County Government of Homa Bay

AMT AKIBA MASHINANI TRUST

GLOBAL CENTER ON ADAPTATION

REMBA ISLAND SETTLEMENT

REPORT - 1

Settlement Profiling - Homa Bay County

AUTHORS & ACKNOWLEDGEMENTS

Developed By

Akiba Mashinani Trust (AMT)

The **Remba Island Situational Analysis** presents an integrated overview of the island's physical, social, economic, and environmental conditions, providing an essential evidence base for inclusive and climate-resilient planning. Drawing on household surveys, spatial mapping, and community profiling conducted in collaboration with the **County Government of Homa Bay**, the study aligns settlement-level data with county priorities under the **Local Physical and Land Use Development Plan (LPLUDP)** and the **Homa Bay County Climate Change Act (2022)**. Guided by national frameworks such as the **Climate Change Act (2016)**, the **Physical and Land Use Planning Act (2019)**, and the **Fisheries Management and Development (Beach Management Units) Regulations (2024)**, the analysis combines community perspectives with technical evidence to establish a robust foundation for future planning, resilience building, and sustainable service delivery within Remba's unique ecological and spatial constraints.

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Finally, we express sincere gratitude to the **residents of Remba Island** and the **community enumerators** who participated in surveys and consultations. Their experiences, priorities, and reflections form the heart of this report. Through their engagement, the Remba Island Situational Analysis stands as a people-centered and evidence-based foundation for building a more resilient and sustainable island community.

EXECUTIVE SUMMARY

Remba Island, a tiny 0.22 km² landmass in Lake Victoria, hosts a dense and dynamic fishing community of about 2,297 residents. Once a transient fishing camp, it has evolved into a permanent, multi-ethnic settlement driven by migration, fisheries, and informal trade. Yet this rapid, unplanned growth has created severe pressures; overcrowding, insecure land tenure, inadequate infrastructure, and environmental degradation, that now threaten both livelihoods and ecosystems.

The situational analysis provides an evidence base for inclusive planning and climate adaptation, combining community-led mapping, household surveys, and spatial analysis in line with the People's Adaptation- Local Physical and Land Use Development Plan for Homa Bay Municipality and national frameworks such as the Climate Change Act (2016) and Physical and Land Use Planning Act (2019).

Findings show that Remba's terrain is mostly flat and flood-prone, with pellic vertisols soils that retain moisture but degrade easily when vegetation is cleared. Flooding affects more than quarter of the households, and water access remains precarious—over three-quarters depend on untreated lake water. Waste disposal into the lake is common, heightening contamination risks, while sanitation facilities are limited to shared or pay-to-use toilets. The island's sole health facility struggles to meet demand amid frequent waterborne and respiratory diseases.

Energy supply is entirely off-grid, relying on solar power for lighting and charcoal for cooking, which accelerates deforestation and air pollution. Nearly all housing is temporary or semi-permanent, and two-thirds of residents live on public land without documentation. Education facilities are minimal, with only one primary school.

Economically, the island relies almost entirely on artisanal fishing, small trade, and micro-enterprise. Women play key roles in post-harvest processing and vending but face barriers in credit and ownership. Climate change—manifested in rising lake levels, erratic rainfall, and shoreline erosion—has worsened livelihood instability and environmental stress.

These conditions reveal a fragile human–environment system where poverty, weak infrastructure, and ecological decline reinforce one another. The report underscores that Remba's resilience will depend on community-led, cross-sectoral interventions: improving water and sanitation, expanding renewable energy, regularizing land tenure, upgrading housing and education, and restoring degraded ecosystems. With coordinated, data-driven, and participatory planning, Remba Island can transition from a vulnerable informal settlement to a model of climate-resilient and sustainable small-island development.

Sustaining this transformation will require strong institutional partnerships among county departments, national agencies, and local governance structures such as the Beach Management Unit (BMU). Strengthening these linkages will be key to unlocking climate finance, promoting sustainable fisheries, and integrating Remba into wider regional initiatives within the Lake Victoria Basin Commission. By embedding local innovation within formal policy support, Remba can demonstrate how Kenya's blue economy and devolution agenda can work together to secure both community livelihoods and lake ecosystem health.

