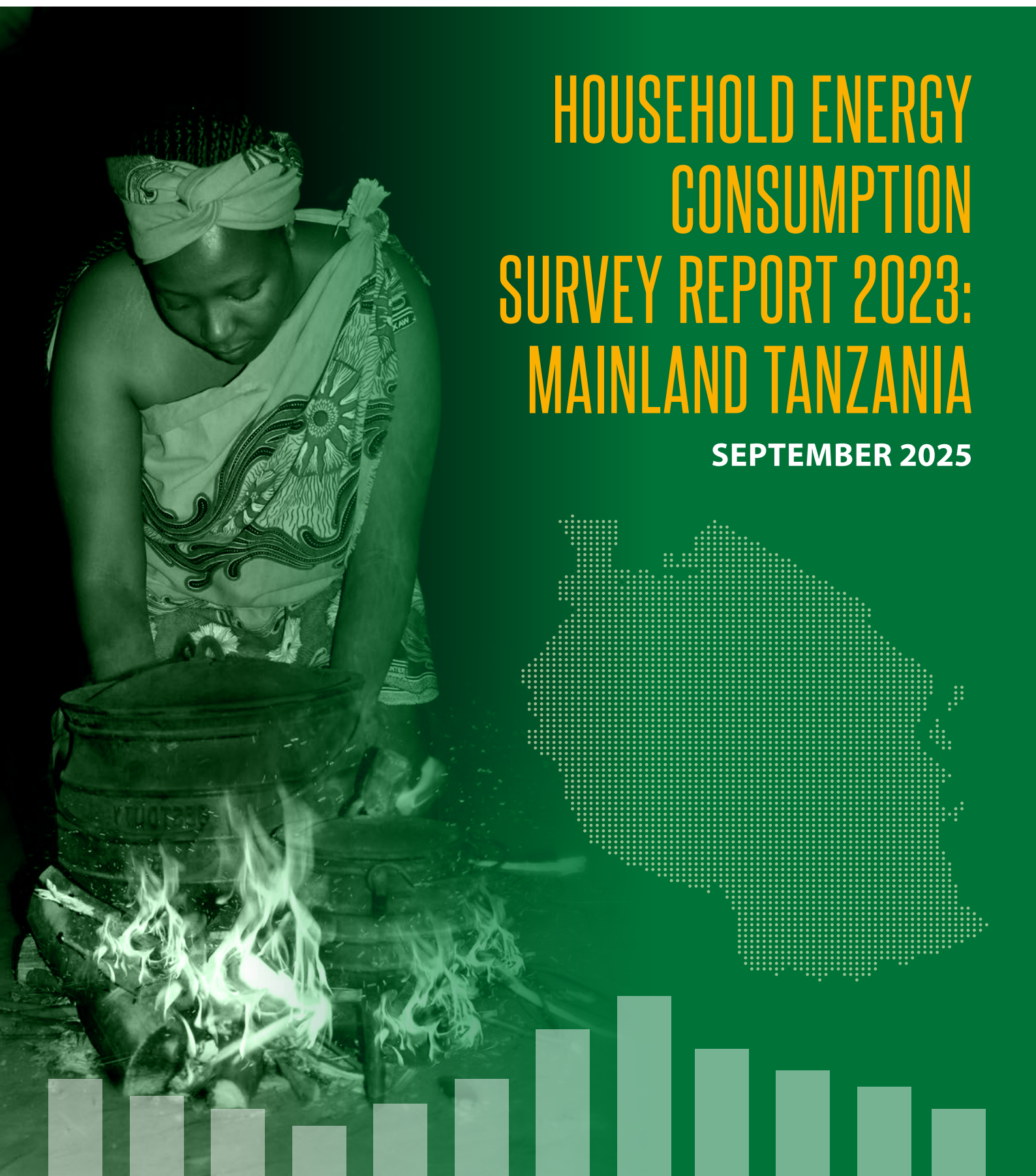




The United Republic of Tanzania

HOUSEHOLD ENERGY CONSUMPTION SURVEY REPORT 2023: MAINLAND TANZANIA

SEPTEMBER 2025



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LIST OF ABBREVIATIONS

CAPI	Computer-Assisted Personal Interviews
CNG	Compressed Natural Gas
D1	Lifeline Electricity Tariff
EA	Enumeration Areas
EF	Expertise France
EU	European Union
EWURA	Energy and Water Utilities Regulatory Authority
GWh	Gigawatt-hour
HBS	Household Budget Survey
HECS	Household Energy Consumption Survey
IASES	Impact of Access to Sustainable Energy Survey
ICS	Improved Cookstoves
kg	Kilograms
ktoe	Kilotons of oil equivalent
kWh	Kilowatt-hour
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MW	Megawatt
NBS	National Bureau of Statistics
OSC	Out of School Care
PBPA	Petroleum Bulk Procurement Agency
PPS	Probability Proportional to Size
PURA	Petroleum Upstream Regulatory Authority
PV	Photovoltaic
REA	Rural Energy Agency
RES	Renewable Energy Sources
SDG	Sustainable Development Goal
SWH	Solar Water Heaters
T1	General Domestic Electricity Tariff
TANESCO	Tanzania Electric Supply Company Limited
TAREA	Tanzania Renewable Energy Association
TDV	Tanzania Development Vision 2025
TJ	Terajoules
TPDC	Tanzania Petroleum Development Corporation
TPES	Total Primary Energy Supply
TZS	Tanzanian Shillings

EXECUTIVE SUMMARY

The 2023 Household Energy Consumption Survey (HECS) represents a landmark step in Tanzania’s national energy data system. Jointly implemented by The National Bureau of Statistics (NBS) and the Ministry of Energy, with support from Expertise France (EF) and funding from the European Union (EU), the survey provides the first comprehensive evidence on how households access, use, and pay for energy across Mainland Tanzania. It comes at a decisive moment when the country is intensifying efforts to achieve Sustainable Development Goal 7 (SDG 7) and the objectives of Tanzania’s Development Vision 2025, which emphasize universal access to affordable, reliable, sustainable, and modern energy.

The survey successfully met its objectives by quantifying the types and quantities of energy used by households for cooking, lighting, water heating, and space heating. It measured the level of access to modern energy sources, identified barriers to adoption, analyzed affordability issues, and revealed regional and socio-economic disparities in access to clean energy. The findings provide actionable insights that can directly inform policy design, guide resource allocation, and accelerate the country’s clean energy transition.

Results show that electricity access in Tanzania has significantly expanded, reaching 71.2 % of households. However, rural access remains considerably lower at 61 % compared to 84 % in urban areas. TANESCO continues to dominate electricity supply in urban centers, while 59.7 % of rural households depend on off-grid solar systems. Although the D1 lifeline tariff has improved affordability for low-income consumers, with 72.5 % of households spending less than TZS 10,000 per month on electricity, the low expenditure indicates constrained consumption rather than improved welfare. This suggests that many households remain “energy poor”—connected to power but unable to use it productively. Expanding access must therefore go hand in hand with affordability and reliability improvements. Policies should prioritize investments in decentralized solar and mini-grid systems through the Rural Energy Agency (REA), expand the D1 lifeline program, and strengthen partnerships with private operators to extend off-grid services to remote areas.

The survey findings underscore an urgent need to accelerate the transition from traditional biomass to modern cooking energy. Despite progress in urban centers, the majority of households still rely on firewood (65.5 %) and charcoal (44 %), while only 24.6 % use Liquefied Petroleum Gas (LPG) and 1.9 % use electricity. This heavy reliance on biomass contributes to deforestation, indoor air pollution, and gender-based time poverty. The data calls for a National Clean Cooking Acceleration Strategy that combines fiscal incentives for cleaner fuels, promotion of locally produced improved cookstoves, and targeted public awareness campaigns, particularly in rural areas. Reducing import duties and taxes on LPG cylinders, accessories, and improved stoves would lower entry barriers and stimulate market growth. Integrating women as distributors and entrepreneurs in clean cooking value chains would further strengthen adoption while promoting gender equality.

Heating and lighting patterns also reveal untapped opportunities for renewable energy integration. Over 97 % of households use biomass for water and space heating, while solar water heaters and biogas remain almost nonexistent. This highlights a policy gap that could be addressed through incentives for solar water heating systems in new housing developments, promotion of biogas plants in livestock-rich areas, and support for local manufacturing of renewable heating technologies. For lighting, although electricity has become the dominant source, many rural households still depend on kerosene and solar lanterns due to limited grid coverage and reliability. Policies should therefore promote the expansion of solar mini-grids and ensure that off-grid solar remains a key component of rural electrification.

