members) reported that at least one child in their household missed school to help with household chores. Among these respondents, 72% answered that these absences were directly linked to weather events such as droughts or floods, with a higher proportion among refugees (80%) compared to the host community (59%). The most common tasks reported were helping with gardening or farming (51%), fetching water (14%), and repairing homes damaged by storms or floods (10%). Many students had to perform these tasks repeatedly throughout the year, with 91% of respondents reporting that at least one child in their household missed school for household chores between one and five times in the past 12 months.

Survey respondents further indicated that **climate events directly affected students' ability to concentrate**, with 70% citing extreme heat, 57% mentioning flooding, and 35% noting droughts. Heat, drought, strong winds, and cold were notably more frequently mentioned by refugee respondents. Additionally, learning materials were lost or damaged due to floods, with 63% of respondents stating that their children's books, uniforms, and writing materials were destroyed or damaged either "somewhat" (44% of respondents) or "significantly" (19% of respondents).



**Figure 15.** *Extreme weather events reported to have negatively impacted children's ability to focus in school in the past 12 months, by % of households with school-aged children enrolled in school*

## b) Teaching Conditions

Teachers also face challenges in maintaining learning continuity during climate-related disruptions. Flooded classrooms delay lessons, while extreme heat leaves both students and teachers exhausted, dehydrated, and struggling to concentrate. Survey data confirms this, as 70% of respondents reported extreme heat as a major factor reducing learning focus in at least one of their household's children in the last 12 months.

Water shortages due to drought force both students and teachers to endure thirst throughout the school day, negatively impacting performance. Survey data shows that 35% of respondents attributed disturbed focus in schools to droughts, further discouraging attendance. Teachers also noted that poor sanitation in teachers' quarters made working conditions unbearable, with limited access to water preventing them from maintaining basic hygiene.

Lightning events further contributed to absenteeism among both students and teachers. Some educators avoided being at school during storms due to a lack of functional lightning arresters, and reports of a child being struck by lightning intensified fears among both students and parents.

## c) School Infrastructure

**Extreme weather conditions severely damaged school infrastructure, making it difficult for students to learn in safe environments.** Flooding damaged classrooms, latrines and school compounds, leaving schools in poor physical condition. Latrines often collapsed or flood, making sanitation facilities unusable and unhygienic, further discouraging attendance.

Drought and heat caused structural damage to school buildings, with teachers reporting that extreme heat weakened roofs and cracked walls. **High temperatures also made classrooms unbearable**, particularly those with poor ventilation. Some schools prioritised certain rooms based on airflow, but many lacked the necessary infrastructure improvements to adequately combat heat stress. Strong winds tore off iron sheets from roofs, making some classrooms unusable for extended periods.

In response, some schools attempted tree planting to reduce wind damage and create shaded outdoor spaces for learning, but teachers noted that the number of trees planted remains insufficient to provide effective windbreaks.

Teachers reported that flood-damaged schools required relocation of students to alternative learning spaces. In some cases, classes were moved to community structures, verandas, or outdoor shaded areas, but these spaces were often cramped, poorly equipped, and lacked protection from further weather disruptions.

## d) Response Strategies

During qualitative interviews, refugee and host community members confirmed that when flooding destroyed classrooms, teachers relocated students to temporary learning spaces, but they noted that these solutions were not ideal due to overcrowding and lack of learning materials.

In response to school material losses from flooding, households often borrowed books, uniforms and supplies from neighbours to ensure their children could continue their education.

**To cope with drought and heat, some schools and households planted trees at home to provide shade**, helping create a cooler study environment for children. Additionally, some students slept outside at night to cool down, but parents noted that this practice affected their ability to focus in school the next morning due to poor sleep quality and exhaustion.

While tree planting can serve as an effective natural barrier against wind when properly executed, it involves technical planning concerning species selection, planting density, orientation, and ongoing maintenance. Without adherence to these principles, the protective benefits may be limited, as noted in observations where insufficient tree planting failed to provide effective windbreaks.

## e) Support Requested by Education Staff and Parents

### 1. Heat:

- Provide free drinking water in schools to keep students hydrated and focused.
- Improve classroom ventilation by modifying buildings to allow better airflow and cooling.
- Ensure medical assistance is available for students suffering from heat-related illnesses.
- Supply mobile, flexible school furniture to enable outdoor teaching in the shade of trees.
- Adjust school schedules to avoid the hottest parts of the day.
- Support heat-resistant school infrastructure and integrate heat-related challenges into school policies.

