HEAT RISK KNOWLEDGE, PERCEPTION AND ADAPTATION IN TANGA AND UNGUJA, TANZANIA

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Photos: Tanzania Red Cross Society

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1. INTRODUCTION

BACKGROUND

Extreme heat is an emerging risk in Africa, given the rising and projected temperature increases across the region. In 2023, Tanzania recorded its highest temperatures on record and many regions experienced prolonged periods of extreme heat lasting up to a week, with significant anomalies persisting for four weeks or more (Kabanda, 2024). In addition, Tanzania is witnessing an increase in the number of hot days and nights, with the highest temperatures in coastal regions (Luhunga, 2022 & 2025; Gyilbag *et al.,* 2021).

Tanzania is also urbanizing rapidly due to economic growth, population increases and rural–urban migration (Nduganda *et al.,* 2017). Due to the urban heat island effect, cities have become significantly hotter than their surrounding regions, placing urban residents at heightened risk of heat stress (Kabanda & Kabanda, 2022, Nduganda *et al.,* 2017). While the scientific understanding of heatwaves in the region has grown, public perception of heat risk and its impacts remain understudied. This report presents the main findings of extreme heat risk perception surveys conducted in the cities of Tanga and Unguja in Tanzania in September 2024, led by the Tanzania Red Cross Society (TRCS) as part of the Coastal City Resilience and Extreme Heat Action Project (*CoCHAP*).

EXECUTIVE SUMMARY

This study examined public risk perception, assessed individual strengths and barriers to heat action, and identified behaviour change strategies to expand action. Based on the findings, recommendations are provided to inform public awareness campaigns which can be developed in collaboration with local government officials and local media partners. The study sought to answer the following research questions:

1. What is the perception of heat risk in Tanga located in the north-east of mainland Tanzania and in Mjini Magharibi on Unguja island in Tanzania?
2. How do different population groups perceive risks related to extreme heat?
3. What are the impacts of extreme heat on communities?
4. How does heat risk vulnerability vary across social groups?
5. What communications strategies can be used to address the impacts of heat?

The table below summarizes the key findings and recommendations.

Table 1: Summary of key findings

Category	Key findings	Suggestions for practice
Knowledge and experience of extreme heat	Most people could only name one (19.1%), two (34.5%) or three (28.3%) symptoms of heat. Age, gender and health were not significantly associated with knowledge of heat stress symptoms.	Symptoms of heat stress should be widely communicated. Ensuring that groups at higher risk of extreme heat such as the elderly, disabled or those with chronic health conditions have high awareness of heat stress symptoms is important.
Heat-related impacts, vulnerability and concerns	32.6% of people could name one action they could take to avoid the health impacts of extreme heat. 42% could name two, 19.5% could name three and 5.54% could name four or more.	Three-quarters of people could only name one or two ways to protect themselves from the heat. Efforts to raise awareness of strategies to cope with the heat will be important.
Adaptation strategies and barriers	58.2% of people only occasionally change their behaviour when it's hot. 7.4% almost never and 9.1% never change their behaviour. People over the age of 65 were the most likely of any age group to never change their behaviour during hot weather (18.6% of their age bracket) followed by people aged 50–65 (13% of their age bracket).	The consistent adoption of actions to cope with the heat during hot weather should be encouraged in the heat awareness campaign. Persuading people aged 50 and above to consistently change their behaviour during hot weather to protect themselves will be another key element.
Adaptation strategies and barriers	People who did not change their behaviour when it's hot said it wasn't hot enough (45.5%); they are used to the heat and it doesn't affect them (36.4%); or they did not know that heat can be dangerous (13.6%).	The heat awareness campaign should highlight that extreme heat is dangerous, even deadly, and that hot weather can be dangerous even if you are used to it.
Early warning information and communication channels	72.6% of people mentioned that they have access to weather forecast information with television as the main channel of communication as mentioned by 76.2%. However, 65.7% mentioned they would not change their behaviour based on the early warning information.	The heat risk awareness campaign should create messages that target behavioural change. Messages should be designed in a participatory approach to lead to behavioural change.

2. METHODOLOGY

2.1 STUDY AREA

Tanzania is the largest country in East Africa with a population of 61.7 million people, according to the latest census in 2022. This study was conducted across eight wards (local administrative units) in two regions: **Tanga**, located in the north-east of mainland Tanzania, and **Mjini Magharibi**, which encompasses Zanzibar City on Unguja island. The wards covered in the Tanga region were Chongoleani, Duga, central Mzingani and Mzizima, while Kikwajuni Juu, Miembeni, Mwebeladu and Shangani wards were covered in the Mjini Magharibi region.

Figure 1: Map of the study areas

Tanga is the sixth most-populous region in the country, with 2.6 million people. Mjini Magharibi in Unguja has 0.9 million inhabitants and, despite being one of the smallest regions by population, is densely urbanized. Tanga hosts the highest number of schools of any region on the Tanzania mainland (1,381), along with a relatively large number of hospitals (22) and health facilities (64). Mjini Magharibi similarly has the highest number of schools (310), hospitals (7) and health facilities (9) among regions on Unguja island.

However, both regions have low hospital-to-population ratios by international standards. In Tanga, there is approximately one hospital for 119,000 people, and one health facility for 41,000 people. In Mjini Magharibi, there is one hospital for 128,000 people, and one health facility for 99,000 people. Such under-resourced healthcare systems are a barrier to the effective treatment of heat-related health issues.

Tanzania has a warm, tropical climate with distinct wet and dry seasons. Both Tanga and Mjini Magharibi experience hot and humid conditions throughout the year and have two rainy seasons: a longer one from March to May, and a shorter one from October to December. Climate change is affecting Tanzania in multiple ways, including increasing average temperatures, higher nighttime temperatures, more frequent and intense heatwaves, less predictable precipitation, decreased water availability, drought, sea-level rise, saltwater intrusion and coastal flooding. (Luhunga, 2022 & 2025; Agrawala *et al.,* 2003).

2.2. SURVEY DESIGN

The analysis draws on both quantitative and qualitative data collected through a household survey (n=866), focus group discussions (FGDs) (n=8) and key informant interviews (KIIs) (n=12) conducted in Tanga and Mjini Magharibi, Tanzania. FGDs were held with different demographic groups (men, women, youths and boda boda (motorcycle taxi) drivers) in four wards of each region. Additionally, KIIs were conducted with local leaders, healthcare professionals and meteorological experts. The survey and guiding questions for the FGDs and KIIs are in Appendix A.

Figure 2: Picture showing volunteers undergoing training

2.3. DATA COLLECTION AND SAMPLING STRATEGY

Data collection was undertaken by trained team of researchers from the TRCS. Participants in the KIIs and FGDs were selected purposively, while participants in the household surveys were selected randomly. Data was collected using both qualitative and quantitative methods. A total of 866 households were surveyed; 12 KIIs took place; and eight FGDs were facilitated (Table 2).

Table 2: Eight FGDs by location and demographic group

FGD demographic	Tanga	Mjini Magharibi
Elders (60+ years)	Chongoleani	Mwebeladu
Women (41–55 years)	Mzizima	Kikwajuni Juu
Youth (18–30 years)	Bombo	Kikwajuni Juu
Men (41–55 years)	Chongoleani	Shangani

3. RESULTS

3.1 SURVEY RESULTS

3.1.1 Demographic information

A total of 866 community members were surveyed across Tanga (742) and Mjini Magharibi (124) (Table 3). Participants were mostly aged 30–50 years (47 per cent), followed by 18–30 years (26 per cent), 50–65 years (21 per cent) and 65+ years (7 per cent). Fifty-six per cent of the respondents were female and 45 per cent were male. Employment varied: 39 per cent were unemployed, 27 per cent ran businesses, 18 per cent were casual labourers, 12 per cent selected 'other' and 4 per cent held professional jobs. Education levels showed that 53 per cent had completed primary school, 36 per cent secondary school, 5 per cent tertiary education and 7 per cent never attended formal education. Additionally, 15 per cent of the people surveyed reported having a health condition.

Demographic characteristics were generally similar across both regions, with small differences in age, education and employment. Mjini Magharibi had a slightly older population and a higher proportion of participants with secondary (75 per cent) and tertiary (11 per cent) education, whereas primary education was more common in Tanga (60 per cent). Business ownership was more common in Mjini Magharibi (37 per cent), while casual labour was more frequent in Tanga (20 per cent). Unemployment was high in both locations (39 per cent).

Table 3: Demographic information of survey participants.

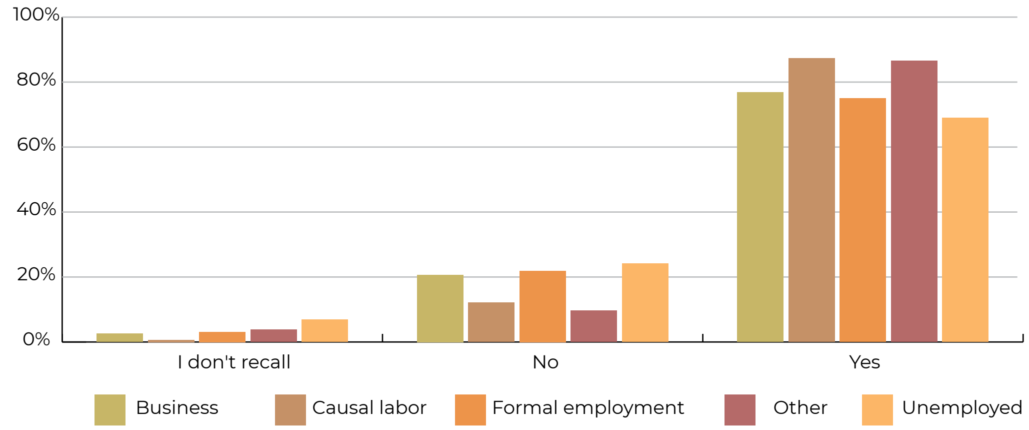
Variable	Category	Tanga (N= 742)	Mjini Magharibi (N=124)	Total (N=866)
Age	18–30	183 (25%)	38 (31%)	221 (26%)
	30–50	355 (48%)	47 (38%)	402 (47%)
	50–65	159 (21%)	25 (20%)	184 (21%)
	>65	45 (6%)	14 (11%)	59 (7%)
Gender	Male	338 (46%)	48 (39%)	386 (45%)
	Female	404 (54%)	76 (61%)	480 (56%)
Employment status	Formal employment	26 (4%)	6 (5%)	32 (4%)
	Business	191 (26%)	46 (37%)	237 (28%)
	Casual labour	147 (20%)	10 (8%)	157 (18%)
	Other	89 (12%)	15 (12%)	104 (12%)
	Unemployed	289 (39%)	47 (38%)	336 (39%)
Education	Never attended formal education	52 (7%)	6 (5%)	58 (7%)
	Primary school	443 (60%)	12 (10%)	455 (53%)
	Secondary school	217 (29%)	93 (75%)	310 (36%)
	Tertiary school	30 (4%)	13 (11%)	43 (5%)
Head of household	Yes	495 (67%)	64 (52%)	559 (65%)
	No	247 (33%)	60 (48%)	307 (35%)

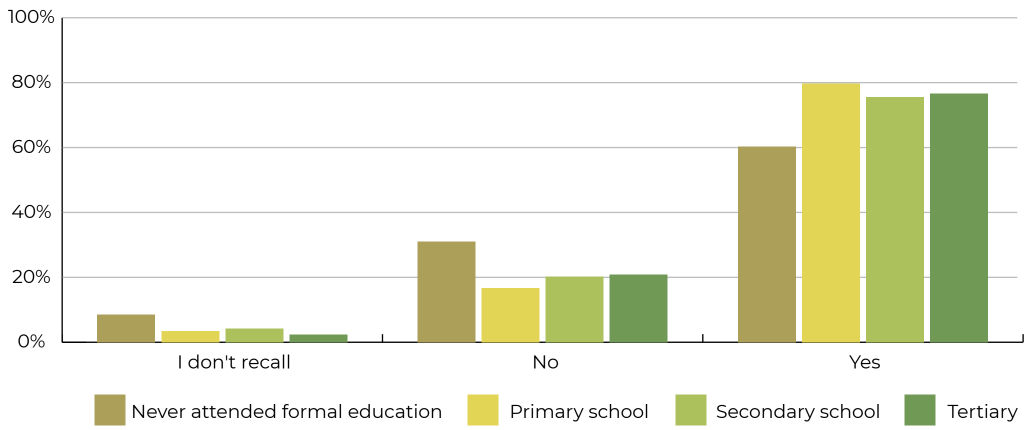
3.1.2. Knowledge and experience of extreme heat

A majority of respondents in Tanga and Mjini Magharibi (76.8 per cent) had experienced periods of unusually or uncomfortably hot weather, though their perceptions varied regarding the frequency of these periods. Two-in-five people (40.6 per cent) reported experiencing unusually or uncomfortably hot weather multiple times a year. Three-in-ten people (29.1per cent) rated the heat as 'severe' compared to over half (55.7 per cent) who rated it as 'mild', 'very mild' or 'not severe'. Whether people reported experiencing periods of unusually hot weather was significantly influenced by their occupation (Figure 3). How often people reported experiencing it was significantly associated with their occupation and level of formal education (Figure 4).