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LIST OF ACRONYMS & ABBREVIATIONS

Abbreviation	Full Meaning
AMT	Akiba Mashinani Trust
BMU	Beach Management Unit
CBC	Competency-Based Curriculum
CIDP	County Integrated Development Plan
CCCI	Cities and Climate Change Initiative (UN-Habitat)
ECDE	Early Childhood Development Education
FGDs	Focus Group Discussions
FLOCCA	Financing Locally Led Climate Action
GCA	Global Center on Adaptation
GIS	Geographic Information System
ICT	Information and Communication Technology
KEMD	Kenya Meteorological Department
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KSH	Kenya Shilling
LREB	Lake Region Economic Bloc
LLCA	Locally Led Climate Adaptation
LPG	Liquefied Petroleum Gas
NEMA	National Environment Management Authority
NGO	Non-Governmental Organization
NMT	Non-Motorized Transport
RCRA	Rapid Climate Risk Assessment
RIM	Registry Index Map
SHIF	Social Health Insurance Fund
SPA	Special Planning Area
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TVET	Technical and Vocational Education and Training
UHC	Universal Health Coverage
UN-Habitat	United Nations Human Settlements Programme
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization

1 INTRODUCTION

This chapter provides an overview of the Situational Analysis Report, setting the foundation for understanding the planning context of Remba Island. It outlines the purpose, scope, objectives, and guiding principles of the study while detailing the methodology used for data collection and analysis.

1.1 Background and Context

This Situational Analysis Report provides a baseline understanding of conditions on Remba Island, an informal but rapidly urbanizing settlement that has emerged as one of the most significant fishing hubs within Lake Victoria. Remba's importance extends far beyond its small size and geographic isolation; it encapsulates the realities of many lake-based communities where livelihoods, housing, and public services are tightly bound to the rhythms of the fishing economy and the fragile ecology of the lake itself. The island's extreme population density, limited land area, and dependence on fisheries make it a vivid microcosm of the development challenges faced by aquatic settlements across Homa Bay County and the wider Lake Region Economic Bloc.

The report draws on a rich combination of evidence, including community-led household enumeration, participatory mapping and spatial analysis, and extensive consultations with local residents, Beach Management Units, and county officials. These approaches were validated through community workshops and stakeholder forums, ensuring that the findings reflect both technical accuracy and the lived experiences of Remba's residents. In doing so, the analysis moves beyond description to provide a multidimensional portrait of the island's demographic composition, social and economic organization, infrastructure deficits, and vulnerability to environmental and climate-related stresses.

The primary aim of the report is to establish a coherent evidence base that can guide future decision-making on upgrading, service provision, and climate resilience for Remba Island. Like many informal lake settlements, Remba has long existed outside formal planning frameworks, rendering it under-served and highly exposed to environmental hazards. This analysis addresses that gap by creating a comprehensive situational baseline that makes the settlement visible to county government departments, development partners, and civil society actors. By integrating quantitative data from enumeration with qualitative insights from residents, the report provides a shared foundation for coordinated and inclusive interventions that respond to community priorities.

Beyond its diagnostic purpose, the report positions Remba Island within the broader development trajectory of Homa Bay County. The island faces the intersecting challenges of insecure land tenure, overcrowded and largely temporary housing, inadequate access to safe water and sanitation, limited energy options, and escalating vulnerability to climate variability—including flooding, rising lake levels, and shoreline erosion. Yet within these constraints, Remba demonstrates remarkable resilience through its community structures, informal economic networks, and adaptive coping mechanisms. Women's active participation in fish trading and small enterprise, youth engagement in fisheries and transport, and the island's evolving governance through Beach Management Units all illustrate local ingenuity in the face of scarcity.

In this context, the report serves a dual role: first, to document and diagnose the conditions on Remba Island with clarity and precision; and second, to provide a shared body of evidence that illuminates the social, economic, and environmental realities of life in the settlement. Through this lens, the report functions not only as a record of current conditions but also as a strategic reference for researchers, planners, and policymakers seeking to design inclusive, climate-responsive, and sustainable interventions. Remba Island thus becomes both a subject of study and a catalyst for reimagining how small, high-density island communities can be integrated into Kenya's broader urban and climate resilience agenda.