## 2. Drought:

- Implement school feeding programs to help children stay in class and maintain focus.
- Improve water access near schools to reduce water-fetching burdens on students.
- Develop community-based food security measures, such as school gardens or local food programs.
- Provide food aid and financial assistance through government and NGO support.

## 3. Floods:

- Construct flood-resistant school infrastructure with elevated floors and strong roofs.
- Enhance drainage systems around schools to prevent water accumulation.
- Train students and teachers in disaster preparedness to improve safety during floods.
- Establish emergency education plans to ensure continued learning during flood events.
- Provide financial and material support to replace lost school supplies and assist affected families.

# 1.20 Impacts and Community Responses – Shelter

This section examines the perceived impacts of climate-related events on **shelter** conditions in Nyumanzi Settlement and surrounding areas. It highlights how extreme weather, such as flooding, heat and drought, disrupts shelter construction, maintenance, and safety. It discusses the **challenges refugees and host community members face** in constructing and reinforcing shelters, including material shortages and gender differences in responsibilities. The section also outlines the most common types of **self-reported damage** to shelters, the **response strategies** employed by households, and the **barriers** to implementing protective measures. It concludes with the **support requested by communities** to improve shelter resilience to climate hazards.

## a) Impact of Climate Events on Shelter

In Uganda's refugee settlements, the Office of the Prime Minister (OPM) allocates plots of land to refugees for shelter construction. The standard plot size is **typically 30x30 meters** per household, though this can vary by settlement. According to the 2024 MSNA data, most shelters in Adjumani district are constructed using grass roofs and bricks – with 93% of refugee households and 75% of host community households relying on these materials. A larger proportion of host community households reported having permanent shelters with corrugated iron roofs (12%), compared to only 4% of refugee households. Households with the financial means tend to invest in more durable materials, such as iron sheet roofing, which offers better protection against the elements than traditional grass thatching.<sup>91,92</sup>

In and around Nyumanzi Settlement, shelter construction was primarily carried out by household members (67% of respondents) and/or with the help of a local contractor (36%).

Among both refugees and the host community, 17% of respondents reported that men and women were equally involved in building their shelters. However, important gender differences emerged between the two groups:

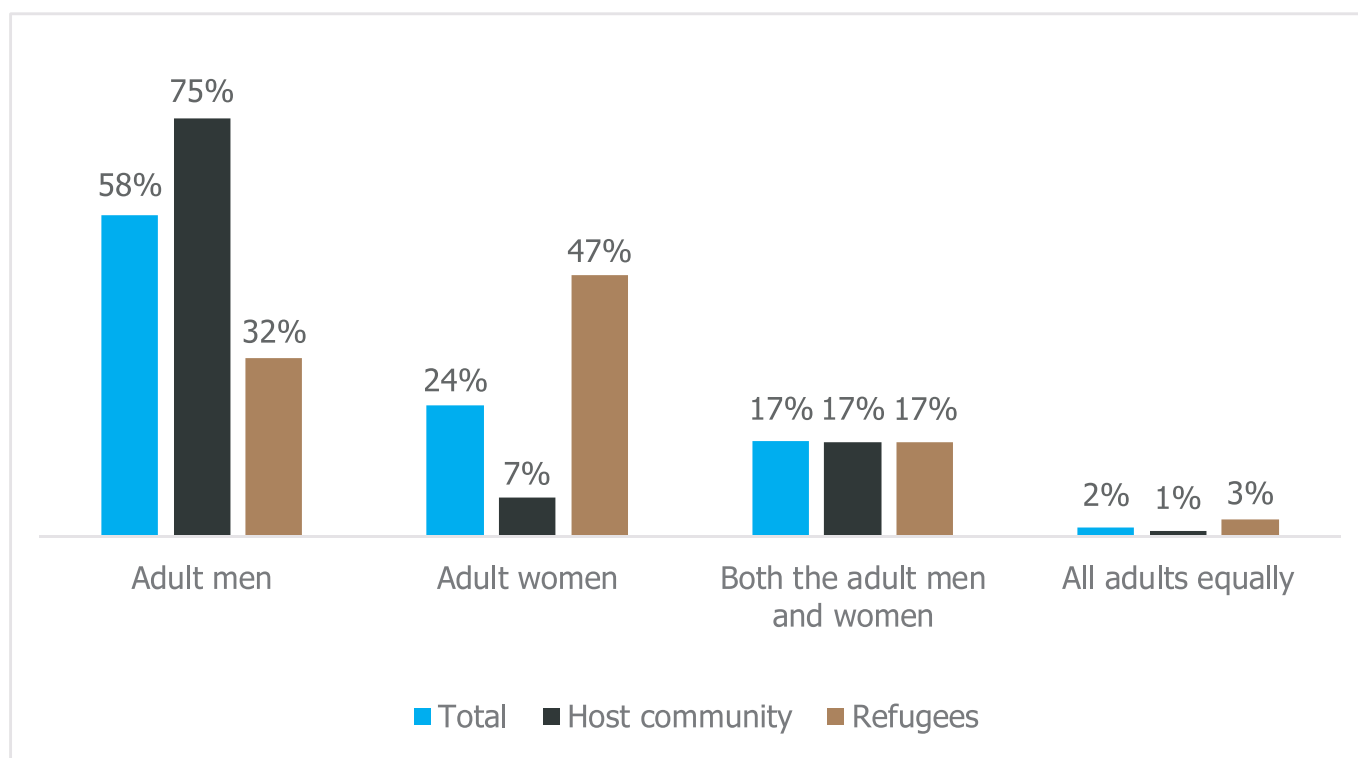
- Among the host community, **75% stated that only adult men in their household were responsible for building their shelter**, while 7% reported that only women carried out this task.
- In contrast, among refugees, 32% reported that only adult men built their shelter, whereas **47% stated that it was built exclusively by women**.