The findings also show that low household energy expenditure reflects limited purchasing power rather than efficiency gains. Average energy spending remains modest around TZS 10,000 per month for electricity and small amounts for biomass fuels. To address this, the government could introduce micro-finance programs to help households purchase efficient appliances and clean cooking equipment, coupled with campaigns to raise awareness about energy efficiency. Introducing progressive electricity pricing that encourages productive use among low-income users would also help translate access into improved livelihoods.

Social and demographic factors continue to shape energy use. With 72 % of households headed by men and 68.8 % of the population having completed only primary education, energy decisions are often constrained by income, education, and gender. Women are the most affected by reliance on biomass, facing exposure to harmful smoke and long hours spent collecting firewood. These findings call for gender mainstreaming and education driven approaches in energy policy promoting women's participation in clean energy entrepreneurship, expanding energy literacy programs, and linking adult education with household energy management training.

The 2023 HECS also demonstrated the critical importance of a reliable and integrated energy data system for evidence-based policymaking. To institutionalize data-driven energy planning, Tanzania should establish a coordinated national energy statistics system that brings together NBS, REA, TANESCO, and the Ministry of Energy under a unified platform. Regular household energy surveys should be institutionalized, and data should be harmonized to enable consistent tracking of SDG 7 indicators and to inform national energy balance updates.

In conclusion, the 2023 Household Energy Consumption Survey has not only achieved its intended objectives but has also provided a clear roadmap for action. Its findings underscore that while access to modern energy in Tanzania is expanding, affordability, equity, and sustainability remain major challenges. The evidence calls for urgent, coordinated, and well-targeted interventions expanding decentralized energy solutions, promoting clean cooking technologies, enhancing affordability through fiscal reforms, empowering women and youth in energy programs, and strengthening national data systems.

DEFINITION OF KEY TERMS

HOUSEHOLD

A person or a group of persons who live together, share the same plot and recognize one of them as the head of household.

REFERENCE PERIOD

The reference period covered by the survey was 2023.

RESPONDENT

Any responsible adult household or family member who provided reliable answers to the survey questions.

ENERGY

Energy is technically defined as the “capacity to do work.” In the household context, it refers to the fuel or power used to operate electrical and non-electrical appliances, vehicles, equipment, and other devices whether for daily needs, convenience, or home-based economic activities. Energy can be generated from and provided by a variety of forms: electricity, petroleum products and renewable energy sources. Electricity covers not only those distributed by utilities but also those produced by generators and batteries. Petroleum products include kerosene, natural gas, LPG (or cooking gas), regular gasoline, premium gasoline, and diesel. Renewable energy sources include firewood, charcoal, biomass residues (such as forest products residues, wood waste, agriculture, and animal waste), solar PV, hydroelectricity, and others.

ELECTRICITY

This includes electricity from large and small power generation plants distributed to households by utilities like TANESCO or private providers, as well as electricity from generators and rechargeable batteries. Batteries are considered as an electricity source if they generate electricity for the household and not for transport purposes.

LIQUEFIED PETROLEUM GAS (LPG)

LPG is a flammable hydrocarbon gas composed primarily of propane (C_3H_8) and butane (C_4H_{10}). It is obtained as a byproduct during the refining of crude oil or the extraction of natural gas.

KEROSENE

Kerosene is a colorless liquid generally used for lighting, cooking, and starting a fire.

DIESEL/PETROL

Diesel and petrol are fuels normally used in transport but can also be used in households to run generators.

BIOETHANOL

Ethanol is a renewable, water-free alcohol produced from fermentation of sugar or converted starch.

NATURAL GAS

A mixture of gaseous hydrocarbons, primarily methane (70 to 90 percent), but generally also include ethane, propane and higher hydrocarbons in much smaller amounts and some non-combustible gases such as nitrogen and carbon dioxide. The separation process produces natural gas by removing or reducing the hydrocarbons other than methane to levels that are acceptable in the marketable gas. The natural gas liquids (NGL) removed in the process are distributed separately. Tanzania extracts natural gas from the Songo Songo and Mnazi fields. Currently, a few hundred households are connected to the natural gas grid in Dar es Salaam, Lindi and Mtwara.

COMPRESSED NATURAL GAS (CNG)

CNG is natural gas (primarily composed of methane, CH₄) that is compressed to less than 1% of its volume at standard atmospheric pressure. This makes it easier to store and transport in cylinders at high pressure, typically around 200–250 bar (2,900–3,600 psi). It is typically used to power vehicles or industrial processes. CNG is currently used in Tanzania.

LIQUEFIED NATURAL GAS (LNG)

LNG is natural gas (primarily methane, CH₄) that has been cooled to an extremely low temperature of approximately -162°C (-260°F) to convert it into a liquid state. This process reduces its volume by about 600 times, making it easier to store and transport over long distances where pipelines are not feasible. It is currently not in use in Tanzania.

RENEWABLE ENERGY SOURCES

Renewable energy sources are energy sources that are naturally replenished on a human timescale and include firewood, charcoal, biomass residues, biogas, hydro, geothermal wind and solar.

BIOMASS

Organic material derived from plants, animals, or microorganisms that can be used as a source of energy. It is a renewable energy source because it is replenished through natural processes like photosynthesis and biological cycles.

GEOTHERMAL

Heat that originates from within the Earth. This heat is generated by the natural radioactive decay of minerals, the residual heat from Earth’s formation, and tectonic activity. Geothermal energy can be harnessed for various applications, including power generation and heating. It is currently not in use in Tanzania, although there are projects to develop several sites.

FIREWOOD

Also referred to as firewood, it is wood that is harvested and used as a fuel source for cooking, heating, or energy transformation into charcoal. It is one of the oldest and most widely used forms of biomass energy, particularly in rural and low-income areas where modern fuels are less accessible.

CHARCOAL

A solid, carbon-rich material derived from the thermal decomposition of organic matter, primarily firewood, in the absence of oxygen. This process, known as pyrolysis, removes moisture and volatile compounds, leaving behind almost pure carbon with a porous structure.

BIOGAS

The gaseous fuel formed when methane producing bacteria acts on organic matter in the absence of oxygen. It can be generated from animal manure, human feces, dead plants or animals and other materials into which plants and animals have been transformed.

SOLAR

Energy harnessed from the sun’s radiation using various technologies. It is a renewable and sustainable source of energy. Solar energy can be converted into electricity, heat, or used directly for lighting and other applications. The two main technologies in use in Tanzania are solar photovoltaic (PV) panels and solar water heaters (SWH).

ACKNOWLEDGMENTS

The successful completion of the 2023 Household Energy Consumption Survey would not have been possible without the invaluable contributions and support of numerous individuals and institutions. We extend our deepest gratitude to the households across the Mainland Tanzania who generously participated in the survey by providing essential information. Their cooperation and openness formed the backbone of this important survey.

We are also grateful to the dedicated team of field enumerators, supervisors, and data collectors whose commitment and professionalism ensured the quality and reliability of the data collected. Special thanks go to the regional and district administrative offices for their logistical support and coordination during fieldwork.

Our sincere appreciation goes to the technical team responsible for designing the survey tools, conducting data analysis, and preparing this report. Your expertise and tireless efforts made this publication possible.

We also acknowledge the support of our development partners and stakeholders whose financial and technical assistance was crucial throughout the planning, implementation, and reporting phases of the survey.

Finally, we recognize the leadership and guidance provided by the management of the National Bureau of Statistics (NBS), whose vision and oversight ensured the smooth execution of the survey.

We say thank you to all who contributed to this important national effort.


Dr. Amina S. Msengwa
Statistician General
National Bureau of Statistics
September 2025

2.1 INTRODUCTION

The 2023 HECS employed a structured and statistically sound methodology to ensure the reliability and representativeness of the data collected across Mainland Tanzania.

2.2 SURVEY SCOPE AND COVERAGE

The survey scientifically covered selected households across all regions in Mainland Tanzania, including both rural and urban areas, to capture diverse energy consumption patterns. The survey examines various energy sources used by households, including solid biofuels (firewood, charcoal), electricity (grid connected and off-grid including PV), liquefied petroleum gas (LPG), kerosene, biogas, and other sources that see minimal use.

2.3 SAMPLE DESIGN

The HECS used a cross-sectional design, collecting data from a nationally representative sample of households at a single point in time. The survey was designed to capture variations in household energy consumption across different geographic areas (urban vs. rural), socio-economic groups, and regions.