Figures 3-4. Reported experience of uncomfortably hot weather by education and employment

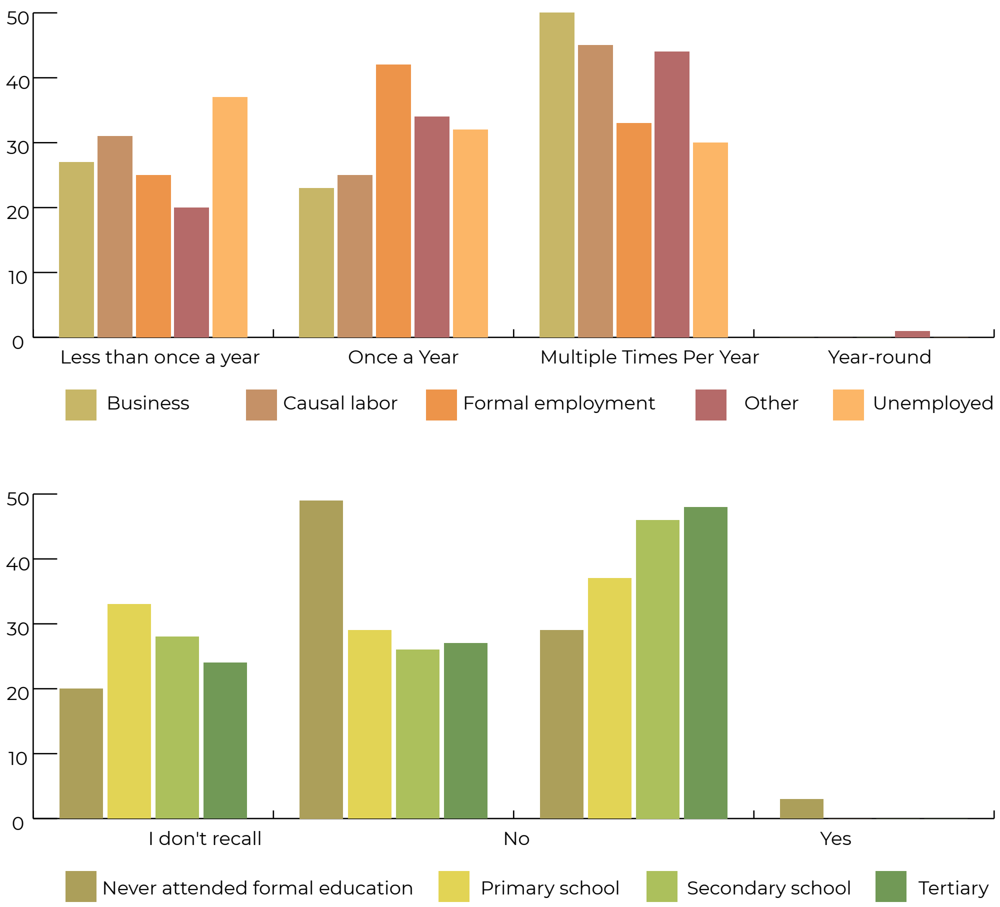
HAVE YOU EXPERIENCED UNCOMFORTABLY HOT WEATHER?





Figures 5-6: Reported frequency of uncomfortably hot weather by education and employment

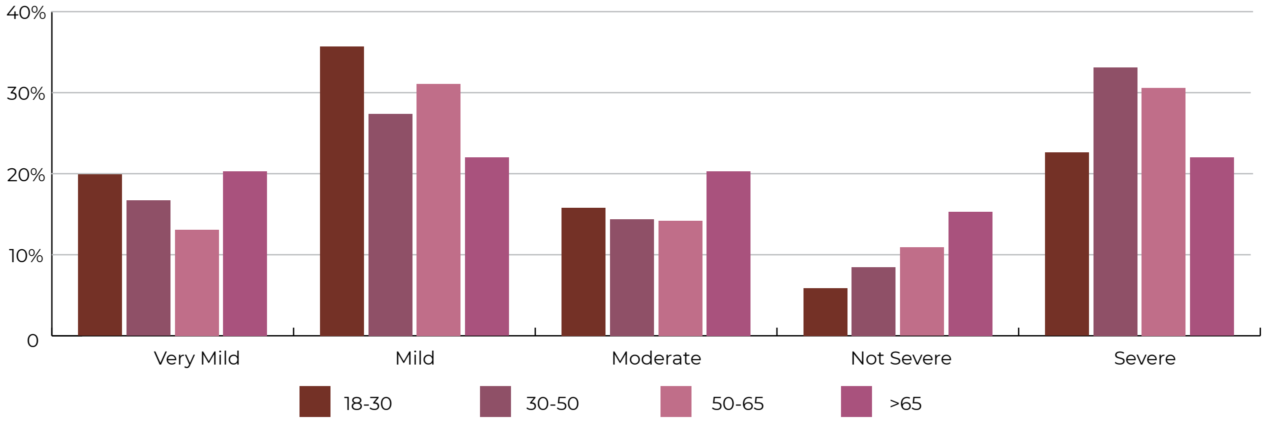
HAVE YOU EXPERIENCED UNCOMFORTABLY HOT WEATHER?

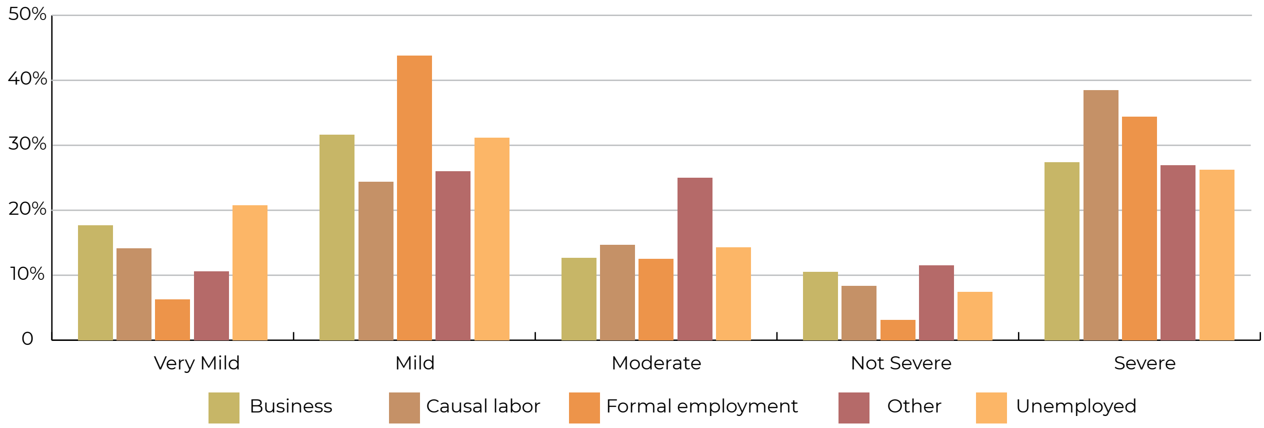


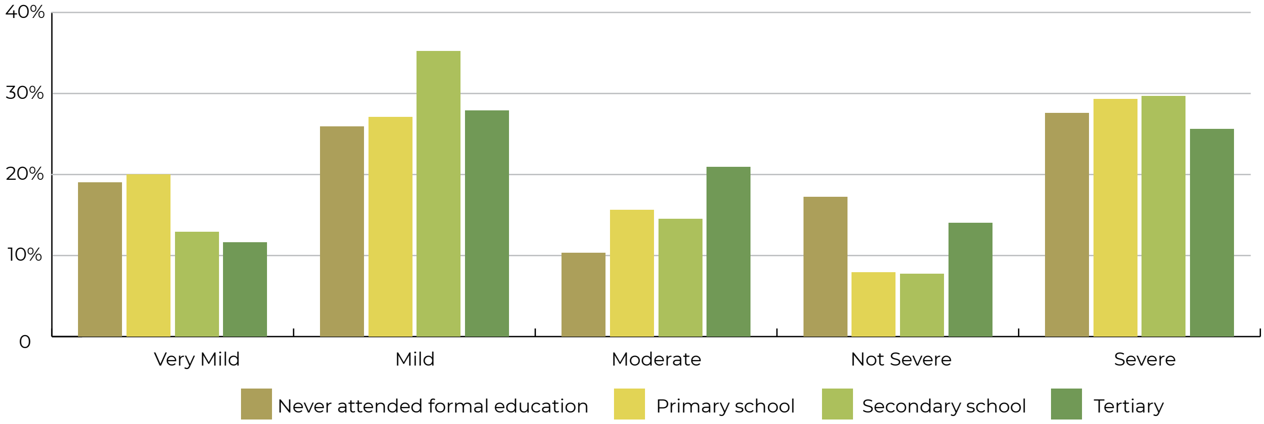
Furthermore, occupation, health and age, but not gender or education, shaped how people rated the severity of heat (Figures 5, 6). People over the age of 65 were more likely than other age groups to be bothered by the heat in the morning (20.3 per cent compared to 9.5 per cent of 18–30 year-olds). Casual labourers, people with existing health conditions and those over the age of 30 were more likely to rate the heat as more severe.

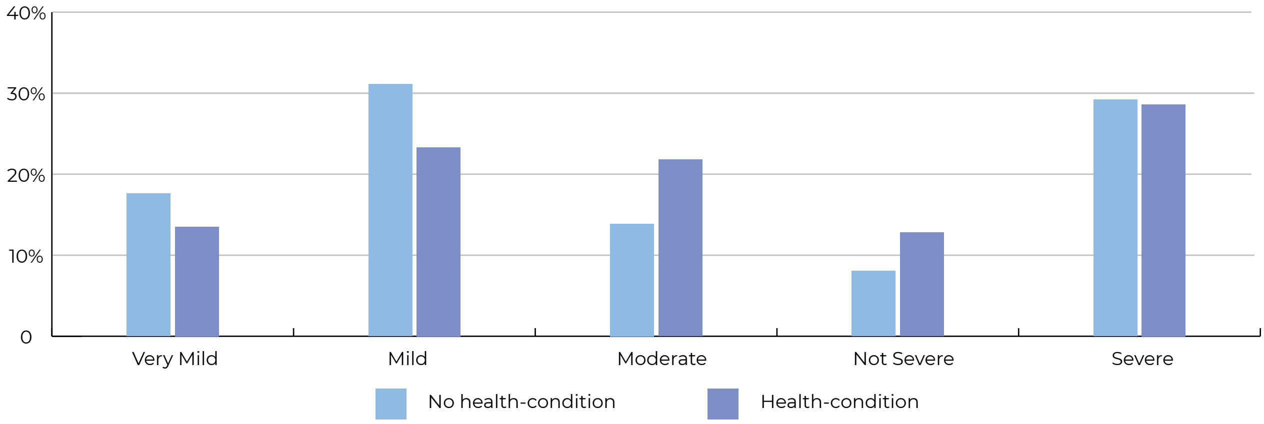
Figures 7–10: Perception of heat severity by age, occupation, education and health

HOW SEVERE DO YOU THINK HEAT IS IN THE REGION?









According to the people surveyed, the hottest months of the year are from September to March, with people's experience of hot weather peaking in January (44.5 per cent). The most common times of the day to feel discomfort from hot weather were at night (73.3 per cent) and in the afternoon (69.4 per cent). Gender, education and age shaped people's knowledge of temperature ranges. A larger proportion of men (29.3 per cent) said they knew the temperature ranges on hot days or nights compared to 19.4 per cent of women. People with higher levels of formal education along with people aged 50–65 were more likely to say that they knew the temperature ranges (Figures 7–10).

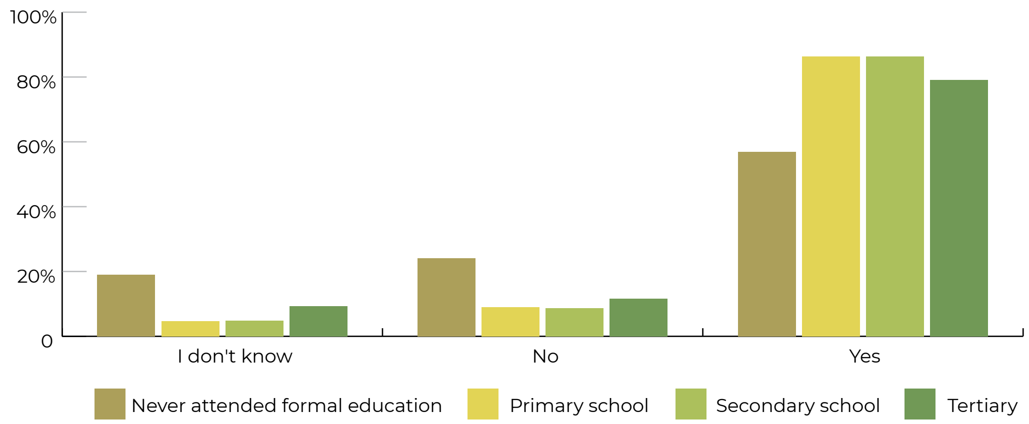
When asked whether there has been an increase in temperature in the area in the past few years, 67.2 per cent of people answered 'yes', 23.7 per cent answered 'no', and 9.1 per cent were unsure. Occupation most strongly influenced peoples' answers, followed by education, gender and age. Four out of five casual labourers thought temperatures had increased (80.3 per cent). Over two-thirds of people with primary education (69.8 per cent) and secondary education (68.1 per cent) thought temperatures had increased, although people with no formal education (51.7 per cent) and tertiary education (53.5 per cent) were less likely to think so. Seventy-two per cent of men thought temperatures had increased compared to 63.3 per cent of women, and people over the age of 65 were most likely to be unsure (15.3 per cent) whether temperatures had increased.