91 LWF, Uganda: a safe Haven for refugees, 2017. <https://uganda.lutheranworld.org/content/uganda-safe-haven-refugees-106>

92 IMPACT Initiatives (REACH Initiative), Multi-Sector Needs Assessment (MSNA) (2024)



**Figure 16.** *Primary household members responsible for shelter construction, by % of households that built their own shelter*



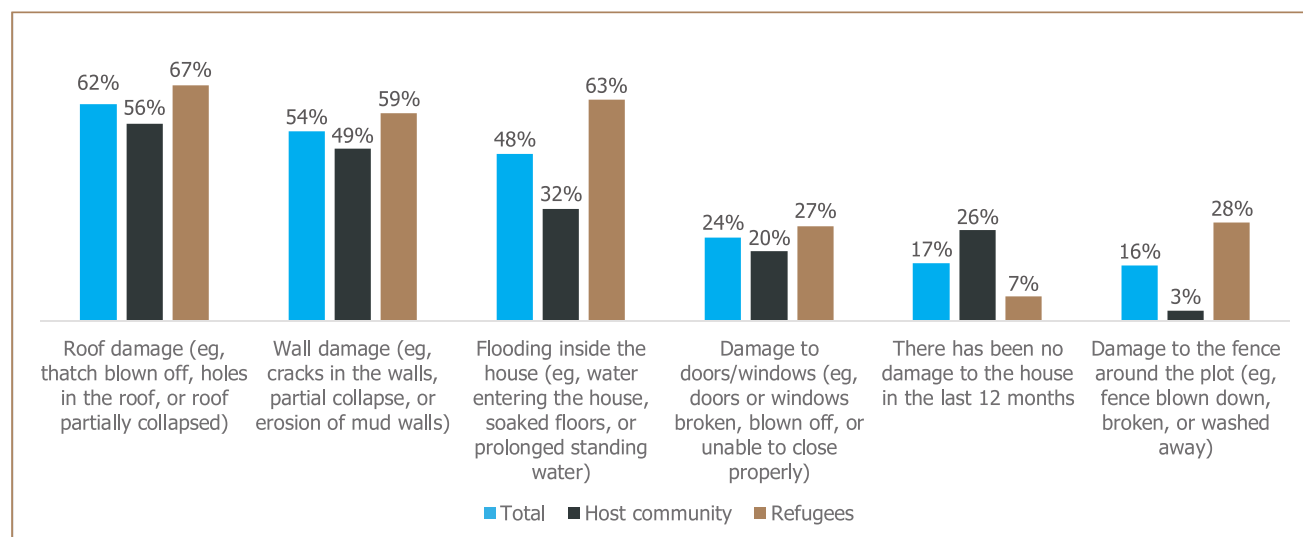
**A similar pattern was observed in shelter maintenance and repair**, where responsibility tended to fall predominantly on men in the host community and women in the refugee community. This could be attributed either to displacement disrupting traditional gender roles, forcing women to take on responsibilities they may not have had before, or to cultural differences, as the host community is predominantly Madi while the refugees are primarily Dinka. If women in refugee communities are primarily responsible for shelter construction and maintenance, they may also bear the **brunt of climate-related impacts** (e.g., repairing damage after storms, heat, or heavy rains). This could increase their vulnerability, especially if they **lack access to durable materials or knowledge of climate-resilient techniques**.