1.2 Historical Background

Unlike mainland settlements that have grown through inherited land tenure and kinship systems, Remba Island has developed through migration and opportunity mainly rooted in fishing. Its population largely transient and multi-ethnic, has grown rapidly since the early 2000s, transforming a once-sparse fishing camp into a dense, economically driven community. Most residents identify

as newcomers, drawn from across Homa Bay County, other western Kenyan counties such as Kisumu, Siaya, and Migori, and even from Uganda and Tanzania. This migration has produced a cosmopolitan island economy organized around fishing, fish trading, and service provision.

The settlement pattern of Remba Island has evolved organically around its landing sites and beaches, which serve as the core of both social and economic life. The island is organized through functional zones shaped by fishing and trade activity. These landing sites are primarily community-operated, with individuals or groups of higher capacity, such as experienced fishers, traders, and boat owners managing larger areas. Access to space for housing, processing, or commerce is negotiated through the Beach Management Unit (BMU), the island's central administrative and organizational structure. The BMU regulates operations at these beaches, coordinates fishing activities, allocates space, and mediates conflicts, ensuring that settlement and economic practices remain orderly despite the absence of a formal planning framework.

The BMU is an officially recognized institution established under the Fisheries Management and Development (Beach Management Units) Regulations, 2024 (Legal Notice No. 121 of 2024). Each BMU is a non-political, community-based organization registered through the County Executive Committee Member responsible for fisheries, under the supervision of the County Director of Fisheries.

Under Regulation 4, the BMU's objectives include ensuring sustainable fisheries, promoting good governance, preventing conflicts, and strengthening co-management of lake resources. It has statutory functions and powers defined in Part II and III of the Regulations, including maintaining hygiene and safety at landing beaches, collecting and reporting fisheries data, enforcing compliance with fisheries laws, and supporting climate-resilient fishing practices.

On Remba Island, the BMU plays a central role not only in resource management but also in settlement organization and local dispute resolution. Since the island's land is officially classified as public and lacks formal cadastral registration, the BMU Land Committee has evolved as a de facto planning body that allocates space for temporary housing, fish-drying areas, and trading plots. Residents recognize BMU-issued registration letters as evidence of occupancy and tenure security, even though these documents are not formal land titles. The BMU also coordinates safety patrols, regulates fishing zones, and liaises with county authorities on environmental conservation and enforcement.

This hybrid governance arrangement anchored in statutory regulation but adapted to local realities, has made the BMU the linchpin of both economic and spatial order on Remba Island. Its structure includes an elected executive committee, sub-committees on patrol, environment and sanitation, and finance, and it operates under the supervision of the County Director of Fisheries. The BMU therefore represents a formal, legally mandated community institution that bridges the gap between government regulation and everyday life on the island, ensuring that the management of fisheries and settlement space reflects both statutory law and community practice

1.3 Problem Statement

Remba Island's emergence as a fisheries-based settlement has generated a complex web of interlinked challenges that define daily life and test the island's ability to sustain itself. Despite its small size, settlement and housing are intensely concentrated within the settlement, where fishing, trade, and habitation converge are within a very limited land area. The island is densely built and heavily utilized, leaving little open space for circulation or social amenities.

The transient nature of Remba's population compounds these pressures. Tenancy dominates, with over 84 percent of residents renting their homes, and very few possessing any form of secure tenure. The island's land is classified as public, and local allocation is overseen by the BMU. While BMU-issued registration letters provide a degree of informal legitimacy, they do not confer legal ownership. Residents therefore occupy their spaces without formal protection, fostering a widespread sense of impermanence and insecurity even in the absence of active eviction threats.

Infrastructure and service provision have not kept pace with population growth. Access to clean water is limited, with most households relying directly on Lake Victoria and unreliable water kiosks, while sanitation and waste systems are rudimentary and often hazardous. The island's single health facility and lone primary school operate far beyond capacity, and the absence of secondary or vocational institutions forces residents to depend on the mainland for continued education or specialized care. During peak fishing seasons, sudden population surges exacerbate congestion and overburden limited infrastructure; when fishing activity declines, temporary outmigration leaves services underutilized and income flows unstable.