The domains cover 26 regions, which are Dodoma, Arusha, Kilimanjaro, Tanga, Morogoro, Pwani, Dar es Salaam, Lindi, Mtwara, Ruvuma, Iringa, Mbeya, Singida, Tabora, Rukwa, Kigoma, Shinyanga, Kagera, Mwanza, Mara, Manyara, Njombe, Katavi, Simiyu, Geita, and Songwe.

2.4 SAMPLING FRAMEWORK

A stratified two-stage sampling technique was applied. In the first stage, 845 Enumeration Areas (EAs) were systematically selected with probability proportional to size (PPS) from the national sampling frame based on the 2022 Population and Housing Census, ensuring both rural and urban areas were represented. In the second stage, a fixed number of 15 households were systematically selected within each EA to participate in the survey.

2.5 SAMPLE SIZE

The total sample size was calculated considering precision requirements of the estimates within each domain. The reference variables used to calculate the sample size were households connected to electricity as collected in the 2019/20 Energy Access and Use Situation Survey II. The total number of EAs selected was 845, resulting in 12,675 households. The sample size was determined to provide reliable estimates at the national and urban/rural levels, and to allow disaggregation by key demographic and socio-economic variables.

2.6 DATA COLLECTION TOOLS

In this survey, household questionnaires, interviews and other tools such as enumerator manual were used to collect information from private households. Scales were used to collect information on the weight of solid biomass consumed.

2.7 HOUSEHOLD QUESTIONNAIRE

A structured questionnaire was used to collect household-level information, covering the following areas:

1. Household demographic characteristics
2. Businesses operation
3. Electricity
4. Cooking
5. Water heating
6. Space heating
7. Lighting
8. Quantities used/related expenditures
9. Privately owned vehicles
10. Business related consumption

The questionnaire was pre-tested and translated into Kiswahili to ensure clarity and consistency.

2.8 ENUMERATOR'S MANUAL

The enumerator's manual guided data collectors, explaining key survey concepts, practical fieldwork approaches, and tips for gathering accurate, complete, and consistent data from respondents.

2.9 TABLET

Tablets were used by enumerators for listing and collecting data from the selected households.

2.10 EA MAPS

Digitized enumeration maps were used during surveys to clearly define the coverage areas, ensuring that enumerators remained within their assigned boundaries and preventing duplicate data collection by marking areas that had already been surveyed.

2.11 RECRUITMENT

Recruiting qualified field personnel was essential for ensuring quality data. A total of 120 experienced enumerators were engaged in the survey.

3.1 INTRODUCTION

In addition to offering insights into household energy access and consumption patterns, the 2023 HECS also presents valuable information on the demographic characteristics of households in Mainland Tanzania. This chapter covers the composition and status of private households, focusing on demographics. It includes details on family structure, age, sex, marital status and education levels.

3.2 COMPOSITION OF HOUSEHOLD MEMBERS

Household composition describes the members based on characteristics like age, sex, relationship to the head of household, and the number of marital pairs or nuclear families within it. Age and sex are key demographic variables forming the basis for classifications in censuses and surveys.

The entire population is almost evenly split, comprising 48% male and 52% female, with notable variations in the gender ratio across diverse age groups. In younger age groups (0–19 years), the gender ratio is relatively balanced, with slight male dominance in some groups (e.g., 5–9 years: 51% male). From ages 20–39, there is a noticeable shift, with females forming a larger proportion (e.g., 20–24 years: 43% male, 57% female). This could be due to factors such as migration or differing survival rates. In older age groups (60+), the male percentage increases in age ranges of 60–64 (51%). However, female dominate significantly at the oldest ages (80+), particularly within the age ranging from 80–84 (62%). This reflects higher female life expectancy. The population steadily decreases with age, reflecting mortality trends (Table 3.1).

TABLE 3.1: DISTRIBUTION OF HOUSEHOLD MEMBERS BY SEX AND AGE GROUP, MAINLAND TANZANIA, 2023 HECS

Age Group	Sex	
	Male	Female
0 - 4	49	51
5 - 9	51	49
10 - 14	50	50
15 - 19	48	52
20 - 24	43	57
25 - 29	44	56
30 - 34	48	52
35 - 39	47	53
40 - 44	49	51
45 - 49	50	50
50 - 54	49	51
55 - 59	49	51
60 - 64	51	49
65 - 69	55	45
70 - 74	48	52
75 - 79	47	53
80 - 84	38	62
85+	45	55
Mainland Tanzania	48	52

3.3 GENDER OF HOUSEHOLD HEAD

The results from the 2023 HECS indicate that 72% of households in Mainland Tanzania were male-headed, while only 28% were female-headed. This result highlights a significant gender disparity in household leadership, with nearly three-quarters of households being headed by men. It reflects broader socio-economic patterns where men are more likely to be considered the heads of households, potentially due to traditional norms, inheritance structures, or income-generating roles (Figure 3.1).

FIGURE 3.1: DISTRIBUTION OF HOUSEHOLDS BY SEX OF HOUSEHOLD HEAD, MAINLAND TANZANIA, 2023 HECS



Table 3.2 provides a detailed breakdown of the number of households by the sex of the household head across different regions in Mainland Tanzania.

Results show the proportion of male household heads is significantly higher across all regions, with Katavi (81%) and Geita (78.9%) recording the highest percentages. The regions with relatively lower proportions of male household heads include Lindi (60.2%) and Mtwara (61.6%). suggesting a relatively more balanced gender distribution compared to other regions.

TABLE 3.2: DISTRIBUTION OF HOUSEHOLDS BY SEX OF HOUSEHOLD HEAD AND REGION, MAINLAND TANZANIA, 2023 HECS

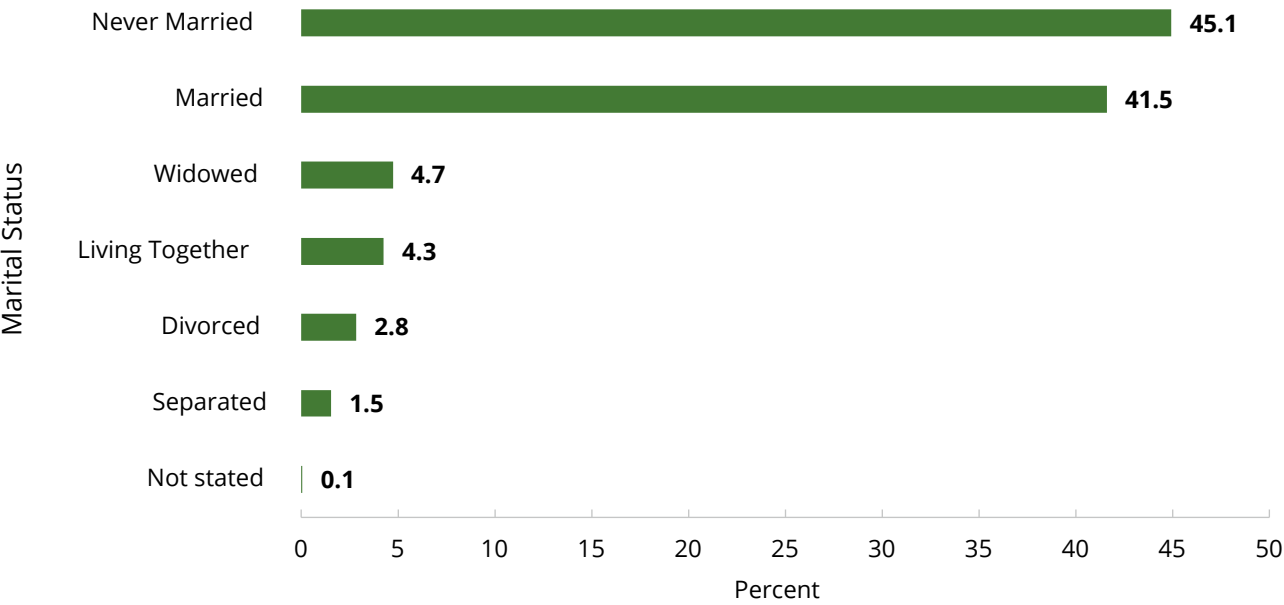
Region	Sex	
	Male	Female
Dodoma	65.0	35.0
Arusha	76.9	23.1
Kilimanjaro	68.2	31.8
Tanga	74.8	25.2
Morogoro	69.7	30.3
Pwani	70.3	29.7
Dar es Salaam	71.6	28.4
Lindi	60.2	39.8
Mtwara	61.6	38.4
Ruvuma	76.0	24.0
Iringa	63.9	36.1
Mbeya	75.6	24.4
Singida	75.7	24.3
Tabora	75.8	24.2
Rukwa	76.1	23.9
Kigoma	74.6	25.4
Shinyanga	73.1	26.9
Kagera	71.6	28.4
Mwanza	71.4	28.6
Mara	67.8	32.2
Manyara	75.7	24.3
Njombe	67.3	32.7
Katavi	81.0	19.0
Simiyu	75.4	24.6
Geita	78.9	21.1
Songwe	78.1	21.9
Mainland Tanzania	72.0	28.0

3.4 MARITAL STATUS

Marital status and energy consumption can be influenced by several socio-economic and behavioral factors. Generally, married individuals or households may experience differences in energy use compared to single individuals, due to factors like household size, shared living arrangements, and collective decision-making regarding energy usage.