The most commonly self-reported types of shelter damage in the 12 months prior to data collection were **roof damage (62%)**, **wall damage (54%)**, and **flooding inside the house leading to potential floor and wall damage (48%)**. While both refugees and host community members reported similar types of damage, there were noteworthy differences in frequency:

- **Flooding inside the shelter** showed the most striking contrast, with **63% of refugees** affected compared to **32% of the host community**.
- **Damage to fences** around plots was also notably higher among refugees (**28%**) than among host community members (**3%**).

This discrepancy in fence damage may be attributed to the higher prevalence of fenced plots among refugees, possibly reflecting a Dinka cultural preference for enclosed spaces, heightened security concerns within refugee communities, and/or housing, land and property (HLP) concerns.

Figure 17. Self-reported types of shelter damage experienced in the past 12 months, by % of households



Among those who reported shelter damage, the majority described it as **“some” damage (77%)**, while **22% classified it as “significant” damage**.<sup>93</sup> Refugees were more likely to report “significant” damage (27%) compared to 16% of host community members. One possible explanation is that refugees are reportedly not permitted to cut grass themselves and must instead purchase it from the host community. This restriction may limit their ability to construct and maintain durable roofs, potentially contributing to the higher incidence of damage reported.

In the 12 months prior to data collection, **43% of the total population** (refugees and host community) in/around Nyumanzi reported being displaced from Nyumanzi or surroundings due to damage caused by an extreme weather event. In total, **24%** of the population had to move temporarily, **21%** had to sleep outside for a period, and **1%** relocated permanently. Refugees were notably more affected, with **57%** experiencing temporary displacement compared to **31%** of host community members.

The most commonly reported action taken to reinforce shelters in the 12 months prior to data collection was **digging trenches around the shelter to divert water flow (63% of households)**, followed by **raising the base of the house (43%)**. This highlights the extent to which **flooding poses a considerable risk** to shelters in and around Nyumanzi.

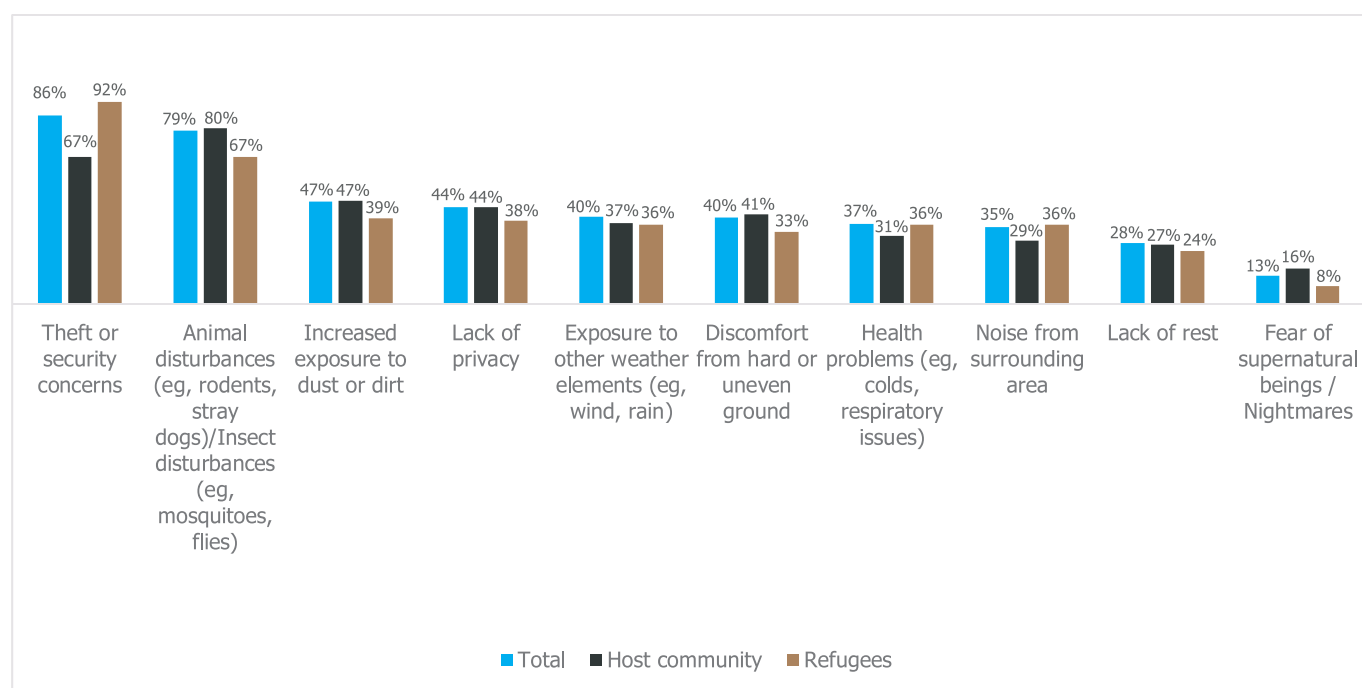
The primary reason for not implementing preventive measures was **lack of financial resources (62%)**, followed by **insufficient materials or supplies (54%)**. Among the missing materials, **elephant grass for roof thatching** (which is typically done yearly for maintenance and strengthening) was the most frequently cited, reported by **78% of respondents**, particularly among refugees (**87% compared to 69% of host community members**).