People gave different reasons for high temperatures in the area: climate change (59.9 per cent), deforestation (56.8 per cent), urbanization (29.3 per cent) and overcrowding (17.6 per cent), among others. Reasons given were also significantly influenced by occupation, with casual labourers more likely to attribute increasing temperatures to climate change, urbanization and deforestation than other employment groups.

A majority of people surveyed thought that extreme temperatures are a problem in their area (84 per cent). Education significantly shaped this perception. Eighty-six per cent of people with primary or secondary education and 79 per cent of people with tertiary education thought that extreme temperatures were a problem.

Figure 11: Whether people think extreme temperatures are a problem in their area by education.

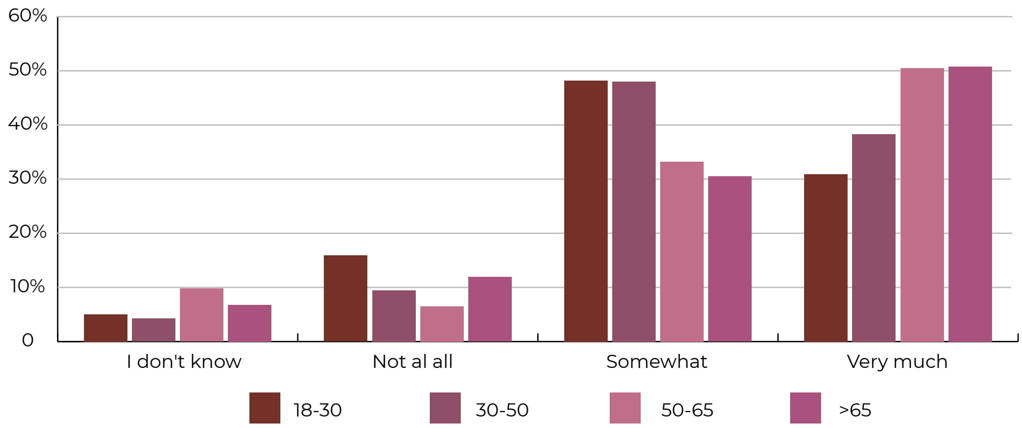
DO YOU AGREE THAT EXTREME TEMPERATURES ARE A PROBLEM IN THE AREA?

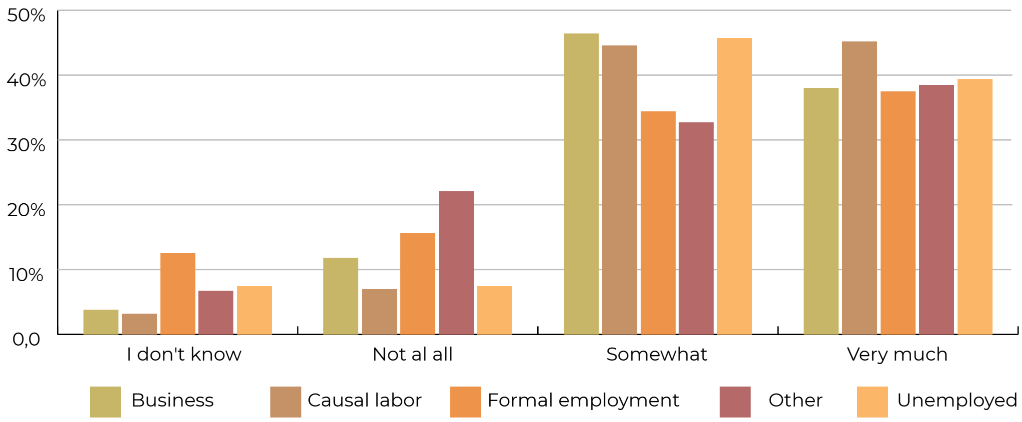


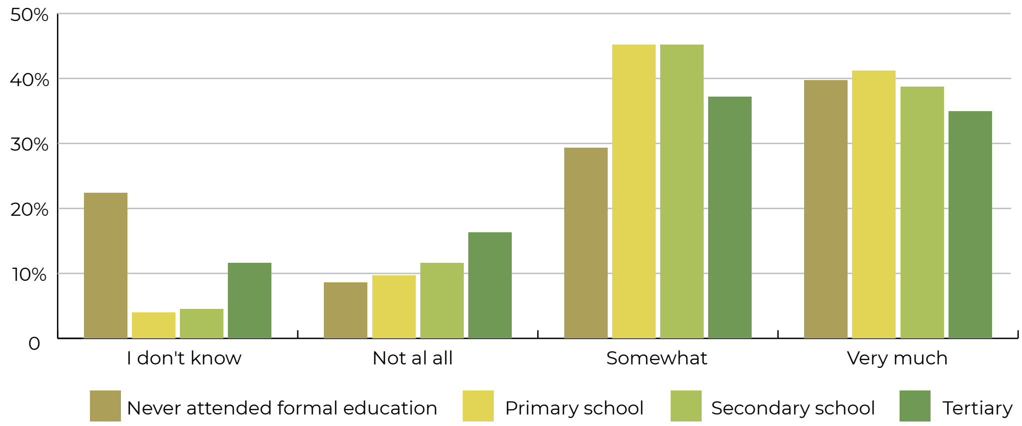
Most people surveyed consider themselves to be 'somewhat' (43.7 per cent) or 'very much' (39.9 per cent) vulnerable to heat. The percentage of those who replied 'not at all' was 10.6 per cent, while 5.8 per cent were unsure. Education, age and occupation were factors that significantly shaped people's responses (Figure 11), not gender or health. **The fact that people with an existing health condition were not significantly more likely to consider themselves vulnerable to heat than people without a condition is cause for concern**, although most people with a condition did consider themselves to be 'very much' (45.9 per cent) or 'somewhat' (39.8 per cent) at risk.

Figures 12–14: Perceived vulnerability to heat by education, age and occupation.

DO YOU CONSIDER YOURSELF VULNERABLE TO HEAT?





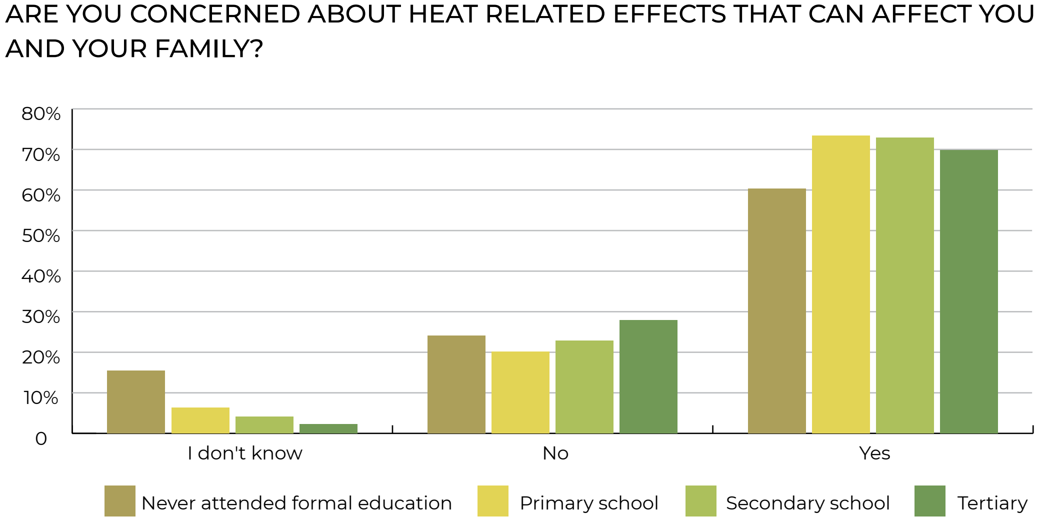


People who had not attended formal education were more likely to answer 'I don't know' when asked if they were vulnerable to heat. Casual labourers were most likely to consider themselves 'somewhat' (44.6 per cent) or 'very much' (45.2 per cent) at risk from heat, followed by unemployed people and businesspeople.

There was awareness of heat risk rising with advancing age. When it came to people over the age of 65, 50.8 per cent considered themselves to be 'very much' at risk, decreasing to 50.5 per cent of people aged 50–65. However, 11.9 per cent of people over the age of 65 considered themselves 'not at all' vulnerable, as did 6.5 per cent of those aged 50–65, 9.5 per cent of people aged 30–50 and 15.9 per cent of people aged 18–30.

Concern about heat-related risks affecting their family or community was significantly shaped by education and occupation (see Figures 12–14). Casual labourers were most likely to be concerned for others (79.6 per cent), which aligns with their high level of concern for their own personal risk. Respondents tended to name only two (38.3 per cent) or three (25.9 per cent) groups of people as being especially vulnerable to extreme heat, suggesting that raising awareness of at-risk groups in Tanzania is important.

Figure 15: Concern about heat affecting people's family and community by education



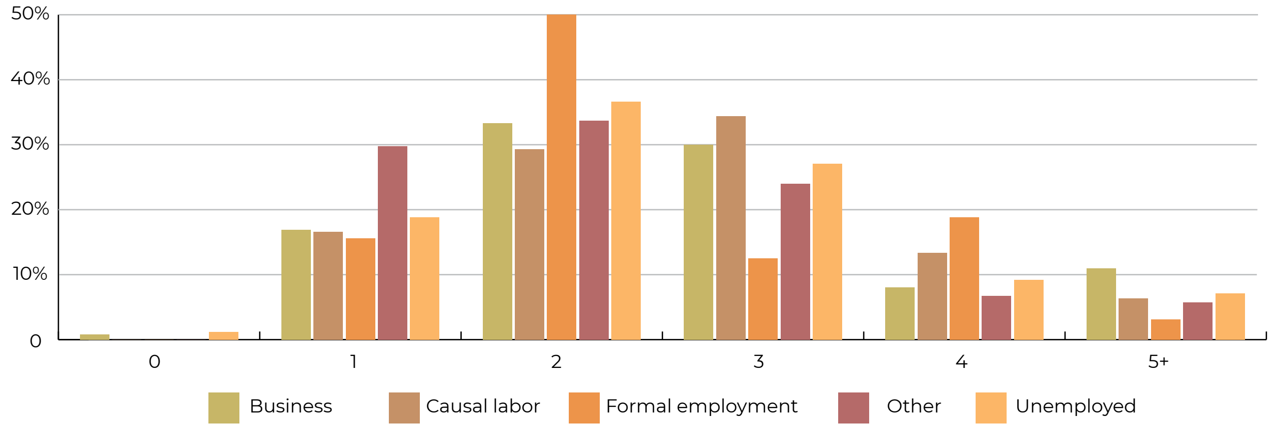
3.1.3. Heat-related impacts, vulnerability and concerns

Occupation was the only recorded demographic variable that was significantly associated with knowledge of heat stress symptoms (Figure 15). People owning businesses were most likely to be able to list five or more symptoms. Age, gender, education and health did not show statistically significant associations. People's jobs and health significantly shaped their knowledge of mitigation strategies to protect themselves from the heat (see Figure 16).

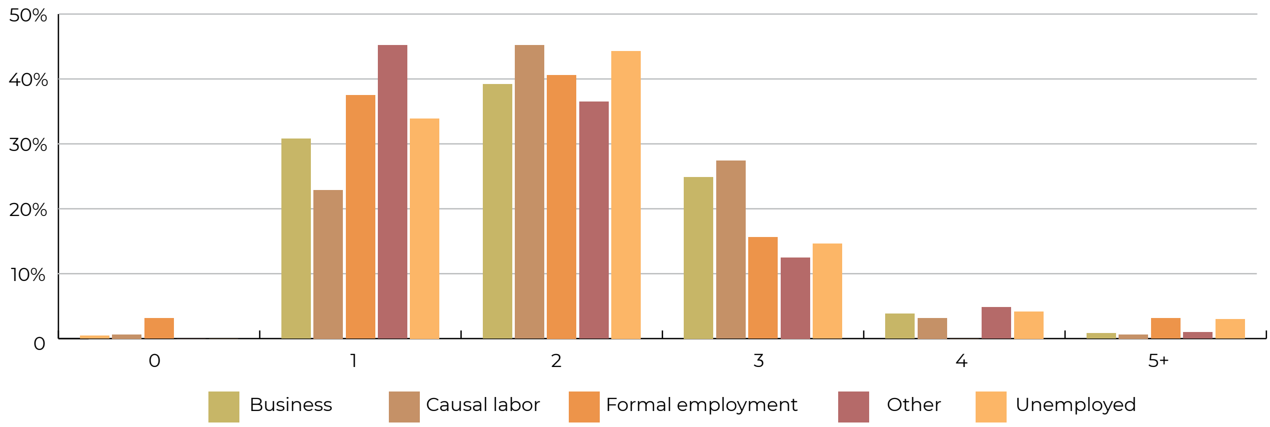
Around one-third could name one action (32.6 per cent) and one-in-twenty could name four or more (5.54 per cent). Concerningly, people with an existing health condition tended to be able to name fewer ways to cope with the heat. Casual labourers and unemployed people, on the other hand, could typically name more (Figures 17, 18).