Remba's demographic structure reinforces this fragility. Households are small—averaging 2 persons—and predominantly composed of single adults or couples without children. Extended family networks are rare, reflecting the island's mobile and economically driven character. The population is overwhelmingly of working age, drawn by fishing and trade opportunities, but this also means that livelihoods are narrowly concentrated within a single, volatile sector. When catches fall or regulatory

restrictions tighten, incomes and food security are immediately jeopardized.

Gender inequalities cut sharply across these dynamics. Women form the backbone of post-harvest activities fish processing, vending, and small-scale trade—yet they face persistent exclusion from land access, credit facilities, and decision-making spaces within both community structures and the BMU hierarchy. Female-headed households, which make up roughly a quarter of the population, are particularly vulnerable, balancing economic insecurity with limited social protection and exposure to gender-based risks.

Taken together, these conditions reveal the precarious foundations of life on Remba Island. Extreme density, insecure tenure, inadequate infrastructure, and livelihood fragility intersect with gendered disadvantage and environmental vulnerability to create a settlement finely balanced on the edge of risk. In such a context, even minor disruptions—whether a failed fishing season, a disease outbreak, or a storm surge—can cascade rapidly into wider social and economic crises, exposing the limits of resilience in one of Lake Victoria's most densely populated islands.

1.4 Scope

1.4.1 Contextual Scope

The contextual scope of this situational analysis is deliberately multi-sectoral, recognizing that settlement life on Remba Island cannot be understood through a single lens. The report therefore adopts an integrated perspective that links the island's physical, social, economic, and environmental dimensions into one interdependent system.

Physical Environment: The report considers the physical setting of Remba Island, including its flat topography, hydrological patterns, soil characteristics, and the climatic conditions of Lake Victoria's basin. These natural features shape where people build, how they access resources, and the degree to which the settlement is exposed to flooding, erosion, and other environmental hazards. The physical landscape forms the ecological foundation on which all human activity on the island depends.

Demographic and Spatial Profile: Attention is given to population size, household composition, and the migration patterns that define Remba as a predominantly migrant settlement. With over 96 percent of residents originating from outside the island, Remba's identity and growth are inseparable from regional mobility and the lake's fisheries economy. Spatially, residents are concentrated in compact zones near the shoreline, leaving only small peripheral areas relatively open. This uneven distribution explains much of the congestion, density, and pressure on housing and services.

Land Tenure and Land Use: The study examines the informal systems through which land is accessed and managed in the absence of formal title deeds. The BMU, established under the Fisheries Management and Development (Beach Management Units) Regulations (Legal Notice No. 121 of 2024), functions as the de facto authority for allocating and regulating space. This BMU-mediated tenure system provides a form of community-level order but also produces insecurity, since occupation rests on informal agreements rather than recognized legal ownership.

Housing and Infrastructure: The analysis documents the dominant housing forms, mostly semi-permanent or temporary, and assesses access to water, sanitation, energy, transport, and waste management. Nearly all housing is informally built and rental-based, reflecting both high population turnover and limited tenure security. Infrastructure remains rudimentary: most households rely on untreated lake water, shared pay-to-use sanitation facilities, and solar-based off-grid lighting. These systems, while adaptive, remain fragile under conditions of rapid growth and environmental stress.

Socio-Economic Conditions and Livelihoods: Fishing remains the economic backbone of Remba, sustaining a wide range of related activities such as fish trading, processing, boat repair, and informal retail. Women dominate the post-harvest and petty-trade sectors but face constraints in access to credit and secure property. Household income levels are low and volatile, tied to the fluctuations of fish stocks and lake conditions. The analysis explores how this economic dependence intensifies vulnerability to environmental shocks, market instability, and overfishing.