Another weather event which can negatively impact shelters and life in shelters is extreme heat. Overheated shelters can become **hard to live in at night**, forcing household members to seek alternative ways to cool down. Survey results indicate that **48% of households** had at least one member **regularly sleeping outside on hot nights**, while **43% did so only when the heat became unbearable**. Among these two groups, **21% reported sleeping outside for a cumulative period of more than a month** in the 12 months prior to data collection.

The primary concerns associated with sleeping outside include **theft and security risks (86%)**, **disturbance from animals and insects (79%)**, and **increased exposure to dust and dirt (47%)**. These challenges can impact **both the quality and duration of sleep**, with potential knock-on effects on **livelihood productivity, mental health, and overall physical well-being**.

93 The origin of the damage was not specified – in some cases, it may be due to general wear and tear rather than specific climate-related events.

**Figure 18.** Challenges faced while sleeping outside the shelter, by % of respondents who reportedly always or occasionally sleep outside due to extreme health



## b) Response Strategies

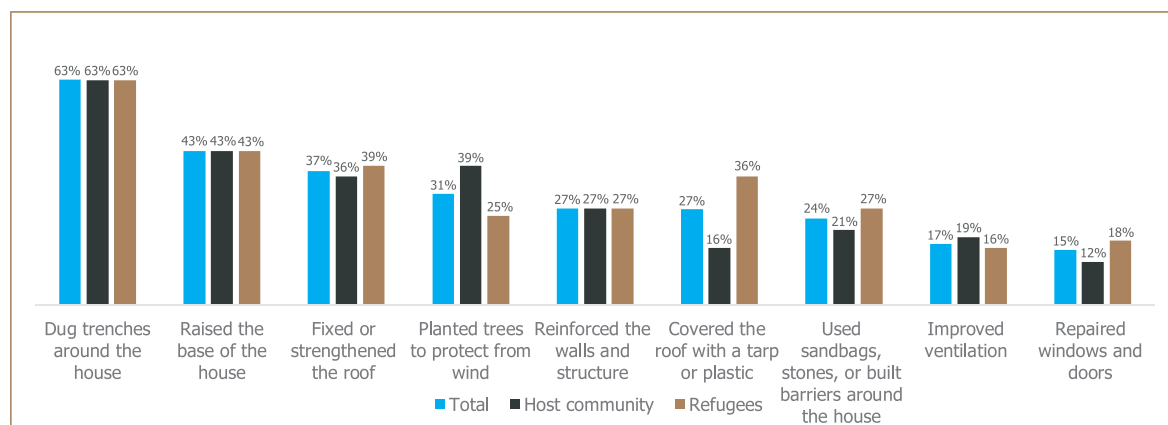
To cope with extreme heat, households adopted various measures to cool their homes. **88% of respondents reported taking proactive steps to protect their houses from extreme weather, primarily by improving ventilation.** Many opened windows and doors to enhance airflow, while others used cloths, tarps, or improvised barriers to block dust intrusion. Tree planting around shelters became a common strategy to provide shade and mitigate high indoor temperatures.

Communities affected by drought developed ways to maintain shelter conditions despite water shortages. 68% of respondents cited water scarcity as a major challenge, limiting their ability to clean homes or mix construction materials for repairs. To compensate, families swept their shelters frequently and used stored rainwater sparingly for cleaning. Some households began planting drought-resistant trees to provide long-term cooling. Families also adjusted their routines, reducing outdoor activities during peak heat hours to limit dust exposure indoors.