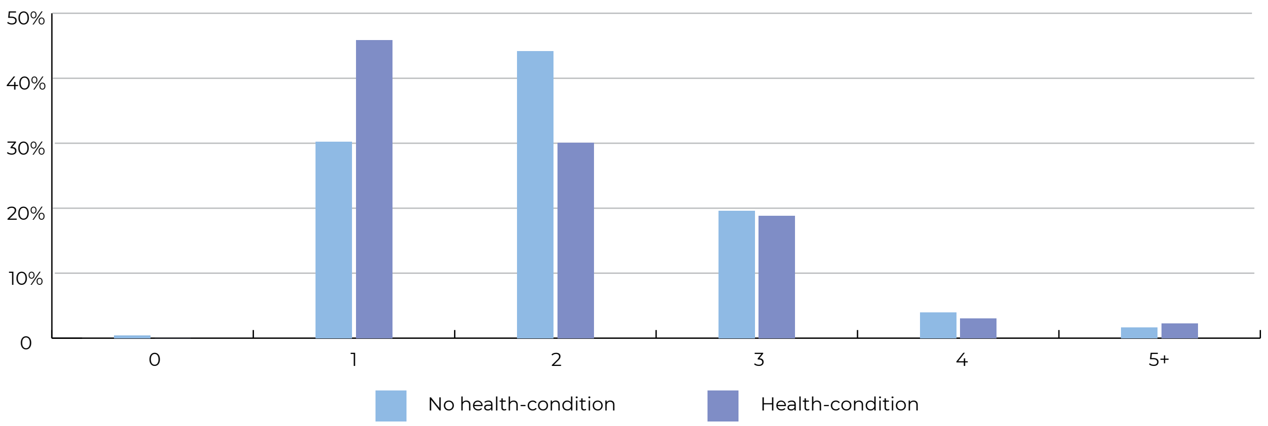
Figure 16: Number of heat stress symptoms identified by occupation

NUMBER OF KNOWN HEAT STRESS SYMPTOMS



Figures 17-18: Number of heat mitigation strategies identified by occupation and health status





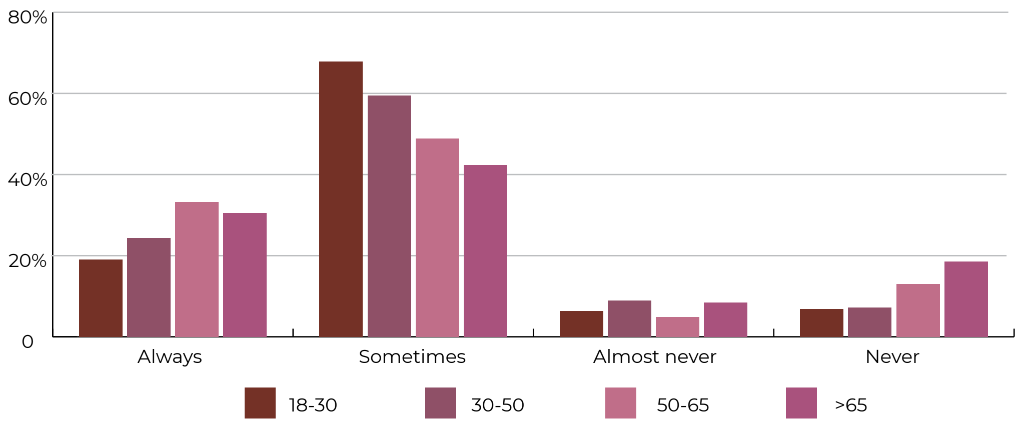
3.1.4. Adaptation strategies and barriers

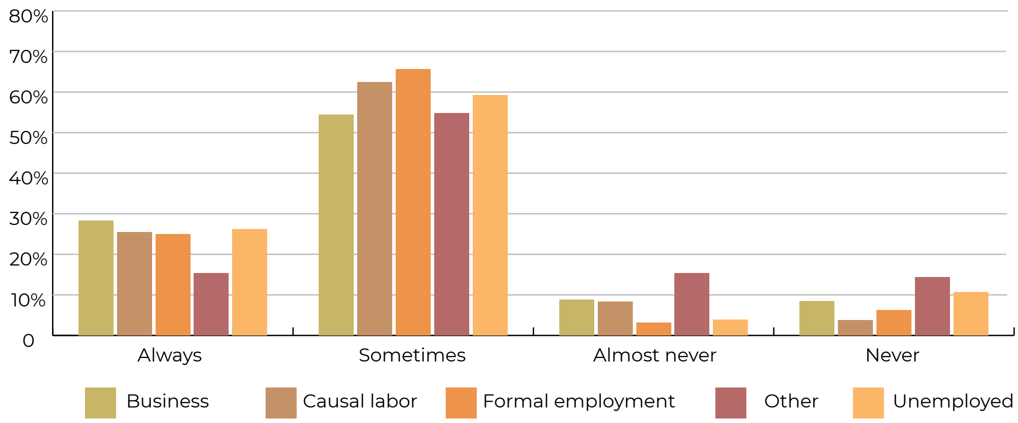
One-in-four people (25.3 per cent) reported 'always' changing their behaviour during periods of hot weather. Well over half (58.2 per cent) said they 'sometimes' change their behaviour. However, 16.5 per cent 'almost never' and 'never' change their behaviour. Of the people who did not change their behaviour, 45.5 per cent said that this was due to the weather not being hot enough; 36.4 per cent said they are used to hot weather and it doesn't affect them; 31.8 per cent did not have the resources to change their behaviour; and 13.6 per cent said they did not know that heat can be dangerous.

Education and age had the strongest association with behavioural change during hot weather (Figures 19, 20) followed by occupation and health. People over the age of 65 were the most likely of any age group to never change their behaviour during hot weather (18.6 per cent of their age bracket). People who consider themselves to be vulnerable to extreme heat are more likely to change their behaviour during hot weather (Figures 18, 19).

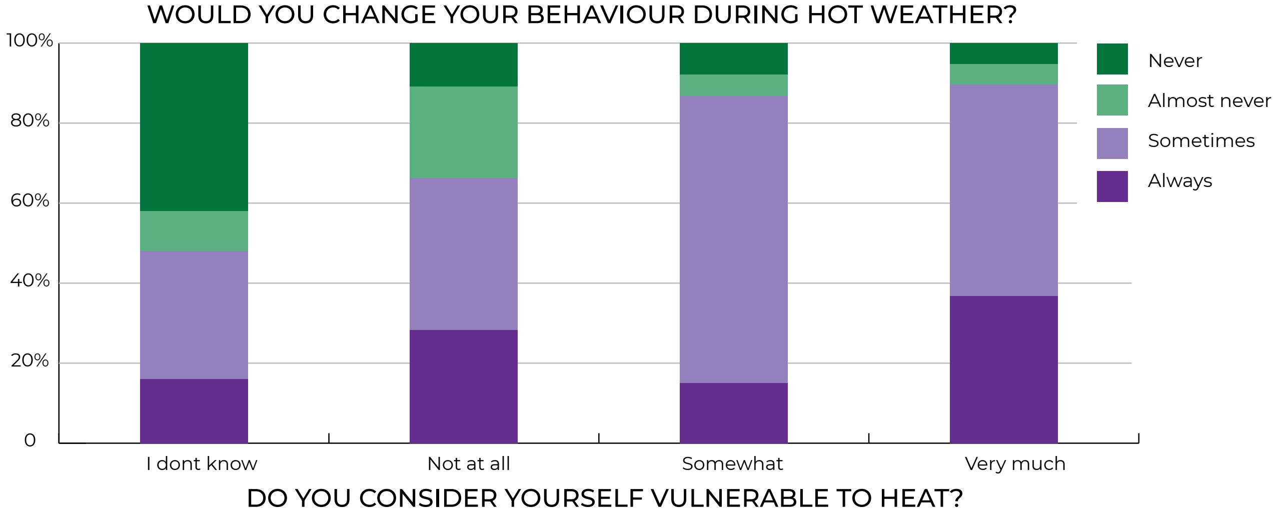
Figures 19-20: Receptivity to changing behaviour during hot weather versus perceived vulnerability to heat.

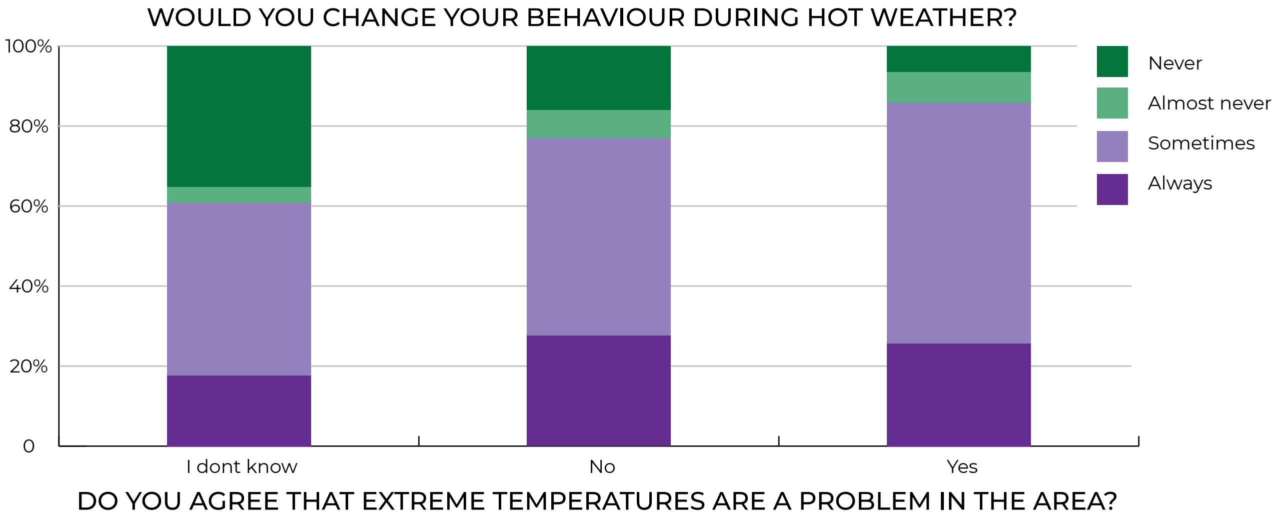
WOULD YOU CHANGE BEHAVIOUR DURING HOT WEATHER?

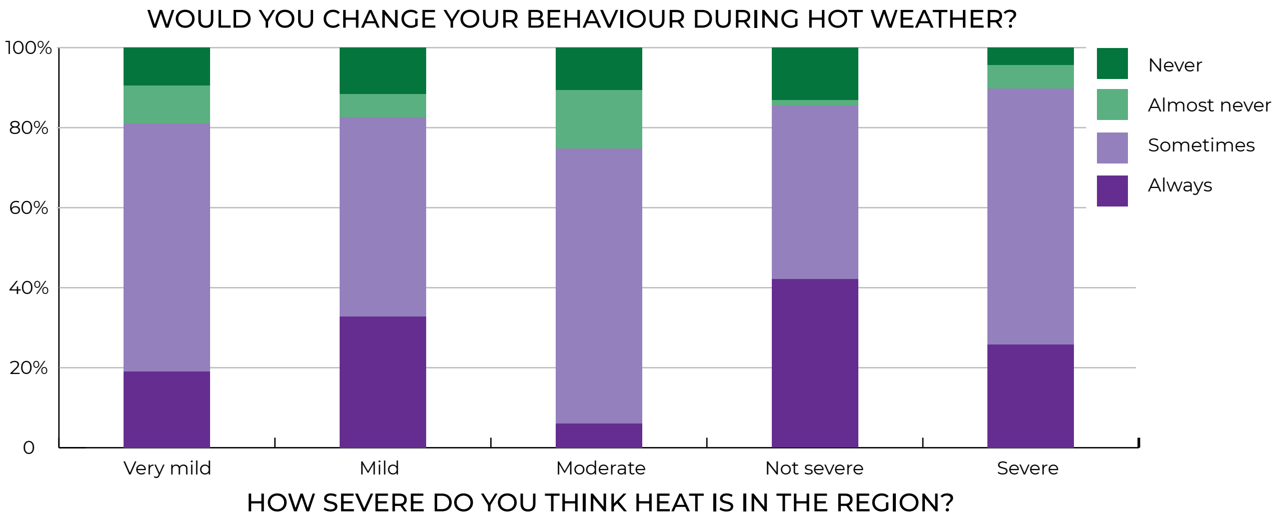




Figures 21–23: Receptivity to changing behaviour during hot weather versus perceived vulnerability to heat





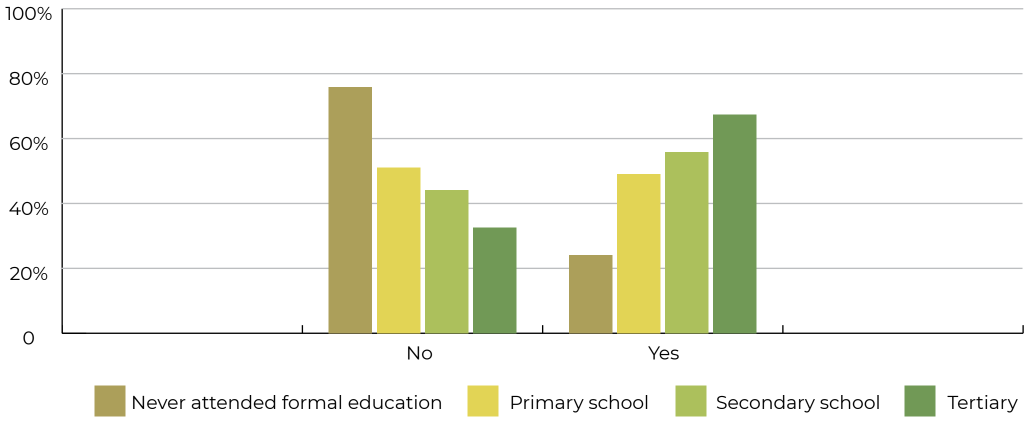


People were most likely to drink more fluids (75.2 per cent) and use a fan (60.7 per cent) in response to hot weather. Other commonly adopted self-protective measures include adjusting clothing by wearing looser, lighter materials and a hat (30.4 per cent). Around one-in-five people listed using air-conditioning (22.2 per cent) among their top three measures during hot weather. 13.9 per cent sleep or rest during the hottest parts of the day; 6.6 per cent avoid physical activity and 5.3 per cent avoid outdoor activities. Few people were least likely to list visiting parks or green areas (5.3 per cent), opening windows (3 per cent), taking no measure at all (2.5 per cent), or eating small meals (2.1 per cent) among their measures to protect against heat.