This section analyses marital status of the household members aged 12 years and above. Figure 3.2 indicates that 45.1% of household members aged 12 years and above in Mainland Tanzania were never married, while 41.5% were married. A small proportion of 4.7% were widowed, 4.3% were living together without a formal marriage, 2.8% were divorced, and 1.5% were separated.

FIGURE 3.2: DISTRIBUTION OF HOUSEHOLDS BY MARITAL STATUS, MAINLAND TANZANIA, 2023 HECS



Dodoma, Dar es Salaam, Mwanza and Mara regions recorded highest number of never married individuals at about 48% compared to lowest (38.0%) recorded in Mtwara (Table 3.3). This could indicate socio-economic factors such as economic instability, delayed marriage, or cultural influences that affect the timing of marriage. This trend could also be reflective of urbanization, where people delay marriage due to career or educational pursuits.

Songwe and Shinyanga regions stand out with the highest percentages of married individuals (52.6% and 50.7%, respectively). This could be due to regional cultural norms that prioritize marriage, or it could reflect a more traditional family structure that is common in rural or semi-urban areas.

Higher percentages of widowed individuals were notable in Kilimanjaro (9.2%), Iringa (7.0%) and Mara (6.8%) regions (Table 3.3 shows). This could be due to factors such as higher mortality rates in certain areas, reflecting a younger demographic.

TABLE 3.3: DISTRIBUTION OF HOUSEHOLDS BY MARITAL STATUS AND REGION, MAINLAND TANZANIA, 2023 HECS

Region	Marital Status						
	Never Married	Married	Living Together	Divorced	Separated	Widowed	Not stated
Dodoma	48.8	40.3	2.2	2.5	1.3	4.8	-
Arusha	43.8	47.9	0.5	1.8	0.8	5.2	-
Kilimanjaro	40.3	44.2	1.2	2.6	2.5	9.2	-
Tanga	46.2	42.4	1.8	2.4	2.0	5.1	-
Morogoro	44.0	35.4	11.2	4.1	1.0	4.2	0.1
Pwani	40.4	46.1	6.0	3.7	1.3	2.4	-
Dar es Salaam	48.4	39.9	4.1	2.3	1.3	4.1	-
Lindi	40.5	40.3	4.2	8.1	1.3	5.6	-
Mtwara	38.0	45.0	1.1	6.9	3.1	5.8	0.1
Ruvuma	42.5	44.0	4.3	2.9	1.8	4.5	-
Iringa	47.4	40.9	2.1	0.9	1.6	7.0	-
Mbeya	42.6	43.5	4.8	2.0	2.3	4.8	-
Singida	47.9	30.7	13.3	2.8	1.3	4.0	-
Tabora	46.6	38.7	6.6	2.9	2.1	2.9	-
Rukwa	45.1	27.5	19.8	1.8	1.0	4.7	0.1
Kigoma	46.7	42.2	1.0	2.3	1.6	6.2	-
Shinyanga	43.7	50.7	-	1.9	0.4	3.2	0.0
Kagera	43.9	44.5	1.0	2.2	2.5	6.0	-
Mwanza	48.7	37.1	4.4	3.3	1.9	4.4	0.3
Mara	48.4	38.9	2.1	2.4	1.3	6.8	0.1
Manyara	44.3	46.9	0.6	1.0	1.1	4.9	1.2
Njombe	39.7	43.1	7.0	1.3	2.3	6.5	-
Katavi	44.3	39.2	9.1	2.9	1.9	2.4	0.2
Simiyu	47.4	45.9	0.8	2.3	0.4	3.2	-
Geita	47.0	39.0	5.9	4.1	1.1	2.8	-
Songwe	39.2	52.6	0.2	1.9	1.1	4.9	0.0
Mainland Tanzania	45.1	41.5	4.3	2.8	1.5	4.7	0.1

“-” Withheld to avoid disclosing data for individual households or insufficient data available from survey (Total includes withheld data)

3.5 EDUCATION ATTAINMENT

The 2023 HECS results on the highest level of education attained by household members provides valuable insight into the educational landscape in Mainland Tanzania.

Figure 3.3 shows that most household members aged 5 years and above attained only primary education (68.8%), suggesting significant barriers to continued education. While 21.1% reached secondary education, only a small fraction progressed to higher levels. Advanced Secondary (1.1%), Diploma (1.8%), and University (2.9%) all together account for just 5.8%, indicating a sharp drop-off after basic education.

Pre-primary (2.9%) education is relatively low, although slightly better than other post-secondary categories. This suggests early childhood education is still underdeveloped. Adult education (0.2%) and out of school care (0.02%) are negligible, showing minimal investment in alternative education programs. Categories like A+Course, O+Course, MS+Course collectively account for 1.2%.

FIGURE 3.3: DISTRIBUTION OF HOUSEHOLD MEMBERS AGED 5 YEARS AND ABOVE BY HIGHEST LEVEL OF FORMAL EDUCATION REACHED, MAINLAND TANZANIA, 2023 HECS

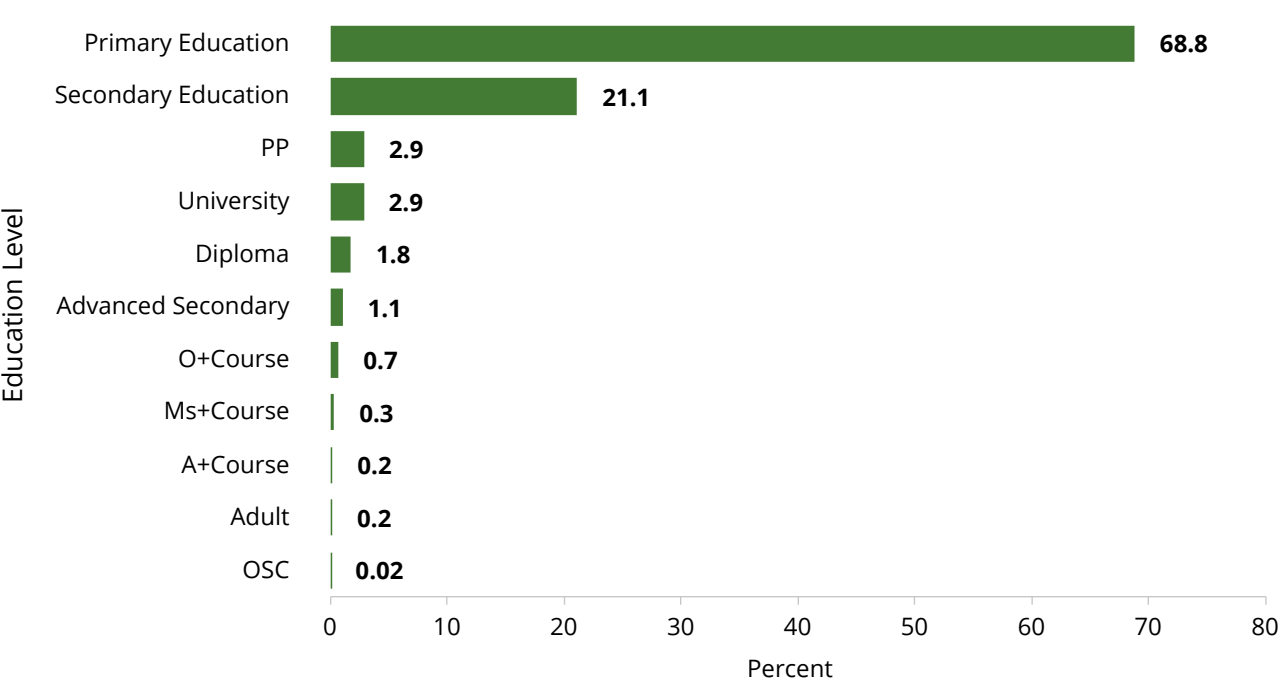


TABLE 4.10: DISTRIBUTION OF HOUSEHOLDS USING ELECTRICITY TARIFF TYPE T1 BY MONTHLY EXPENDITURE AND REGION, MAINLAND TANZANIA, 2023 HECS