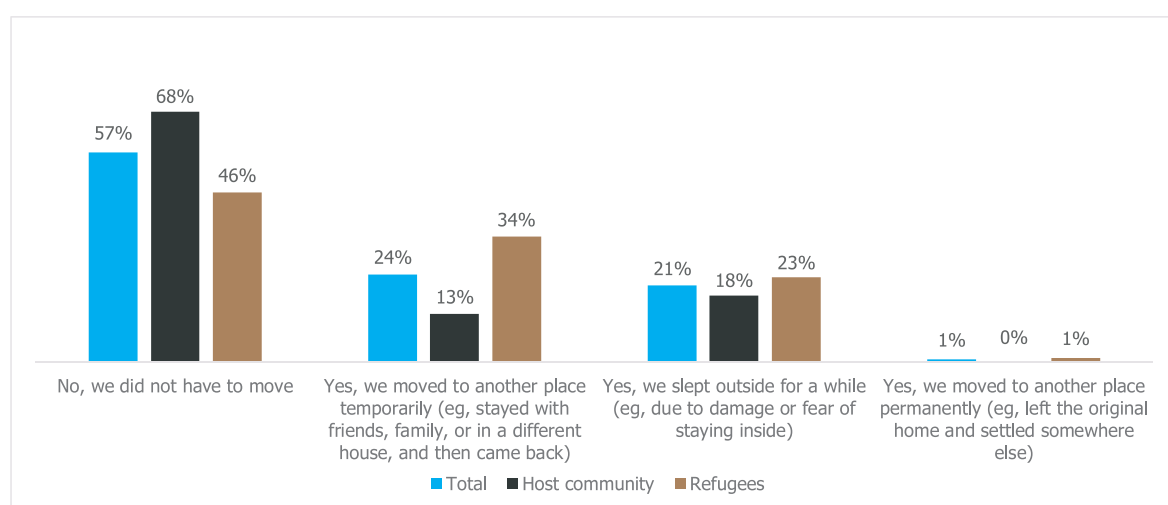
In response to flooding, many households reinforced their homes with stronger materials, although affordability remained a barrier. Sandbag use was common, with 37% of respondents indicating they placed sandbags around their homes to prevent water from entering. Drainage management was another adaptation, with 38% of households digging trenches to direct water away from their homes. However, 53% of respondents reported difficulty implementing protective measures due to a lack of materials such as roofing sheets, timber and cement.

Some households had to temporarily relocate to safer areas when their homes became uninhabitable, while others elevated furniture and stored essential items in waterproof containers to prevent damage.

**Figure 19.** *Protective measures taken to strengthen shelters, by % of households implementing preventive actions*



**Figure 20.** *Household responses to shelter damage caused by extreme weather events in the past 12 months, by % of households*



### c) Support Requested for Shelter by the Refugees and Host Communities

- Improved shelter designs: Construct heat-resistant homes with durable materials such as insulated roofing and reinforced walls.
- Enhanced water access: Increase water supply for household maintenance, including installing boreholes or water storage facilities.
- Flood-resistant structures: Build elevated homes with materials that can withstand heavy rains and water exposure.
- Improved drainage systems: Develop better flood management solutions, including constructing drainage channels around residential areas.
- Shelter reinforcement programs: Provide construction materials to help families repair and strengthen their homes.
- Government and NGO support: Expand financial assistance programs for rebuilding efforts after climate-related damage.
- Community awareness programs: Educate households on cost-effective and sustainable adaptations to extreme weather.
- Tree planting initiatives: Promote vegetation in residential areas to provide shade, improve air quality, and reduce soil erosion.
- Disaster preparedness planning: Implement emergency relocation plans and shelter maintenance programs to reduce displacement risks.



## 1.21 Impacts and Community Responses - Social and Cultural Impact

This section examines the impacts of climate-related hazards on social and cultural practices in Nyumanzi Settlement. It discusses how **extreme heat, drought and flooding** disrupt traditional ceremonies, cultural gatherings, and community events. These disruptions lead to reduced participation, modifications of customs, and, in some cases, the erosion of cultural traditions. The section also highlights the **response strategies** communities have developed to adapt to these challenges, such as rescheduling events, relocating ceremonies, and creating shaded spaces. Finally, it outlines the **support requested** to ensure the continuity of cultural practices despite climate impacts.

### a) Impact of Heat on Social and Cultural Practices

Excessive heat has disrupted traditional ceremonies, gatherings, and cultural events, often leading to cancellations or reduced participation. Many activities, such as traditional dances that require physical exertion, become difficult and uncomfortable due to high temperatures. This has led to adaptations in attire, as traditional clothing is often not suited for extreme heat, forcing modifications that may conflict with cultural norms. The timing of ceremonies is also affected, with events being rescheduled to cooler hours of the day, such as early mornings or evenings, disrupting traditional schedules.