There was an even split between people who did (50.7 per cent) and did not (49.3 per cent) spend more money during hot seasons. Education was significantly associated with this (Figure 24). The higher people's level of formal education, the more likely they were to spend more money to cope with the heat.

Figure 24: Spending more money to cope during hot seasons by level of formal education

DO YOU SPEND MORE MONEY DURING HOT SEASONS TO COPE?



Respondents who answered 'yes' to spending more money to cope with the heat defined their expenditures to be:

Around half of the people surveyed (54.7 per cent) always have access to water during periods of high heat. On most days, 17.8 per cent have access to water and 10.6 per cent have access to water half of the time. Very little access to water during periods of high heat was reported by 16.8 per cent. Many people in the areas surveyed experience frequent electricity blackouts. Three-in-ten people (29.7 per cent) experience them more than once a week, 18.3 per cent once a week and 18.5 per cent once a month. Fewer people experience them only a few times per year (20.3 per cent) or never (13.2 per cent).

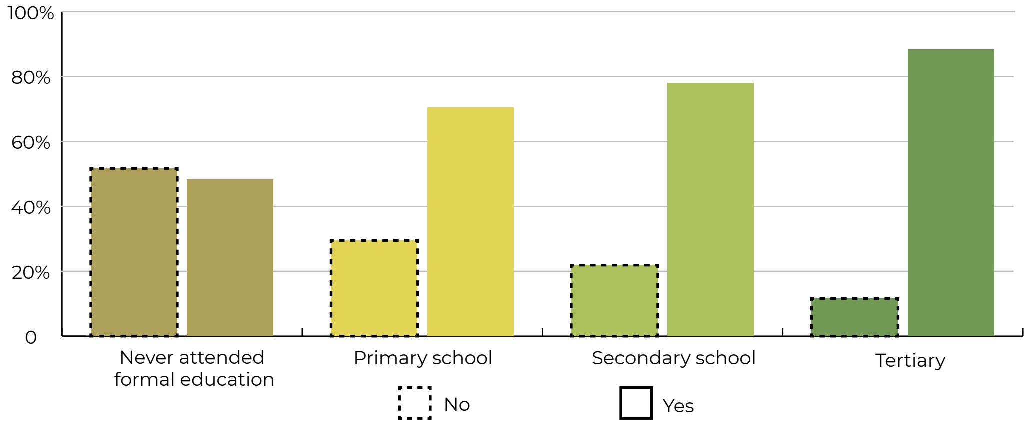
When asked how their community could best adapt to unusually hot weather, many people suggested the provision of shade. The construction of community shades (57.9 per cent of respondents), small-scale planting of shade trees (31.1 per cent) and setting up open spaces with vegetation cover (29.7 per cent) were the most common recommendations. Ensuring a steady supply of clean and safe water (15.5 per cent) was the next most-mentioned measure, followed by ensuring a steady supply of electricity (13 per cent) and easing access to green spaces (10.3 per cent). Fewer than one-in-ten people suggested increasing access to cooling equipment (8.5 per cent), raising community awareness of the dangers of heat (8.4 per cent), adding green rooftops to buildings (6 per cent) or reducing the cost of electricity (5.1 per cent).

3.1.5. Early warning information and communication channels

Most people (72.6 per cent) have access to weather forecast information, but 27.4 per cent do not. Education significantly shapes this (Figure 25). Of the people who have never attended formal education, 51.7 per cent do not have access to weather forecast information, compared to 11.6 per cent of those with tertiary education.

Figure 25: Proportion of people who receive weather forecasts by level of formal education.

DO YOU RECEIVE WEATHER FORECASTS?

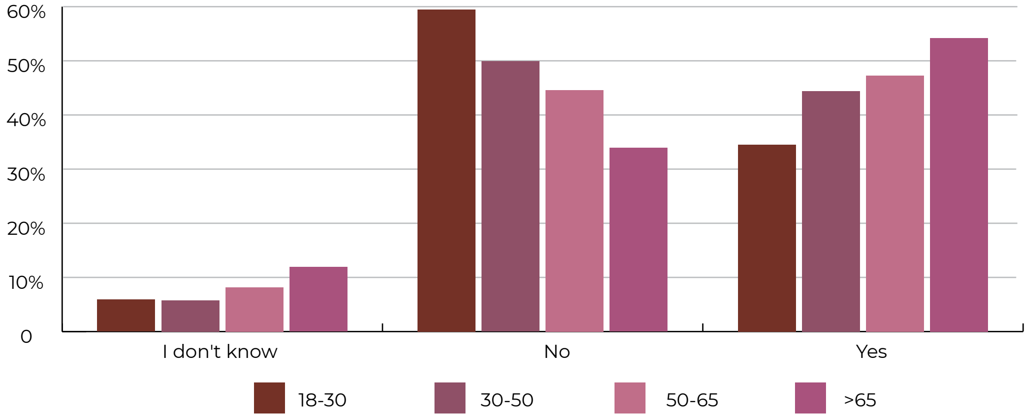


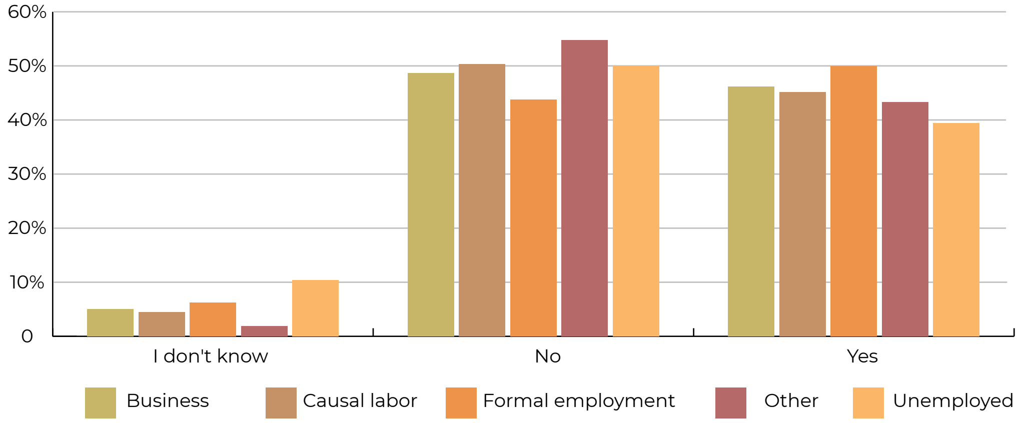
Most respondents access weather forecast information through television (76.2 per cent) or radio (70.6 per cent). Around one-in-three access this information through social media (32.4 per cent) and one-in-ten through newspapers (10 per cent). Relatively fewer people receive this information from healthcare professionals (2.2 per cent) or online postings (2.2 per cent).

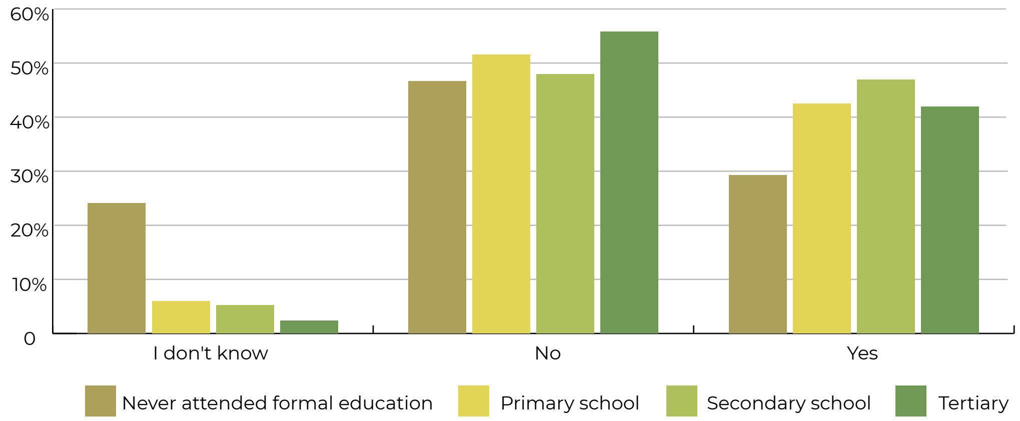
Whether people had received an alert was significantly shaped by their level of formal education, age and occupation (Figures 26–28). Half of respondents (50.1 per cent) had never received an alert or warning message for extreme heat; 43.2 per cent had; and 6.7 per cent were unsure.

Figures 26–28: Reception of heat early warning or alert by education, age and occupation.

DID YOU RECEIVE EARLY WARNING INFORMATION







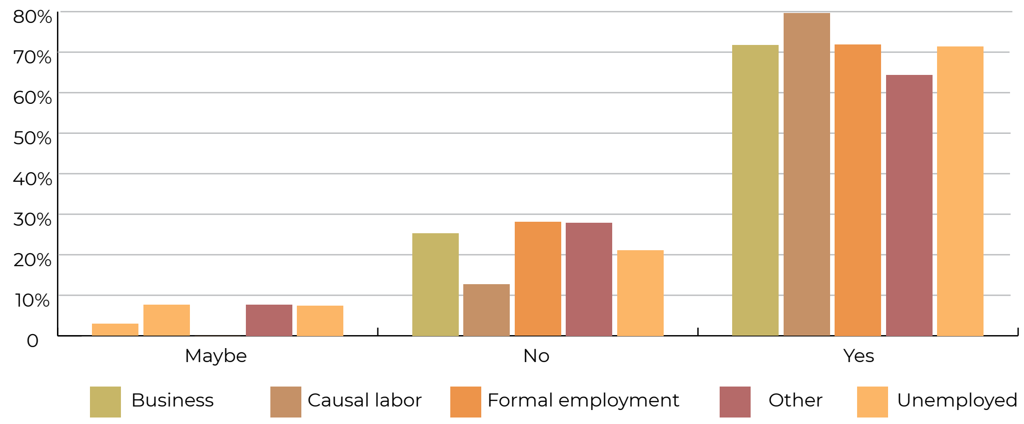
People with primary, secondary or tertiary education were more likely to answer that they had received a heat warning (42.5 per cent, 46.9 per cent and 43.3 per cent respectively) than people who had not attended formal education (29.3 per cent).

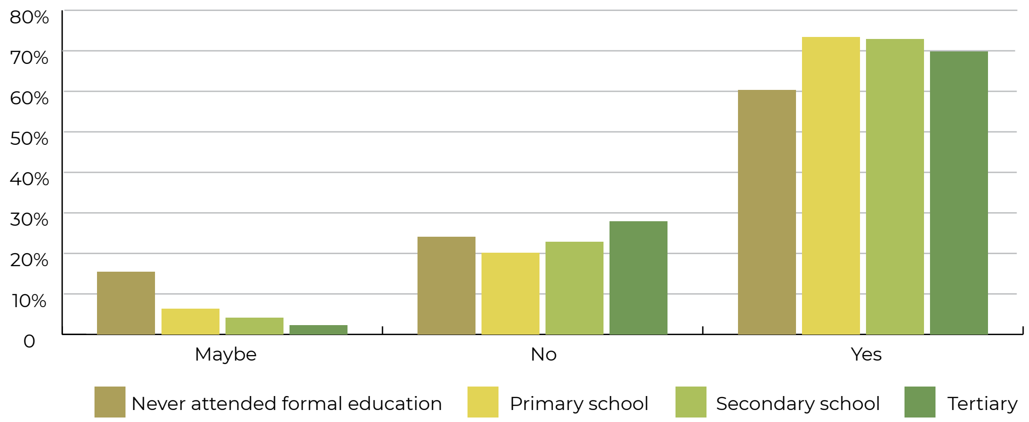
Younger people were less likely to have received early warning information than older people. Around one-third of people aged 18–30 had received an alert (34.5 per cent) whereas 44.4 per cent of people aged 30–50, 47.3 per cent of people aged 50–65 and more than half of people aged over 65 (54.2 per cent) had.