Region	Amount Spent (TZS)			
	Less than 5000	5000-10000	10000-15000	15000+
Dodoma	13.6	42.9	25.9	17.6
Arusha	4.2	41.9	34.2	19.7
Kilimanjaro	30.1	22.7	9.6	37.6
Tanga	7.7	42.3	19.2	30.9
Morogoro	-	-	21.2	78.8
Pwani	14.2	39.3	23.7	22.9
Dar es Salaam	1.2	15.4	42.7	40.6
Lindi	25.0	50.0	25.0	-
Mtwara	13.4	51.4	16.6	18.6
Ruvuma	28.3	36.8	23.9	10.9
Iringa	10.5	50.1	26.8	12.6
Mbeya	10.3	49.5	25.9	14.3
Singida	17.2	46.3	22.6	13.9
Tabora	18.2	30.4	23.5	27.9
Rukwa	53.3	40.8	5.9	-
Kigoma	-	24.0	-	76.0
Shinyanga	-	-	90.6	9.4
Kagera	43.0	45.2	6.8	5.0
Mwanza	26.8	38.1	19.2	15.9
Mara	25.3	34.6	26.1	14.0
Manyara	14.0	57.3	-	28.7
Njombe	15.5	57.9	17.9	8.8
Katavi	16.0	44.3	21.2	18.5
Simiyu	9.8	35.2	39.3	15.8
Geita	2.6	49.7	26.8	20.9
Songwe	19.7	45.7	16.3	18.4
Mainland Tanzania	10.2	33.1	31.0	25.8

“-” Withheld to avoid disclosing data for individual households or insufficient data available from survey (Total includes withheld data)

4.2.4 Monthly Electricity Consumption (kWh)

Over 69.9% of households consume 21–40 kWh monthly. This aligns with monthly spending of 10,000–15,000 TZS, matching the most common expenditure bracket in Mainland Tanzania.

In rural areas, 80.4% of households use 21–40 kWh per month and 13.2% use only 1–20 kWh. In urban areas, households are more likely to consume 41–100+ kWh, with 12.1% consuming 41–60 kWh and 5.9% consuming 81–100 kWh. Only about 1.2% of households consume more than 100 kWh/month (Figure 4.5).

FIGURE 4.5: DISTRIBUTION OF HOUSEHOLDS BY MONTHLY ELECTRICITY CONSUMPTION, MAINLAND TANZANIA, 2023 HECS

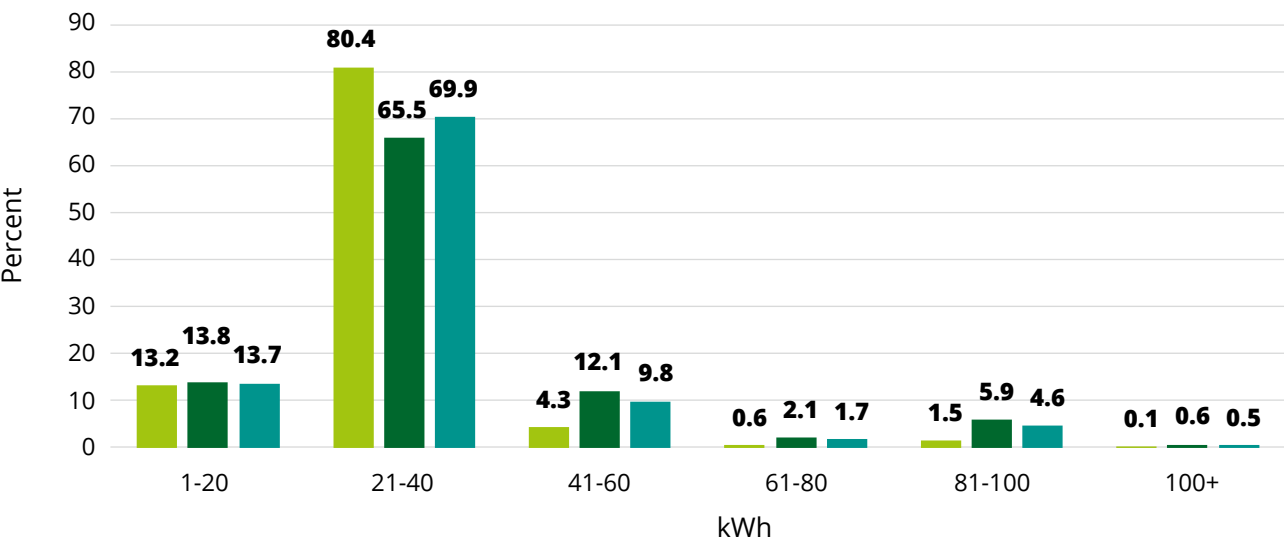


Table 4.11 indicates a dominance in low electricity consumption as most of the households fall under the 1-20 kWh and 21-40 kWh consumption categories.

Kilimanjaro (93.8%), Manyara (92.2%), and Shinyanga (90.8%) have the highest percentages of households that consume 21-40 kWh monthly. Katavi (38.2%) and Dodoma (35.4%) have the highest shares in the lowest bracket (1-20 kWh), suggesting limited access or affordability of electricity.

Households consuming above 100 kWh are very few, with Morogoro (1.7%), Tanga (1.4%), and Dar es Salaam (1.2%) having the highest (but still minimal) shares. Dar es Salaam stands out with 11.4% of households in the 81-100 kWh category, the highest among all regions, likely due to urbanization and higher appliance usage.

Dar es Salaam has a relatively higher share of mid-to-high consumption (21.3% in 41-60 kWh, 11.1% in 81-100 kWh), while Simiyu has almost no households consuming above 60 kWh per month. Regions such as Lindi, Mtwara and Rukwa have zero or negligible consumption in higher categories of monthly consumption (Table 4.11).