**The prolonged impact of heat has led to a decline in participation in cultural events**, as fatigue and heat-related illnesses deter people from attending. There is an increased risk of dehydration and other heat-related illnesses during physically demanding rituals, affecting both performers and attendees. Over time, **reduced participation has resulted in the erosion of traditions**, as fewer opportunities for practice hinder the transmission of cultural knowledge to younger generations. This disruption weakens community bonds, as the inability to gather for cultural events limits social cohesion and shared identity.

### b) Impact of Drought on Social and Cultural Practices

Drought disrupted traditional ceremonies and gatherings due to the scarcity of water, food, and shaded spaces. Many communal gathering areas, such as fields or spaces under large trees, became barren and unusable, reducing opportunities for cultural events. **Participation declined as extreme heat and resource scarcity discouraged people from attending, particularly in physically demanding ceremonies.**

Drought-related resource shortages also led to modifications or the abandonment of certain customs that rely on natural elements, eroding cultural traditions and heritage. Competition for limited resources, such as water and food, fostered divisions within the community, reducing cooperation in cultural and social activities. Furthermore, heat-related illnesses and dehydration limited individuals' ability to engage in traditional practices, further reducing overall participation.

### c) Impact of Floods on Social and Cultural Practices

**Flooding disrupted traditional cultural practices by making it difficult to hold ceremonies in outdoor spaces or specific locations central to rituals.** Communal spaces, including shrines and ceremonial grounds, were often damaged or rendered inaccessible due to waterlogging. Additionally, the fear of waterborne diseases, displacement, and restricted access to gathering areas discouraged attendance at cultural events.

Flood-related health risks, such as cholera, malaria and diarrhoea, allegedly further restricted participation in rituals and celebrations. Economic hardship due to flooding led families to prioritise survival over cultural expenses, resulting in simpler or fewer ceremonies. Over time, frequent disruptions to traditions are thought to weaken their continuity, **affecting the transmission of cultural knowledge to younger generations.**

## d) Response Strategies

To mitigate the effects of climate hazards on cultural practices, **communities adjusted by rescheduling ceremonies to cooler times of the day or year to reduce heat exposure and encourage attendance.** Temporary shelters and natural shade were used to provide relief during events, and participants were encouraged to bring water or take hydration breaks. Certain cultural rituals were simplified to reduce the physical strain on attendees, such as shorter dances or less strenuous activities.

During droughts, ceremonies were relocated to areas with better access to water and shade, ensuring continuity in cultural practices. **Community members contributed shared resources, such as food and water, to sustain events despite resource scarcity.** In flood-prone areas, cultural events were moved to higher ground or less affected locations. Drainage systems were established around gathering spaces to prevent waterlogging, and platforms were raised to protect ceremonial sites from flood damage.

## e) Support Requested for Social and Cultural Practices

- **Permanent shaded spaces:** Construct durable shaded areas for cultural events to ensure comfort during extreme heat.
- **Cooling measures:** Install fans and water stations at event locations to improve comfort for participants.
- **Cultural preservation programs:** Document and maintain the authenticity of cultural practices adapted for climate hazards.
- **Community awareness:** Educate participants on staying hydrated and protecting themselves during outdoor events.
- **Shared resource hubs:** Establish community centres with access to water, shade and essential resources to support cultural and social activities during droughts.
- **Reforestation projects:** Plant drought-resistant trees to restore traditional gathering spaces and improve local microclimates.
- **Reinforced cultural spaces:** Construct raised platforms or flood-resistant structures to protect ceremonial sites from damage.
- **Improved infrastructure:** Build drainage systems and flood barriers to protect cultural spaces from water damage.
- **Community resource pooling:** Establish funds and shared resources to support cultural events impacted by extreme weather.
- **Documentation and preservation:** Record traditional practices at risk of being lost to ensure their transmission to future generations.
- **Government and NGO support:** Provide financial aid and materials to help restore and protect cultural spaces, ensuring the continuation of traditions during climate challenges.



# CONCLUSION

**The impacts of climate-related hazards such as extreme heat, floods and prolonged dry spells on the community in Nyumanzi Settlement and its surrounding areas are multifaceted, affecting livelihoods, health, education, shelter and social practices.** Refugees, particularly women, youth, the elderly, farmers, and persons with disabilities, are disproportionately affected by climate-related hazards, with each group facing distinct challenges that amplify their vulnerability. These populations experience unique and compounded impacts due to their specific roles and circumstances within the community.