Only around one-third of people (34.3 per cent) would change their behaviour based on such an alert or warning message while two-thirds (65.7 per cent) said they would not. Occupation and education were significantly associated with people acting on heat alerts (Figures 29, 30) while age, gender and health were not. Casual labourers were most likely to respect heat warnings. People without formal education were least likely to change their behaviour based on an early warning message.

Figures 29-30: Receptivity to changing behaviour based on a heat alert by occupation and education.

WOULD YOU CHANGE BEHAVIOUR BASED ON AN EARLY WARNING MESSAGE?





The main information conveyed in heat alerts were maximum temperature (according to 52.7 per cent of respondents), minimum temperature (14.1 per cent), affected locations (8.4 per cent), personal protective actions (7.1 per cent), duration of the period of hot weather (6.7 per cent), how to protect family and friends (3.6 per cent) and the level of humidity (1.8 per cent).

When asked about the single most useful type of information people would like to receive, maximum temperature (32.4 per cent), actions to take to protect yourself from the heat (29.2 per cent), duration of the period of hot weather (15 per cent) and minimum temperature (13.9 per cent) were most often named. These figures indicate that people wish to receive more information about the duration of periods of hot weather and actions they can take to protect themselves than they currently do.

One-quarter of people had received a heat alert a week in advance (25.4 per cent). Occupation, health and age significantly shaped how far in advance people received early warning information. Casual labourers received alerts the earliest of any occupation: 44.6 per cent reported receiving them a week in advance. Troublingly, people with existing health conditions tended to receive heat alerts later than people without.

Around half as many people with a health condition received an alert a week in advance (13.2 per cent) as people without a health condition (27.5 per cent). Older people tended to receive heat alerts later than younger people; they were more likely to receive alerts one day in advance or on the same day. Four-in-ten people aged 18–30 (39.3 per cent), 30–50 (37.6 per cent) and 50–64 (40 per cent) receive heat alerts a few days in advance compared to just three-in-ten over-65 year-olds (29.3 per cent).

When asked for the best ways to share information in their communities, people favoured television (73.1 per cent) and radio (56.8 per cent), which were also the most relied upon channels for accessing weather forecast information. Word-of-mouth (34.1 per cent) and social media (18.8 per cent) were popular responses, but fewer than one-in-ten people recommended public displays (9.1 per cent), newspapers (5.5 per cent), other channels (3.5 per cent), or WhatsApp (2.5 per cent).

People's occupation age and health significantly shaped how they thought information could best be spread in their community, not gender or level of formal education (Figures 31–33). Casual labourers were more likely to favour radio (66.9 per cent), social media (27.4 per cent) and public displays (14.6 per cent) than people in other occupations. Business owners were more likely to suggest newspapers (9.7 per cent) as the best way to spread information in their community.

Figure 31: Recommended community communication channels by occupation

IN YOUR COMMUNITY, HOW DO YOU THINK INFORMATION CAN BEST BE SPREAD?

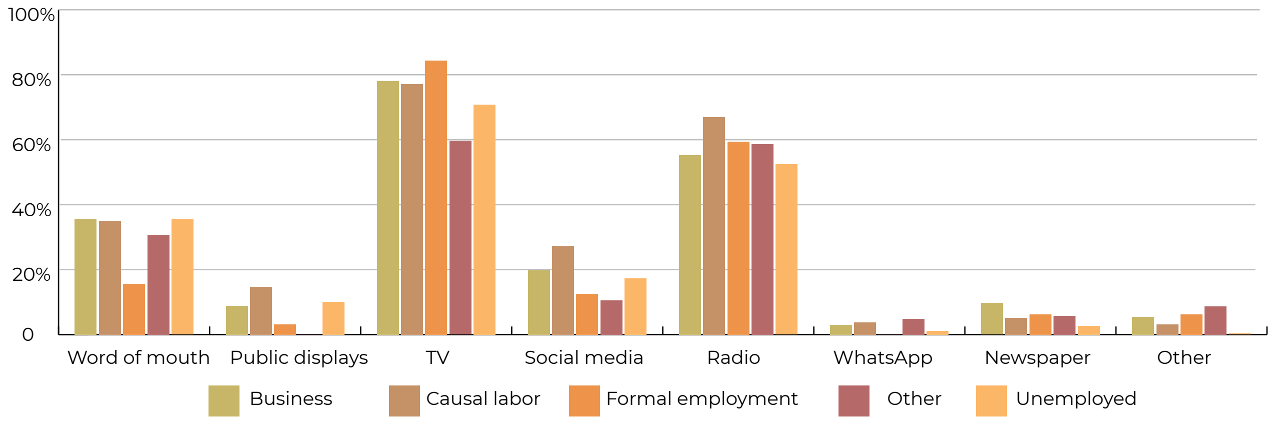


Figure 32: Recommended community communication channels by age

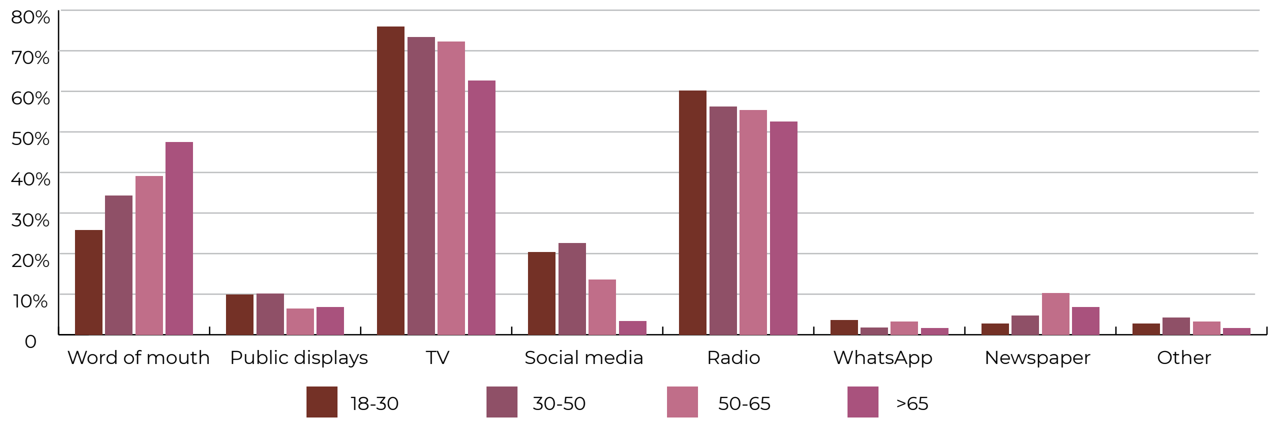
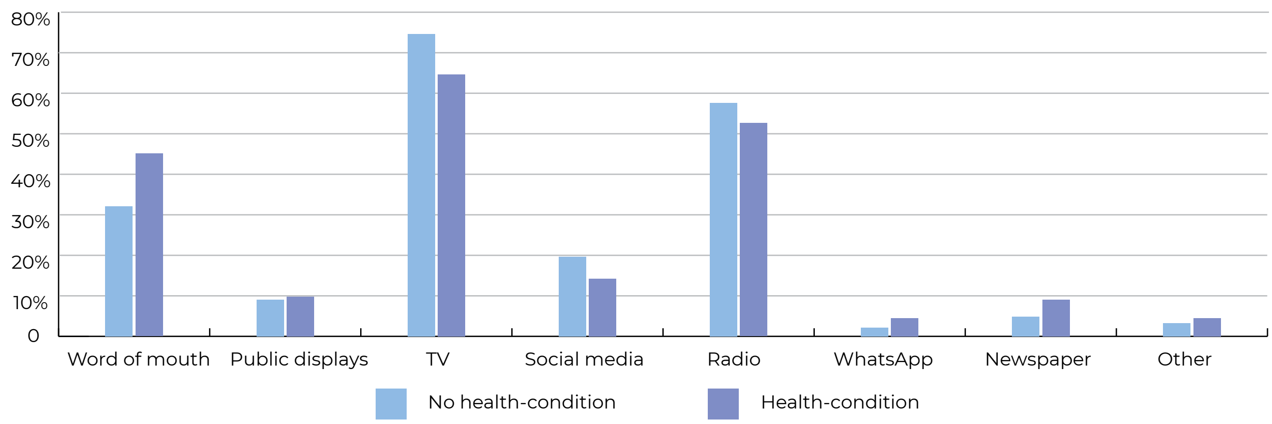


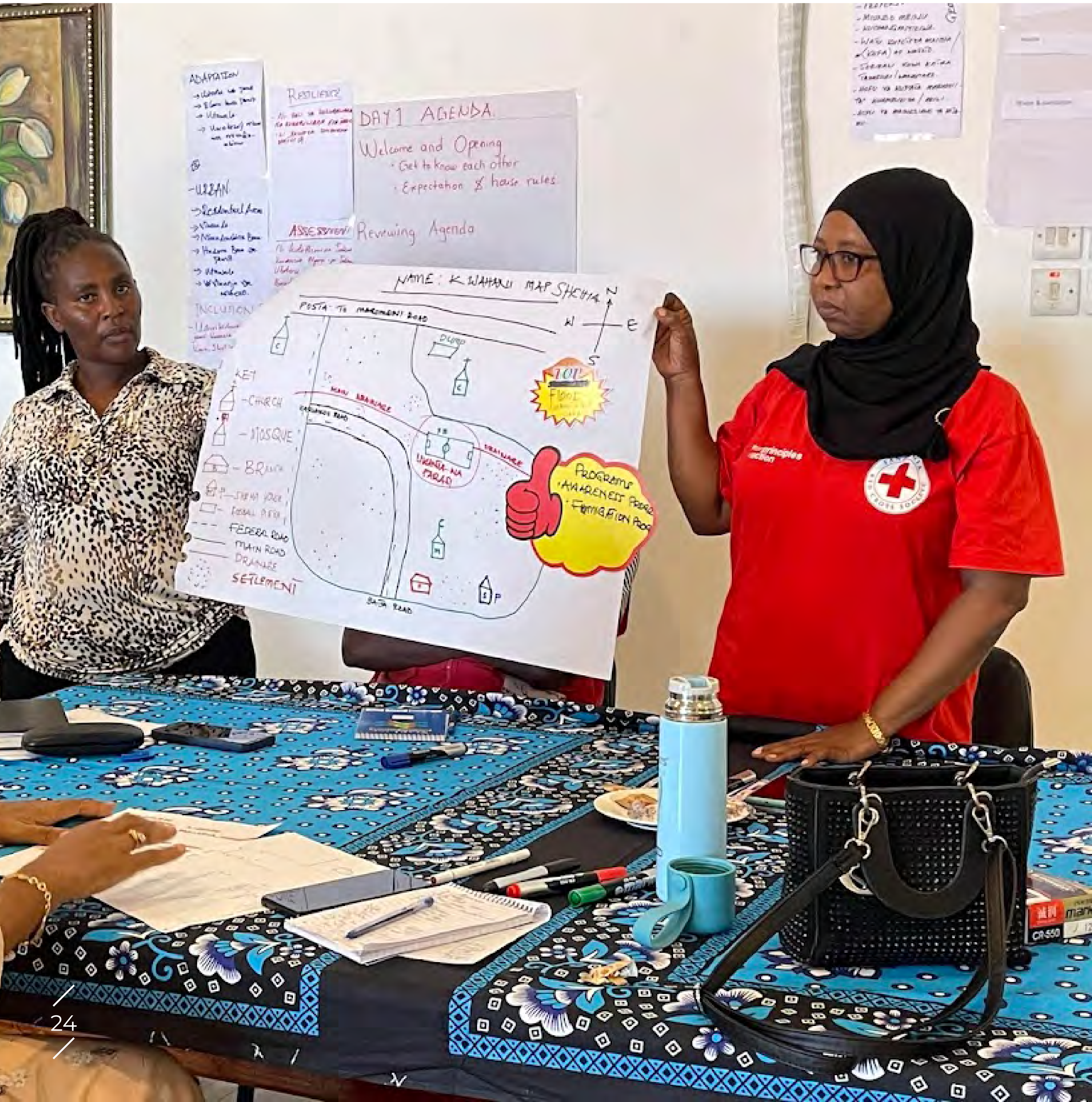
Figure 33: Recommended community communication channels by health



Older people were more likely to prefer communication via word-of-mouth. Around half of over-65s favoured it (47.5 per cent) compared to one-quarter of people aged 18–30 (25.8 per cent). Social media was favoured by around one-in-five people aged 18–30 (20.4 per cent) and 30–50 (22.6 per cent), falling to 13.6 per cent of people aged 50–65 and just 3.4 per cent of people over the age of 65.

People with existing health conditions were more likely than people without to favour communication via word-of-mouth (45.1 per cent versus 32.1 per cent) and less likely to favour television (64.7 per cent versus 74.6 per cent) as well as social media (14.3 per cent and 19.6 per cent).