FIGURE 4.9: DISTRIBUTION OF HOUSEHOLDS BY SOURCES FOR COOKING AND PLACE OF RESIDENCE, MAINLAND TANZANIA, 2023 HECS

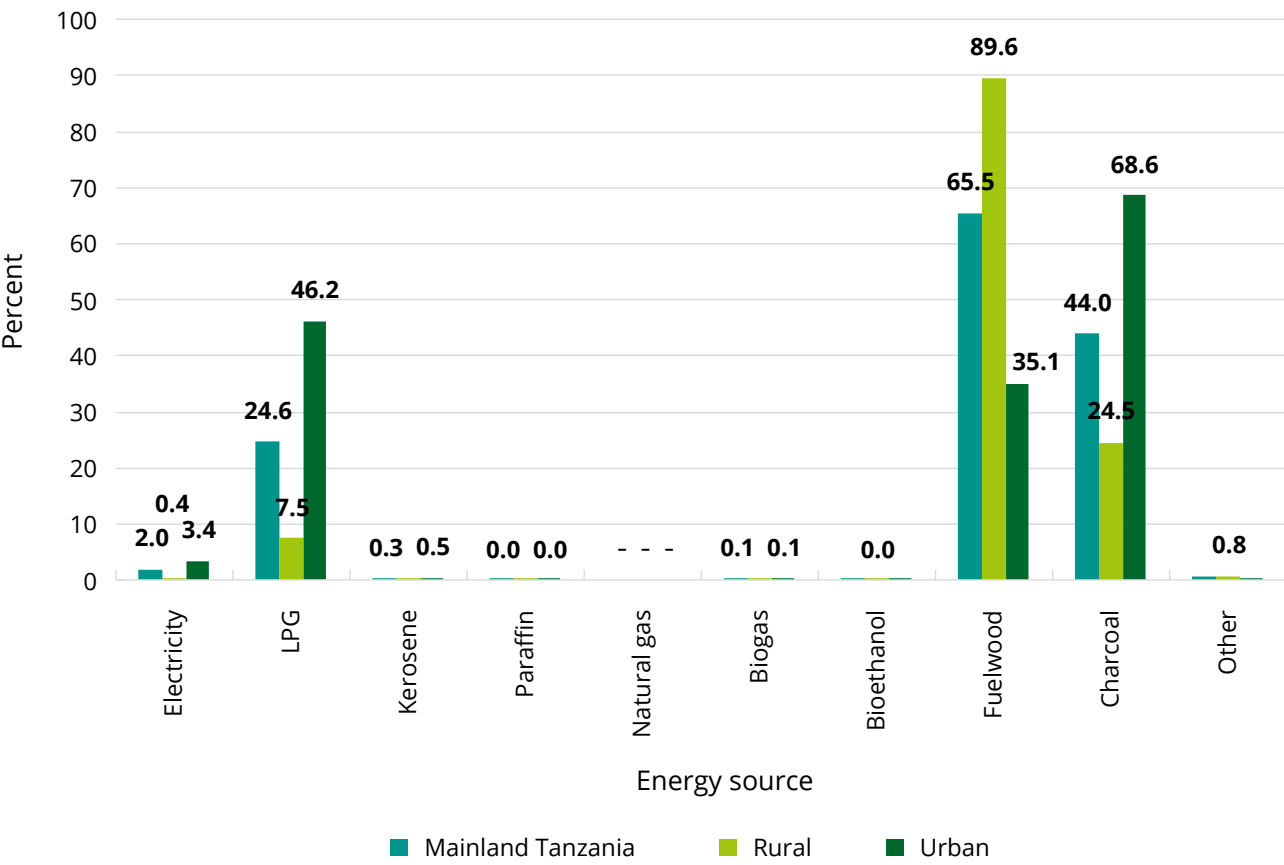


Table 4.12 provides a detailed breakdown of the primary energy sources used for cooking across different regions in Mainland Tanzania. The results show that firewood is the primary cooking energy source in most regions, with an overall national average of 65.5% followed by charcoal with a national average of 44.0%. Simiyu (91.2%), Manyara (90.0%), and Kagera (84.2%) rely heavily on firewood with percentages well above national average.

Electricity and LPG are the primary modern energy sources, but their usage is relatively low compared to solid biomass. Electricity usage is minimal, with the highest percentage in Dar es Salaam (5.1%), followed by Pwani (4.4%) and Arusha (4.2%). Most regions use electricity below 1.5%.

The use of LPG is higher than electricity but still limited, with the highest usage in Dar es Salaam (74.4%), followed by Arusha (56.3%) and Kilimanjaro (37.0%). In contrast, regions like Kigoma (5.7%) and Rukwa (6.0%) have very low LPG usage. Other modern energy sources like natural gas, biogas, paraffin, and bioethanol are almost negligible, with shares close to zero in most regions.

TABLE 4.12: PERCENTAGE DISTRIBUTION OF HOUSEHOLDS BY SOURCES FOR COOKING AND REGION - 2023 HECS, MAINLAND TANZANIA

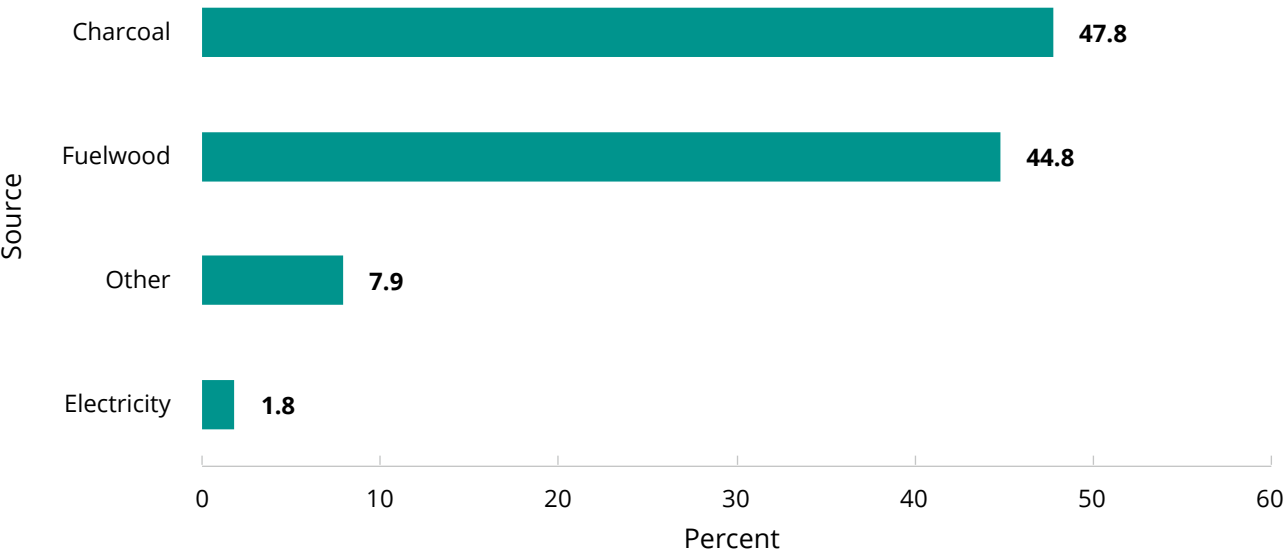
Region	Energy Source									
	Electri-city	LPG	Kerose-ne	Paraffin	Natural gas	Biogas	Bioetha-nol	Fire-wood	Charcoal	Other
Dodoma	1.7	22.2	-	-	-	-	-	65.5	36.7	-
Arusha	4.2	56.3	0.8	-	-	-	-	66.4	32.8	-
Kilimanjaro	1.0	37.0	1.4	0.2	-	0.4	-	83.5	23.6	0.3
Tanga	2.3	15.5	-	-	-	-	-	72.8	38.2	1.1
Morogoro	0.4	16.4	0.6	-	-	-	-	64.2	59.6	-
Pwani	4.4	37.2	0.4	-	-	-	-	62.7	75.8	0.7
Dar es Salaam	5.1	74.4	0.4	-	-	-	-	7.6	65.3	-
Lindi	-	6.4	-	-	-	-	-	82.4	42.3	-
Mtwara	1.0	11.7	-	-	-	-	-	77.9	29.4	-
Ruvuma	1.3	7.8	-	-	-	-	-	84.1	31.4	1.9
Iringa	0.7	25.6	-	-	-	-	-	72.4	41.3	-
Mbeya	1.7	22.1	0.3	-	-	-	-	61.3	51.0	-
Singida	1.0	13.5	-	-	-	-	-	82.0	30.6	0.2
Tabora	0.6	12.0	-	-	-	-	-	67.0	41.6	-
Rukwa	1.3	6.0	0.3	-	-	-	0.2	73.7	50.2	-
Kigoma	2.1	5.7	-	-	-	0.3	-	77.2	30.7	-
Shinyanga	2.2	15.6	-	0.2	-	1.4	-	71.4	36.5	-
Kagera	0.8	8.1	-	-	-	-	-	84.2	27.1	-
Mwanza	2.5	28.1	0.9	-	-	-	-	61.8	59.7	-
Mara	0.2	14.8	-	-	-	0.2	-	78.4	40.6	-
Manyara	-	16.0	0.2	-	-	-	-	90.0	21.5	13.1
Njombe	0.5	12.4	-	-	-	0.2	-	76.3	32.3	0.2
Katavi	0.8	9.9	-	-	-	-	-	53.9	65.6	-
Simiyu	0.8	6.5	-	-	-	0.2	0.1	91.2	21.8	-
Geita	-	7.7	-	-	-	-	-	73.6	48.2	-
Songwe	2.1	15.0	-	-	-	-	-	67.7	43.5	0.2
Mainland Tanzania	2.0	24.6	0.3	0.0	-	0.1	0.0	65.5	44.0	0.6

4.5.1 Energy sources for space heating

In Mainland Tanzania, space heating was not commonly practiced as a dedicated activity. Instead, in cooler regions such as Njombe, Iringa, and Mbeya, households often experienced incidental space heating as a by-product of indoor cooking. The primary energy sources contributing to this incidental heating included electricity, LPG, kerosene, firewood, charcoal and other.

Traditional biomass fuels, primarily firewood (47.8%) and charcoal (41.9%), remained the dominant energy sources for space heating and electricity accounted only for 1.8% while other sources of heating recorded 7.9% (Figure 4.15).

FIGURE 4.15: DISTRIBUTION OF HOUSEHOLDS THAT HEATED DWELLING BY SOURCE OF ENERGY FOR SPACE HEATING AND REGION, MAINLAND TANZANIA, 2023 HECS



Firewood and charcoal emerged as the dominant sources of energy for space heating across most regions in Mainland Tanzania. The findings in Table 4.16 reveal that Simiyu, Geita, and Kilimanjaro (100%), Mtwara (93.1%), Kilimanjaro (74.5%) and Pwani (73.3%) had the highest reliance on firewood, indicating a strong dependence on readily available natural biomass, particularly in rural and semi-rural areas. Conversely, charcoal was the primary source in more urbanized regions such as Morogoro (100%), Mbeya (85.6%), Iringa (81.2%) and Ruvuma (81.0%), likely due to its relative convenience, higher energy density, and suitability for indoor heating compared to firewood. On the other hand, other types of sources had a significant number as shown in Table 4.16.