**Extreme heat, floods and prolonged dry spells have caused reduced crop yields, postharvest losses, increased food prices, and decreased income-generating opportunities for market vendors and farmers,** negatively impacting their mental health, food security, and labour productivity. In response, farmers have adjusted their planting schedules, adopting drought-resistant crops, while vendors have sought alternative markets and mobile vending to maintain their incomes during disrupted conditions. However, these coping strategies remain limited due to financial constraints and a lack of resources for implementing long-term solutions.

**These same hazards have a negative impact on shelters.** Notably, refugees and host communities both face these challenges, though refugees report higher instances of shelter damage and temporary displacement, particularly due to flooding. The lack of durable building materials and limited financial resources have hindered the implementation of adequate climate-resilient measures, leaving both groups vulnerable to recurring climate hazards. In response, households have taken steps to reinforce their shelters by digging trenches, raising the base of their homes, and using sandbags to prevent water entry. However, material shortages and financial barriers have prevented many from fully securing their homes.

**The physical and mental health impacts of extreme temperatures and flooding are particularly severe for vulnerable groups such as children, the elderly, persons with disabilities, farmers and women, who bear the brunt of household labour and caregiving responsibilities.** Access to health facilities is hindered for both patients and healthcare providers, with some facilities having to close, reduce operating hours, or struggle to manage an overwhelming number of patients following floods. Staff fatigue due to extreme heat and inadequate storage capacities for medical supplies further exacerbate these challenges. To address this, healthcare professionals have called for improvements in healthcare infrastructure, mobile health services, and increased support for frontline staff. Additionally, the rising prevalence of heat stress, waterborne diseases, and psychological distress, including depression and anxiety, has deepened the community's struggles, further undermining the overall well-being of the population.

**In the education sector, climate events have contributed to increased absenteeism, disrupted learning, and damaged school infrastructure.** A large proportion of households with school-aged children, particularly among refugees, missed school due to extreme weather events, such as heatwaves, floods and droughts, which also led to the destruction of educational materials. These conditions have negatively impacted the quality of education, with schools unable to maintain regular schedules due to unsafe classrooms or damaged infrastructure. Teachers and students alike are experiencing exhaustion from heat, disrupted school attendance, and deteriorating learning conditions, which in turn has contributed to lower academic performance and higher dropout rates. In response, some schools have attempted to relocate classes to shaded or safer spaces, and others have called for improved infrastructure, including better ventilation and flood-resistant buildings, to ensure educational continuity.

**In addition to education, the effects of climate change have also severely disrupted social and cultural practices within the community.** Traditional ceremonies and cultural gatherings have been altered or cancelled due to extreme heat, water scarcity, and flooding. These disruptions not only diminish community cohesion but also hinder the transmission of cultural knowledge to younger generations, potentially eroding traditional practices that are integral to the community's identity and resilience. Communities have adapted by rescheduling events, relocating them to higher ground, or simplifying ceremonies to reduce physical strain. However, the ongoing climate pressures threaten the sustainability of these adaptations.

**Communities have responded to these challenges with various adaptive strategies, including modifying work schedules, improving shelter ventilation, and relocating to higher ground during floods.** However, many of these coping mechanisms are insufficient due to the financial constraints faced by households, particularly refugees. Despite efforts to plant trees for shade, elevate storage structures, and reinforce shelters, the lack of adequate resources and support from external actors has made it difficult for households to fully protect their homes and livelihoods from the increasingly erratic and severe weather patterns. Additionally, the absence of a formal disaster preparedness plan has left communities to rely on informal support systems, which, while valuable, are not always sustainable or effective in the face of escalating climate risks.

**The community has expressed urgent needs for support, including improved water access, healthcare infrastructure, financial aid, climate-resilient shelter solutions, and enhanced educational facilities.** There is also a call for targeted interventions to preserve cultural practices and ensure that vulnerable groups receive the assistance they require to cope with the compounded effects of climate change. Specifically, the community has requested improvements in flood management, enhanced water access, better healthcare access during extreme weather events, and the establishment of early warning systems for both health and disaster preparedness. These interventions are critical to building resilience and supporting the community in adapting to the growing climate-related challenges.





Uganda Learning, Evidence, Accountability,  
and Research Network  
P.O. Box 12018, Kampala – Uganda.  
[www.ulearn-uganda.org](http://www.ulearn-uganda.org)

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