Around four-in-ten people (38.5 per cent) had spoken with one or more members of their community about the risks of heat. Six-in-ten people (61.5 per cent) had not. Education was the only demographic factor recorded that significantly affected this. The higher people's level of formal education, the more likely they were to have spoken about the risks of extreme heat with others in their community.



3.2 Qualitative results (KIIs and FGDs)

The key findings of the KIIs and FGDs are summarized below:

A health expert from Tanga emphasized there is an increase in hospital admissions during the hot season, explaining that many patients come in with unexplained symptoms. He described how,

"after several tests, we often find nothing wrong with their bodies. What we do is give them rest, fruits and educate them to drink plenty of water to ensure smooth blood circulation. After that, the headaches and other symptoms disappear, and they realize they aren't sick, it's just the increased heat causing water loss from their bodies, leading to headaches and changes in urine colour. While we don't diagnose the exact cause, it's related to climate change."

- Both community members and key informants observed an increase in extreme heat over the years, with particular concern over warmer nights, unpredictable rainfall and urban heat retention, though some perceived the heat as less severe.
- While many community members attributed rising temperatures to divine forces or natural changes, many also pointed to human activities such as deforestation, urbanization and pollution; experts strongly emphasized deforestation, poor urban planning and climate change as key contributors.
- The impacts of extreme heat mentioned were wide-ranging, with community members and experts highlighting health issues like skin rashes, high blood pressure and dehydration along with increased hospitalizations as well as economic burdens on agriculture and fisheries.
- Children, pregnant women and individuals with pre-existing conditions were widely recognized as particularly vulnerable to extreme heat. Experts further noted that low-income households were disproportionately affected due to their limited access to cooling solutions.

One participant in a community FGD in Mjini Magharibi remarked,

"the occurrences have been quite frequent, and those going to the hospital are told to avoid the sun and stay in shaded areas to rest. But dealing with it is hard. We just thank God because even if you take medicine, how many times can you take it? The boils keep appearing, so you just have to stay calm."

- Community members employed personal adaptation strategies such as staying in the shade, modifying clothing and adjusting diets. In addition, community members and experts emphasized institutional measures, including tree-planting programmes, climate education campaigns and improved public health messaging.
- Formal weather forecasts from the Tanzania Meteorological Authority are provided through radio, television and other channels, though community members also emphasized traditional knowledge and indicators to predict the weather are still prevalent, mostly in villages through word-of-mouth communication.
- Both communities and experts stressed the importance of tree planting, improved urban planning and stronger public awareness efforts. In addition, policy enforcement and alternative energy incentives were mentioned.
- Some participants emphasized the need for improving access to cooling infrastructure and called for financial assistance to purchase fans or reduce the cost of gas and electricity, making cooling solutions more accessible, especially for low-income households.
- Key informants strongly advocated for strengthening urban planning policies to improve building regulations, encourage green spaces and reduce heat traps in urban areas. There was a particular call for government oversight in housing construction, adherence to regulations and industrial zoning to keep industries away from residential areas.
- Collaboration among sectors was seen as essential in tackling the problem of extreme heat. In addition, a local leader's recommended was that the TRCS should engage with schools and universities to create youth ambassadors on environmental conservation.

4. DISCUSSION

The study found that most people had noticed and experienced changes in temperature over the past few years, especially with warmer nights. This is unsurprising given the impacts of global warming and the fact that Tanzania has registered a warming trend over most parts of the country (FCFA, 2017; Luhunga, 2022 & 2025; Kabanda, 2024). The study also noted differences in perception of the severity, vulnerability and exposure to extreme heat. Casual workers appeared to be more knowledgeable about the impacts of extreme heat and were the most likely to change their behaviour in the event of an extreme heat event, likely due to their experience of working in hot conditions. Older people, casual labourers and unemployed individuals considered themselves to be at the greatest risk of the impacts of extreme heat. This aligns with literature which identifies older people and outdoor workers as being vulnerable to extreme heart (Margolis, 2014; Wilhemi & Hayden, 2010).

We also found that the patterns of concern and age/education were significant, with individuals with formal education and older people acknowledging worries about extreme heat compared to younger people and those without formal education. Knowledgeable people, who perceive the risks as high, are the most likely to take action against the impacts of extreme heat (Ying Deng *et al.,* 2017). This underscores the need to take into consideration demographics when designing knowledge awareness interventions. Younger people should be targeted with accessible information on extreme heat – most of the young people interviewed were engaged in outdoor activities such as boda boda (motorcycle taxis) riding and are highly exposed to hot temperatures.

The majority of people were knowledgeable about the symptoms of extreme heat. However, less than half reported changing their behaviour to address its impacts. This shows a gap between turning knowledge into action. One of the reasons for this inaction could be the belief that extreme heat is God's will – a perception that is widely held in religious communities in Tanga and Mjini Magharibi. Religion significantly shapes a community's perception of climate change (Schuman *et al.,* 2018; Veldman et al. 2014 and it is critical to collaborate with religious leaders to raise awareness of the dangers of extreme heat via their communication to different groups of people.

Although most people acknowledge receiving early warning information, they expressed a desire for it to include a description of the self-protective actions they can take. One of the reasons why people don't act on early warnings is a lack of clarity on what to do (Finnish Red Cross, 2024). Effective early warning information should include the hazard, its impacts, who will be affected and the actions that can be taken. These warnings should be 'people centred' with clarity on the potential impacts and what can be done to avoid them (Coughlan *et al.,* 2022).The study revealed a sense of awareness of both short-term and long-term strategies towards addressing the impacts of heat at the individual, community and institutional levels. For example, a majority of the participants reported tree planting as a common remedy for addressing climate change impacts, including extreme heat. Tree planting is formally a widely recognized adaptation strategy to climate change (Hopkins *et al.,* 2021; Anabaraonye *et al.,* 2022). Of interest was the recognized need to address the underlying causes of deforestation, before communities are likely to see the sustained benefits of tree planting. Wood is used widely as a source of fuel for cooking, and its sale is a source of livelihoods. Without addressing these needs in sustainable ways, long-term adaptation measures such as tree planting will not offer solutions towards addressing impacts of heat.

5. CONCLUSION

The findings of the study indicate a generally good level of knowledge about climate change, with broad consensus among participants on the observed changes and recognition of human activity as a key driver. While concern about heat was widely expressed, younger participants tended to perceive it as less severe and more familiar, while some older participants were more reluctant to adopt behaviour change measures. Although overall preparedness levels were reported as high, respondents with pre-existing medical conditions demonstrated lower levels of knowledge on the impacts of extreme heat and possible mitigating actions. Notable gaps also existed in participants' understanding of early warning information and appropriate self-protective actions.

Given the financial constraints faced by low-income earners in accessing certain interventions (e.g., cooling solutions), it is essential to design strategies that are equitable and accessible for all vulnerable groups. Partnerships with income-generating institutions could help to address affordability barriers. In parallel, institutional measures – including community-level tree planting initiatives, improved urban planning and sustained public awareness campaigns – are needed to ensure widespread benefits.

The study demonstrates that there is existing – though uneven – levels of preparedness at both the individual and institutional levels. Scaling these efforts is also essential.

Priorities should include:

- Targeted risk communication and awareness-raising campaigns to drive behaviour change with focused engagement on older people and youth as well as action-oriented early warning messages that clearly outline the dangers of heat and the symptoms of heat-related illnesses alongside specific preparedness and response measures.
- Special attention must be paid to highly exposed groups, such as older people and outdoor workers (including casual labourers).
- Strengthened collaboration with local authorities and government is also necessary to support advocacy, policy development and operational frameworks for heat preparedness and emergency response.

Implementing these measures will help ensure that communities are better supported, equipped and protected against the growing impacts of extreme heat.

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ANNEXES

ANNEX 1. HOUSEHOLD SURVEY

INTRODUCTION

My name is ______________, and I am a volunteer with the Tanzania Red Cross Society. We are conducting this survey to understand the perception of the community on heat, its impacts, and what can be done to prepare for and address these impacts. In addition, we also want to understand what communication channels are used by the community to access early warning information. The findings from this study will help the Tanzania Red Cross Society and its stakeholders design actions that can help the community prepare for heat stress. Your answers will be anonymized and will not be traced back to you.

Do you consent to participate in this study?
a. Yes
b. No
If the answer is No, please terminate the interview.

No. of the survey: ______________

Date of the survey: ______________

GPS coordinates: ______________

DEMOGRAPHIC INFORMATION

Name of region
- a. Mjini Magharibi – Unguja
- b. Tanga

Wards in Magharibi – Unguja region:
- a. Mwebeladu
- b. Shangani
- c. Miembeni
- d. Kikwajuni Juu

Wards in Tanga region
- a. Chongoleani
- b. Central Mzingani
- c. Duga
- d. Mzizima

PART 1: GENERAL INFORMATION

1. Age group of respondent
   - a. 18–30
   - b. 30–50
   - c. 50–65
   - d. > 65

2. Gender of household head
   - a. Female
   - b. Male
   - c. Other

3. Gender of respondent
   - a. Female
   - b. Male
   - c. Other

4. Employment status of respondent
   - a. Unemployed
   - b. Formal employment (specify job)
   - c. Casual labour (specify job)
   - d. Business (specify)
   - e. Other (specify job)

5. Highest level of education attended
   - a. Never attended formal education
   - b. Primary school
   - c. Secondary school
   - d. Tertiary

6. Health condition
   - a. No health condition
   - b. Existing chronic illness
   - c. Disability (specify)
   - d. Other (specify)
   - e. Prefer not to answer

PART 2: KNOWLEDGE OF HEAT AND RELATED RISKS

7. Have you ever experienced periods of unusually or uncomfortably hot weather in this area?
   f. Yes
   g. No
   h. I don't recall

8. If yes, how often do you experience periods of uncomfortably hot weather?
   a. Less than once a year
   b. Once a year
   c. Multiple times per year
   d. Year-round

9. During which time of the day do you mostly experience discomfort from hot weather?
   a. Morning
   b. Afternoon
   c. Evening
   d. At night

10. In which month(s) and year **did you last experience extremely** unusual or uncomfortably hot weather
    Month ___________ Year ____________

11. Which months of the year do you usually experience hot weather? (Select multiple)
    a. January
    b. February
    c. March
    d. April
    e. May
    f. June
    g. July
    h. August
    i. September
    j. October
    k. November
    l. December

12. Do you know the temperature levels on hot days/ nights?
    a. Yes
    b. No
    c. Sometimes

13. If so, which temperature range does the hot days/ nights fall within?
    a. 20–24°C
    b. 25–29°C
    c. 30–34°C
    d. Above 35°C

14. Do you think there has been an increase in temperature in this area in the past few years?
    a. Yes
    b. No
    c. I don't know

15. What do you think are the causes of the high temperature in this area? List below. [Do not provide the respondent with the options below, but select which ones best approximate the responder's answer]:
    a. Climate change
    b. Urbanization
    c. Deforestation
    d. Overcrowding
    e. Other: ______

16. Do you agree that extreme temperatures are a problem in this area?
    a. Yes
    b. No
    c. I don't know

17. How severe do you think the heat is in this area?
    a. Not severe
    b. Very mild
    c. Mild
    d. Moderate
    e. Severe

18. Do you consider yourself vulnerable to heat?
    a. Very much
    b. Somewhat
    c. Not at all
    d. I don't know

19. If yes or maybe, in which areas of your life does heat affect you?
    a. Health issues
    b. Food availability
    c. Water availability
    d. Work productivity

e. Community aggression or violence
f. Social activities
g. Other: ___________________

20. Are you concerned about heat-related risks that can affect your family or your community?
   a. Yes
   b. No
   c. Maybe

21. Some people are more vulnerable to extreme heat. Can you name some groups of people who you think are most vulnerable to extreme heat? [Do not provide the respondent with the options below, but select which ones best approximate the responder's answer]:
   • Socially isolated
   • Elderly
   • Newborns
   • Children
   • People on medication
   • Obese
   • People with disability
   • Athletes
   • Outdoor workers
   • Tourists
   • Informal settlers
   • Homeless

22. Heat can have various impacts on human health. Do you know some of the symptoms associated with heat? List below the ones you know. [Do not provide the respondent with the options below, but select which ones best approximate the responder's answer]:
   a. Dizziness
   b. Sunburn
   c. Headache
   d. Nausea
   e. Muscle cramps
   f. Fatigue
   g. Increased heart rate
   h. Skin rash
   i. Excessive sweating
   j. Others: […]
   k. I don't know

PART 3: ADAPTATION STRATEGIES AND BARRIERS

23. There are ways to protect yourself from extreme heat. Do you know some things you could do to prevent negative health effects from extreme heat? [Do not provide the respondent with the options below, but select which ones best approximate the responder's answer]:
   a. Increase consumption of fluids (water)
   b. Using a fan or air-conditioning
   c. Sleeping/resting during hottest periods of the day
   d. Adjust clothing (wear loose clothes, light materials/colour, wear hat)
   e. Close windows (when outdoor temp is higher)
   f. Visit parks / green areas
   g. Avoid physical activity
   h. Avoid outdoor activities
   i. Eat small meals
   j. Other, namely: _________________

24. Do you change your behaviour during periods of hot weather?
   a. Always
   b. Sometimes
   c. Almost never
   d. Never