TABLE 4.16: DISTRIBUTION OF HOUSEHOLDS THAT HEATED DWELLING BY SOURCE OF ENERGY FOR SPACE HEATING AND REGION IN MAINLAND TANZANIA, 2023 HECS

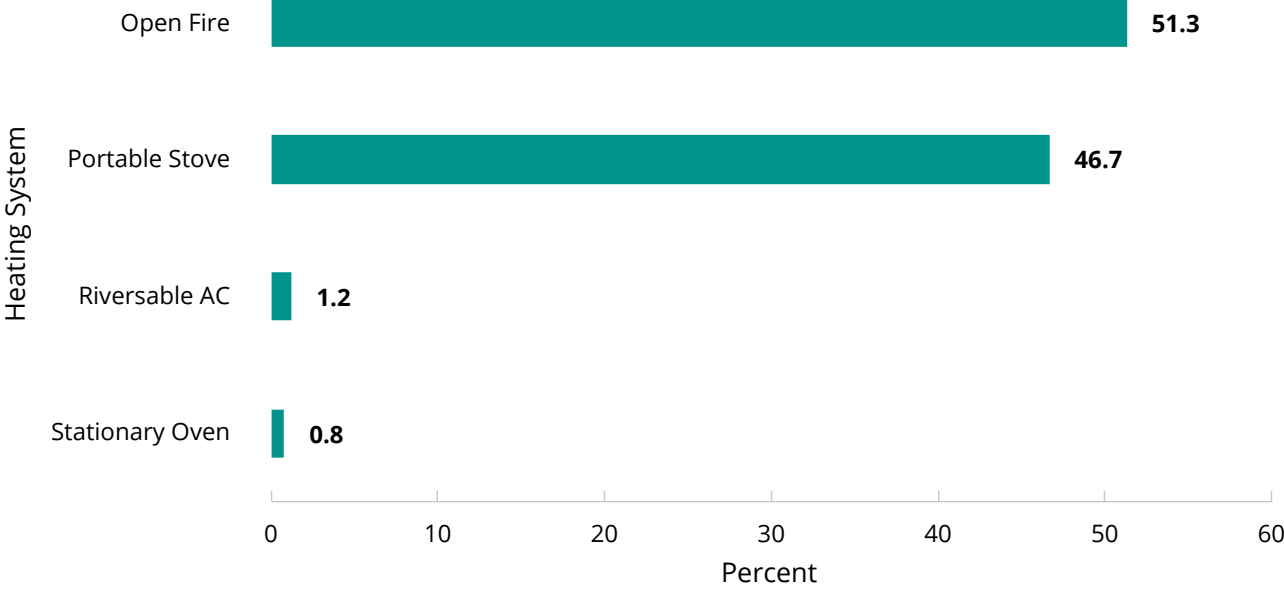
Region	Main Source			
	Electricity	Firewood	Charcoal	Other
Dodoma	-	63.8	21.5	14.7
Arusha	-	64.5	23.6	11.9
Kilimanjaro	-	74.5	25.5	-
Tanga	2.9	66.3	27.2	3.6
Morogoro	-	-	100.0	-
Pwani	-	73.3	39.8	-
Lindi	-	-	-	100.0
Mtwara	4.9	93.1	6.9	-
Ruvuma	6.9	12.2	81.0	-
Iringa	-	16.4	81.2	2.4
Mbeya	-	14.4	85.6	-
Singida	11.8	12.6	72.1	15.4
Tabora	-	51.5	29.5	19.0
Rukwa	-	25.7	74.3	-
Kigoma	-	56.7	43.3	-
Shinyanga	15.9	89.8	-	10.2
Kagera	7.9	31.3	-	60.7
Mwanza	-	22.9	57.4	19.7
Mara	-	47.4	34.9	17.7
Manyara	-	44.2	50.2	9.8
Njombe	-	32.9	60.9	6.2
Katavi	-	56.2	43.8	-
Simiyu	-	100.0	12.7	-
Geita	-	58.8	41.2	-
Songwe	-	29.8	55.9	14.3
Mainland Tanzania	1.8	44.8	47.8	7.9

4.5.2 Heating system

In Mainland Tanzania, space heating systems are largely informal and non-mechanized, reflecting both the country's generally warm climate and the socioeconomic conditions of most households. In areas where heating is necessary, particularly in the cooler highland regions or during colder seasons, households primarily depend on simple, traditional methods, rather than modern, centralized, or automated heating systems.

Results from Figure 4.16 indicate that Open fire was the most used heating method, employed by more than half of the households (51.3%) followed by portable stoves accounting for 46.7% and reversible AC (1.2%). Stationary oven was the least common heating method, used by 0.8% of households.

FIGURE 4.16: DISTRIBUTION OF HOUSEHOLDS THAT HEATED DWELLING BY MAIN HEATING SYSTEM IN MAINLAND TANZANIA, 2023 HECS



Open fire remains the most widely used method for space heating across many regions. Notably, regions such as Shinyanga, Simiyu, and Lindi reported full reliance (100%) on open fire. In contrast, regions with significantly lower usage include Mbeya (14.4%), Iringa (18.8%), and Ruvuma (12.2%), reflecting a shift toward alternative heating methods (Table 4.17 shows). On the other hand, the use of reversible air conditioners (ACs) was limited to a few regions, with Singida leading at 11.8%. Minimal usage was also recorded in Tanga (2.9%), Ruvuma (6.9%), and Kagera (7.9%).

Results in Table 4.17 further showed Portable Stove was also common in some regions, the highest was recorded in Morogoro (100 %) followed by Mbeya (85.6%) and Iringa (81.2%) and the lowest was recorded in Mtwara (6.9%).

TABLE 4.17: DISTRIBUTION OF HOUSEHOLDS THAT HEATED DWELLING BY MAIN HEATING SYSTEM AND REGION IN TANZANIA, 2023 HECS

Region	Means of Heating Dwelling			
	Open Fire	Portable Stove	Stationary Oven	Reversible AC
Dodoma	78.5	21.5	-	-
Arusha	76.4	23.6	-	-
Kilimanjaro	74.5	25.5	-	-
Tanga	69.9	27.2	-	2.9
Morogoro	-	100.0	-	-
Pwani	73.3	26.7	-	-
Lindi	100.0	-	-	-
Mtwara	93.1	6.9	-	-
Ruvuma	12.2	81.0	-	6.9
Iringa	18.8	81.2	-	-
Mbeya	14.4	85.6	-	-
Singida	27.9	60.2	-	11.8
Tabora	70.5	29.5	-	-
Rukwa	25.7	74.3	-	-
Kigoma	56.7	43.3	-	-
Shinyanga	100.0	-	-	-
Kagera	82.2	9.8	-	7.9
Mwanza	42.6	57.4	-	-
Mara	47.4	34.9	17.7	-
Manyara	49.8	50.2	-	-
Njombe	39.1	60.9	-	-
Katavi	56.2	43.8	-	-
Simiyu	100.0	-	-	-
Geita	58.8	41.2	-	-
Songwe	44.1	55.9	-	-
Mainland Tanzania	51.3	46.7	0.8	1.2

"-" Withheld to avoid disclosing data for individual households or insufficient data available from survey (Total includes withheld data)

TABLE 1: NUMBER AND PERCENTAGE DISTRIBUTION OF HOUSEHOLDS BY SEX OF THE HOUSEHOLD HEAD AND REGION IN MAINLAND TANZANIA, 2023 HECS

Region	Sex		Total N
	Male %	Female %	
Dodoma	65.0	35.0	761,645
Arusha	76.9	23.1	614,212
Kilimanjaro	68.2	31.8	519,263
Tanga	74.8	25.2	682,898
Morogoro	69.7	30.3	853,923
Pwani	70.3	29.7	571,805
Dar es Salaam	71.6	28.4	1,635,473
Lindi	60.2	39.8	368,434
Mtwara	61.6	38.4	500,353
Ruvuma	76.0	24.0	471,368
Iringa	63.9	36.1	368,793
Mbeya	75.6	24.4	638,471
Singida	75.7	24.3	400,382
Tabora	75.8	24.2	598,909
Rukwa	76.1	23.9	367,096
Kigoma	74.6	25.4	491,515
Shinyanga	73.1	26.9	437,135
Kagera	71.6	28.4	704,890
Mwanza	71.4	28.6	817,178
Mara	67.8	32.2	474,692
Manyara	75.7	24.3	425,230
Njombe	67.3	32.7	279,608
Katavi	81.0	19.0	250,832
Simiyu	75.4	24.6	355,712
Geita	78.9	21.1	567,027
Songwe	78.1	21.9	368,456
Mainland Tanzania	72.0	28.0	14,525,300.0