25. Can you mention these behaviour changes?

26. Which measures do you most likely take during hot weather? List your top 3:
   a. Increase consumption of fluids (water)
   b. Using air-conditioning
   c. Using a fan
   d. Sleeping/resting during hottest periods of the day
   e. Adjust clothing (wear loose clothes, light materials/colour, wear hat)
   f. Close windows (when outdoor temp is higher)
   g. Visit parks / green areas
   h. Avoid physical activity
   i. Avoid outdoor activities
   j. Eat small meals
   k. Other, namely: ________________

27. If you don't take any measures, why not?
   a. The weather was not hot enough
   b. The heat doesn't affect me / I am used to the hot weather
   c. I didn't know the heat can be dangerous
   d. I don't have the resources to change my behaviour
   e. Other: _________________________

28. Do you spend more money during hot seasons to cope with heat?
    a. Yes. If yes, list why: ____________
    b. No

29. Do you have access to water during periods of high heat?
    a. Always
    b. Most days of the week
    c. Half of the time
    d. Very little

30. Do you experience blackouts during the hot season?
    a. Very often (more than once a week)
    b. Often (once a week)
    c. Sometimes (once a month)
    d. Rarely (few times per year)
    e. Never

31. Do you look for cooler locations in this area during hot days?
    a. Yes. If yes, what type of locations do you visit: ________
    b. No

32. How can your community be best prepared to respond/adapt to unusually hot weather?
    a. Construction of community shades
    b. Setting up open spaces with vegetation cover
    c. Putting in place green rooftops
    d. Steady supply of clean and safe water
    e. Steady supply of electricity
    f. Reducing the cost of electricity
    g. Planting more trees at micro-level
    h. Easing access to green spaces
    i. Providing incentives on cooling equipment
    j. Carrying out community awareness
    k. Others (Specify)

PART 4: INFORMATION & COMMUNICATION CHANNELS

33. Do you have access to weather forecast information?
    a. Yes
    b. No

34. What are the sources of this weather forecast information?
    a. Social media (specify)
    b. Brochures/posters
    c. Television
    d. Online materials (specify)
    e. Radio
    f. Newspapers
    g. Health professionals
    h. Tanzania Meteorological Authority
    i. Relatives/friends
    j. Local council's leaders
    k. Community members
    l. Other (specify)

35. Which of the above sources are the most trusted by the community? (List top 5 options)

36. Have you ever received an alert or warning message for heat stress?
    a. Yes
    b. No
    c. I don't know

37. If yes, mention the source.

38. Did or would you change your behaviour based on such an alert/warning message?
    a. Yes. If yes, explain how:_________________
    b. No

39. If yes, what type of information did you receive?
    a. Maximum temperature
    b. Minimum temperature
    c. Level of humidity
    d. Locations that would be affected
    e. How long the heat would last
    f. What actions to take to protect yourself from the heat
    g. How to protect my family and friends
    h. Other: _______

40. If yes, how many days in advance did you receive this information?
    a. A week in advance
    b. A few days in advance
    c. One day in advance
    d. On the same day
    e. Others (Specify)

41. What other type of information would be useful for you to receive?
    a. Maximum temperature
    b. Minimum temperature
    c. Level of humidity
    d. Duration of the event
    e. What actions to take to protect yourself from the heat
    f. How to protect my family and friends
    g. Other: _______

42. In your community, how do you think information can best be spread?
    a. Word-of-mouth (specify: community leaders, neighbours, family members and/or friends)
    b. Public displays
    c. TV
    d. Social media (specify platform: Facebook, Instagram, etc.)
    e. Radio
    f. WhatsApp
    g. Newspaper
    h. Other: __________

43. Have you talked to one or more people about the risks of heatwaves in your community?
    a. Yes
    b. No

44. In what language would you prefer to receive information?
    a. English
    b. Swahili
    c. Other: _______

45. Do you think your community would benefit from being more prepared to deal with hot weather?
    a. Yes
    b. No
    c. Don't know

PART 5: CONCLUDING QUESTIONS

46. Do you have any other comments that we have not addressed until now, that you feel are important for our study?

    ____

    ____

47. Would you like to receive a quick guide on the impacts of extreme heat and what you can do to reduce heat risk? If yes, list below your address or email (your email will not be used for any other purposes):

    ____

48. In the next phase of this project, we will test specific awareness messages. Would you like to participate in a focus group on this topic? If yes, indicate your phone number or email below:

    ____

    ____

ANNEX 2. KEY INFORMANT GUIDE

INTRODUCTION

My name is _______________, and I am a volunteer with the Tanzania Red Cross Society. We are conducting this survey to understand the perception of the community on heat, its impacts and what can be done to prepare for and address these impacts. In addition, we also want to understand what communication channels are used by the community to access early warning information. The findings from this study will help the Tanzania Red Cross Society and its stakeholders design actions that can help the community prepare for heat stress. Your answers will be anonymized and will not be traced back to you.

Date:____________________
Name of respondent: __________________
Gender of respondent: ____________________

1. Can you please provide an overview of your role and responsibilities related to heat preparedness response in Mjini Magharibi – Unguja/Tanga?
2. How long have you been involved in addressing heat-related issues in Mjini Magharibi –Unguja/Tanga?
3. How do you define heat in Mjini Magharibi – Unguja/Tanga?
4. What, according to you, are the impacts of heat in Mjini Magharibi – Unguja/Tanga?
5. What measure or strategies were implemented by the government before the onset of heat to mitigate its impact in Mjini Magharibi – Unguja/Tanga?
6. What measure or strategies were implemented by the community before the onset of heat to mitigate its impact in Mjini Magharibi – Unguja/Tanga?
7. Can you describe any early warning systems or indicators used to anticipate heat and trigger preparedness actions in Mjini Magharibi – Unguja/Tanga?
8. Are the early warning systems working effectively to mitigate the impacts of heat in Mjini Magharibi – Unguja/Tanga?
9. How were community knowledge and traditional practices integrated into heat preparedness and response strategies?
10. What are the current sources of early warning information in your region?
11. What are the current communication channels for disseminating early warning messages in your region?
12. What are the preferred communication channels for disseminating early warning messages in Mjini Magharibi – Unguja/Tanga?

ANNEX 3. FOCUS GROUP DISCUSSION GUIDE

INTRODUCTION

My name is ______________, and I am a volunteer with the Tanzania Red Cross Society. We are conducting this survey to understand the perception of the community on heat, its impacts and what can be done to prepare and address these impacts. In addition, we also want to understand what communication channels are used by the community to access early warning information. The findings from this study will help the Tanzania Red Cross Society and its stakeholders to design actions that can help the community to prepare for heat stress. Your answers will be anonymized and will not be traced back to you.

1: KNOWLEDGE ON HEAT/EXTREME TEMPERATURES:

1. What, in your opinion, is climate change? (Write down the first two or three words that come to your mind when you think about climate change.)
2. Over the past few years, how have you experienced changes in temperature? What do you think is the trend? Is it happening more frequently? More intensely?
3. If you think the temperature has increased over the past few years? What problems do you think this has or will bring to you and your community? Have you experienced any of those problems?
4. In which months do you and your the community experience these extreme temperatures/heat?
5. How do you define and what do you understand by extreme temperatures/heat?
6. Do you think climate change is the cause of extreme temperatures?
7. In your opinion, is there a group of people who are at higher risk from the heat/extreme temperatures than others? Why do you think so?
8. When you think about yourself and your family, how do you think you are impacted by heatwaves? Can you provide some examples?

2. PERCEPTION OF THE IMPACTS OF HEAT/EXTREME TEMPERATURES – HEALTH AND ENVIRONMENTAL IMPACTS

1. Which sectors are majorly affected by heat/extreme temperatures? (Health, environment, economy, education). And how?
2. How does a heatwave impact health? (Give examples)
3. What could be the mitigating measures for minimizing the risk of heat/extreme temperatures on the environment and/or health?

3. PROTECTIVE MEASURES

1. What have people in the community done to prepare for heatwaves?
2. What actions have people in your community done to reduce the impacts of heat/extreme temperatures?
3. Does the community take the necessary actions to prepare for and respond to heat/extreme temperatures? If yes/no, why?
4. What early warning systems and information are available?
5. What information have you received regarding heat/extreme temperatures? How did you know/hear about that information?
6. What is the source of this information? And what is the format in which this information is shared (e.g., brochures/flyers, radio messages)?
7. What kind of early warning information would help you to take necessary early action?
8. Do you think the current communication strategies/channels regarding heat/extreme temperatures is sufficient, why?
9. What strategies could be adopted for effectively communicating the risks of a heatwave?

ANNEX 4: SAMPLING METHODOLOGY

The data collection process was carried out over two weeks by trained researchers and local facilitators from the Tanzania Red Cross Society, ensuring that participants felt comfortable sharing their experiences and perspectives on extreme heat impacts. For the FGDs and KIIs, a semi-structured discussion guide was used, covering topics such as observed climate changes, impacts of heat, coping mechanisms, sources of information and community recommendations. All discussions were recorded, transcribed, translated and analysed thematically to identify key insights.

The FGDs were structured to encourage open dialogue, allowing participants to share lived experiences and perspectives on how extreme heat is affecting their lives. The FGDs were held with eight groups, four per region.

1. SAMPLING STRATEGY

Multi-stage sampling was done to identify households.

Stage 1 involved purposive sampling of the regions based on the baseline results of the CoCHAP project. Two regions, Tanga and Mjini Magharibi in Unguja, were selected for this study based on their exposure and vulnerability to heat. Additionally, the wards where the household survey was conducted were selected based on a literature review, temperature analysis and GIS mapping of heat exposure and stress.

Stage 2 involved proportionate sampling to identify households in each ward. A household list was generated from which households were selected randomly.

i) QUALITATIVE SAMPLING

Purposive sampling was used to select key informants for the KIIs as well as participants for the FGDs in the two regions. The key informants were selected based on their roles and expertise in disaster preparedness and response. The FGD participants were selected in consultation with the local leaders.

ii) QUANTITATIVE SAMPLING

For the household survey, the wards were selected based on the GIS mapping of heat stress. A total of eight wards were identified as being highly exposed to heat stress. All the households in the wards were listed and random sampling was conducted to systematically select households using the Open Data Kit (ODK) app (*https://opendatakit.org/*). The volunteers walked through the wards, listing each household along with its GPS coordinates. A total of 854 households were selected and visited. Households that were found to be vacant were replaced with different households on a like-for-like basis. Household respondents that were interviewed were adults and must have lived in the area for at least six months.

iii) SAMPLE SIZE

The sample size was determined using the Kish-Leslie (1965) formula for a single proportion in a cross-sectional cluster design study:

$$n := \frac{\text{Deff}^{*} Z_{\alpha/2} P(1-P)}{d^2} * \left(\frac{100\%}{100\% - \text{NR}}\right)$$

Where:

Deff = design effect, a measure of efficiency of cluster sampling compared to a direct simple. Random sample taken as 2.0 from similar studies.

Z = standard normal value corresponding to 95 per cent level of confidence (1.96).

P = is the anticipated population proportion of the evaluation outcome (here we used a conservative percentage of 50 per cent for climate hazard exposure), d = margin of allowable error (5 per cent).

NR = expected non-response assumed to be 10 per cent (0.1) based on similar studies.

This yields a sample size of 854 households which was proportionately distributed across the eight wards in Tanga and Mjini Magharibi.

Below is the sample distribution of households per ward

Distribution of sample size			
TANGA			
s/n	Ward	Total HH	Distribution of sample size
1	Chongoleani	1,469	79
2	Central Mzingani	1,092	58
3	Duga	6,226	333
4	Mzizima	4,888	261
Total		**13,675**	**731**
MJINI MAGHARIBI			
s/n	Shehia / ward	Total HH	Distribution of sample size
1	Mwebeladu	520	28
2	Shangani	403	22
3	Miembeni	874	47
4	Kikwajuni Juu	505	27
Total		**2,302**	**124**

2 . DATA ANALYSIS

For the quantitative analysis, data from the household survey was processed using descriptive statistics and inferential statistical methods to quantify key trends in heat risk perception, adaptive behaviours and vulnerability factors. Frequency distributions and percentages were calculated to summarize responses on heat exposure, awareness levels and adaptation strategies. Cross-tabulations were used to examine how demographic characteristics such as age, gender and income influenced heat perception and preparedness. Statistical tests, including chi-square analyses, were applied to assess associations between categorical variables, while correlation and regression analyses explored relationships between household characteristics and adaptive capacity, such as access to cooling mechanisms and reliance on early warnings.

The qualitative data from the FGDs and KIIs, conducted in Kiswahili, was transcribed, translated to English, coded and analysed using thematic analysis, which identifies recurring patterns and key themes. First, all transcripts were reviewed to gain a holistic understanding of responses. Initial coding was conducted to categorize segments of text based on the following themes: knowledge and experience of extreme heat; heat-related impacts, vulnerability and concerns; adaptation strategies and barriers; and early warning information and communication channels.

FGDs and KIIs were analysed separately before being compared to identify converging and diverging perspectives between community members and experts. Relevant quotations were extracted from transcripts to illustrate key findings.

TANZANIA RED CROSS SOCIETY

Climate Centre

IFRC