TABLE 2: NUMBER AND PERCENTAGE DISTRIBUTION OF HOUSEHOLD MEMBERS BY SEX AND AGE GROUP IN MAINLAND TANZANIA, 2023 HECS

Age	Sex		Total N
	Male %	Female %	
0 - 4	49	51	9,031,693
5 - 9	51	49	9,069,405
10 - 14	50	50	8,647,411
15 - 19	48	52	6,753,887
20 - 24	43	57	5,445,346
25 - 29	44	56	4,744,875
30 - 34	48	52	4,338,747
35 - 39	47	53	3,485,495
40 - 44	49	51	2,992,321
45 - 49	50	50	2,616,101
50 - 54	49	51	2,202,035
55 - 59	49	51	1,381,472
60 - 64	51	49	1,433,539
65 - 69	55	45	857,272
70 - 74	48	52	703,462
75 - 79	47	53	450,051
80 - 84	38	62	340,027
85+	45	55	328,064
Mainland Tanzania	48	52	64,821,200

TABLE 14: PERCENTAGE DISTRIBUTION OF HOUSEHOLDS USING ELECTRICITY TARIFF TYPE D1 BY MONTHLY EXPENDITURE AND REGION IN MAINLAND TANZANIA, 2023 HECS

Region	Amount Spent			
	Less than 5000	5000-10000	10000-15000	15000+
	%	%	%	%
Dodoma	46.2	36.3	11.1	6.4
Arusha	33.0	56.0	9.3	1.7
Kilimanjaro	30.8	47.8	18.1	3.3
Tanga	21.0	48.0	21.5	9.5
Morogoro	31.5	39.4	17.0	12.0
Pwani	13.8	42.3	32.9	11.0
Dar es Salaam	5.0	34.4	41.9	18.7
Lindi	57.6	35.0	7.4	-
Mtwara	34.3	48.6	17.2	-
Ruvuma	33.0	46.1	12.0	8.9
Iringa	35.6	47.8	9.6	6.9
Mbeya	19.6	52.6	21.7	6.1
Singida	24.8	37.1	19.4	18.7
Tabora	15.6	68.0	16.4	-
Rukwa	55.7	35.2	6.1	3.1
Kigoma	13.6	43.9	31.5	11.0
Shinyanga	21.9	51.3	17.0	9.8
Kagera	51.2	36.3	9.9	2.7
Mwanza	23.7	59.4	12.5	4.4
Mara	34.6	35.2	21.6	8.6
Manyara	27.1	59.8	9.7	3.4
Njombe	14.7	52.0	26.0	7.2
Katavi	50.8	25.8	11.4	12.1
Simiyu	4.8	88.4	6.9	-
Geita	24.1	67.2	5.8	3.0
Songwe	40.4	32.7	12.5	14.4
Mainland Tanzania	26.9	45.6	19.5	8.0

“-” Withheld to avoid disclosing data for individual households or insufficient data available from survey (Total includes withheld data)

TABLE 15: PERCENTAGE DISTRIBUTION OF HOUSEHOLDS USING ELECTRICITY TARIFF TYPE T1 BY MONTHLY EXPENDITURE AND REGION IN MAINLAND TANZANIA, 2023 HECS

Region	Amount Spent (TZS)			
	Less than 5000	5000-10000	10000-15000	15000+
	%	%	%	%
Dodoma	13.6	42.9	25.9	17.6
Arusha	4.2	41.9	34.2	19.7
Kilimanjaro	30.1	22.7	9.6	37.6
Tanga	7.7	42.3	19.2	30.9
Morogoro	-	-	21.2	78.8
Pwani	14.2	39.3	23.7	22.9
Dar es Salaam	1.2	15.4	42.7	40.6
Lindi	25.0	50.0	25.0	-
Mtwara	13.4	51.4	16.6	18.6
Ruvuma	28.3	36.8	23.9	10.9
Iringa	10.5	50.1	26.8	12.6
Mbeya	10.3	49.5	25.9	14.3
Singida	17.2	46.3	22.6	13.9
Tabora	18.2	30.4	23.5	27.9
Rukwa	53.3	40.8	5.9	-
Kigoma	-	24.0	-	76.0
Shinyanga	-	-	90.6	9.4
Kagera	43.0	45.2	6.8	5.0
Mwanza	26.8	38.1	19.2	15.9
Mara	25.3	34.6	26.1	14.0
Manyara	14.0	57.3	-	28.7
Njombe	15.5	57.9	17.9	8.8
Katavi	16.0	44.3	21.2	18.5
Simiyu	9.8	35.2	39.3	15.8
Geita	2.6	49.7	26.8	20.9
Songwe	19.7	45.7	16.3	18.4
Mainland Tanzania	10.2	33.1	31.0	25.8

“-” Withheld to avoid disclosing data for individual households or insufficient data available from survey (Total includes withheld data)

SECTION II: EDUCATION			
For all household member 5 years and older we would like to know about their education.			
	1.Can [Name] read and write ?	2. What is the schooling status of (NAME)?	3.What is the highest grade of education [Name] completed?
I N D I V I D U A L I D	Kiswahili.....1 English.....2 Kiswahili & English.....3 Any other language4 Don't Read/Write.....5	Attending School.....1 Dropped Out.....2 Completed.....3 Never Attended School...4	PP...1 ADULT...1 PRIMARY D1...11 D2...12 D3...13 D4...14 D5...15 D6...16 D7...17 D8...18 OSC...19 MS+COURSE...20 SECONDARY F1...21 F2...22 F3...23 F4...25 O+COURSE...25 F5...31 F6...32 A+COURSE...33 DIPLOMA...34 UNIVERSITY & EQUIVALENT U1...41 U2...42 U3...43 U4...44 U5&+...45
	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		
	12		

Section 1: Businesses operation			
Questions asked/Variables requested	Yes=1/no=2	Share	Specification
1. Did you run one or more business linked to your household in 2023?			
1.1. Was this the only income?			
1.2. Is it possible to separate the energy consumption of business activities from private consumption?			
Type of business			
Crop Farming			
Livestock breeding			
Charcoal production			
Restaurant			
Brickyard			
Brewery			
Other			

Section 2: Electricity					
Questions asked/Variables requested	Yes=1/no=2	Frequency annually=1 monthly=2	Quantity in l/kwh	Specification	Expenditures
2. Did your household use Electricity during the period of January to December 2023?					
2.1. What were the sources of your electricity?					
Tanesco					
Minigrid					
Own solar					
Own generator					
Diesel					
Petrol					
Kerosene					
Other					
Other					
2.2.Is electricity used for					
Business					
Lighting					
Consumer/office electronics					
Kitchen appliances					
Charger					
Air condition					
Other					
2.3. What were the quantities purchased in the last month?					
D1 Contract					
T1 Contract					
T2 Contract					
T3 Contract					
2.4.1 How much did you pay for electricity in the last month?					

Section 3: Cooking				
Questions asked/Variables requested	Yes=1/no=2	Frequency	Quantity in kg	Specification
3. Do you cook mainly indoors				
3.1. Do you use cooking activity during cool season also for space heating?				
3.2 Do you use cooking also for water heating for other purposes than cooking, e.g. dish washing or body care?				
3.3. Do you use electricity for cooking?				
3.4 Do you use LPG for cooking?				
3.5. Do you use kerosene for cooking?				
3.6. Do you use paraffin for cooking?				
3.7. Do you use natural gas for cooking?				
3.8. Do you use biogas for cooking?				
3.9. Do you use bioethanol for cooking?				
3.10. Do you use fire wood for cooking?				
Three-stone stove				
Round mud stove				
Improved cooking stove				
Rocket stove				
Burned mud/clay stove				
Lorena 1 Rocket stove				
Rocket stove metal				
Lorena 2 Rocket stove				
Moz Metal rocket stove				
3.10.3 Do you heat up water for other purposes than cooking (e.g. dish washing) directly after cooking?				
3.11.Do you use charcoal for cooking?				
Traditional charcoal stove				
Traditional raised charcoal stove				
Old generation charcoal ICS				
Ceramic lined charcoal ICS				
3.11.3 Do you heat up water for other purposes like cooking directly after cooking?				
3.12.Do you use other?				
3.13.Do you use other?				
3.14.Do you use other?				