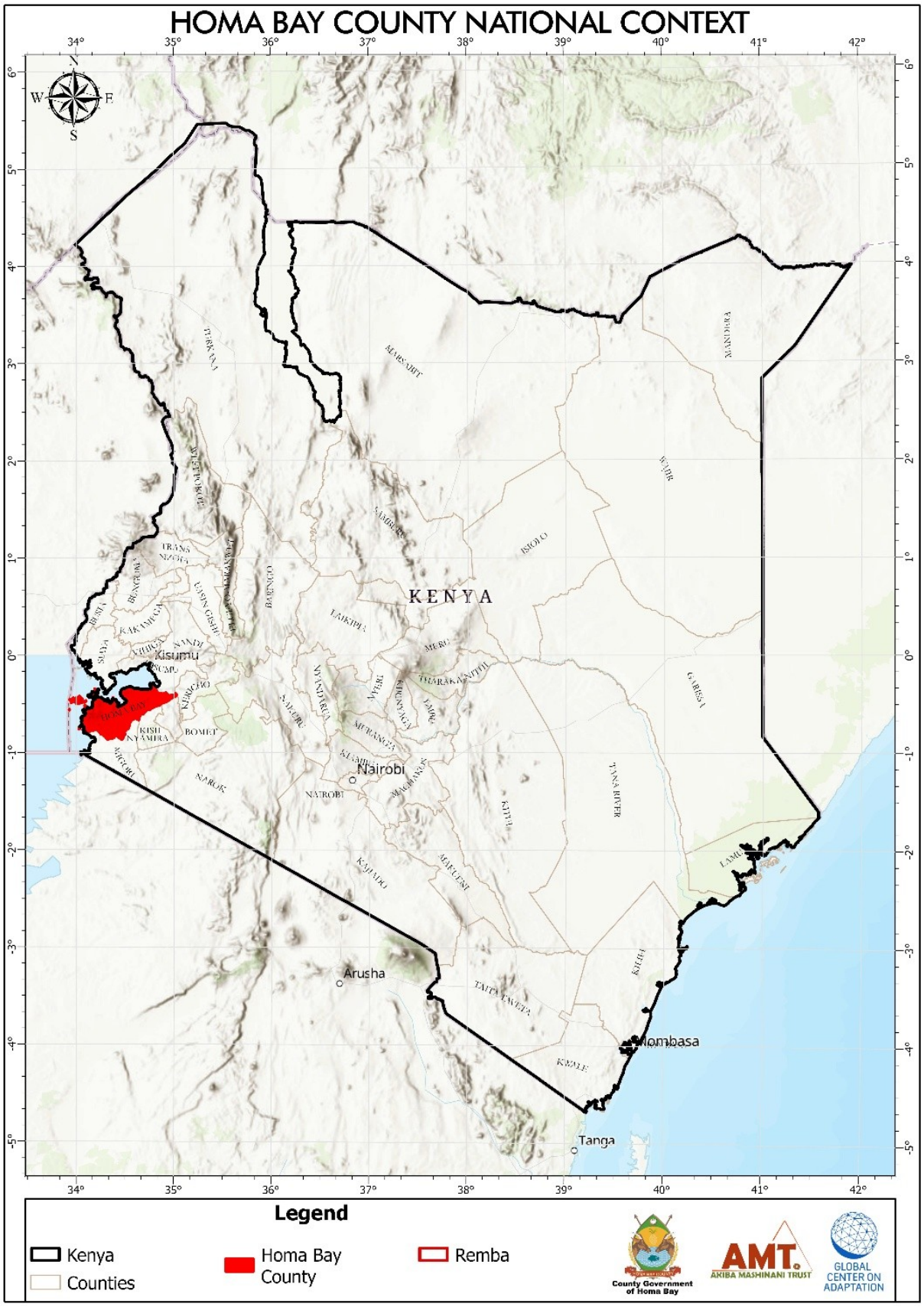
Environmental Pressures and Climate Risks: The report identifies the major environmental and climate-related stresses shaping life on the island: flooding, fluctuating lake levels, waste pollution, deforestation, and declining water quality. These hazards are aggravated by unplanned settlement growth and inadequate waste disposal, which contribute directly to the degradation of the lake ecosystem. The study also highlights the adaptive strategies adopted by households and the BMU, including community-led drainage maintenance, informal flood relocation, and small-scale tree planting—measures that, while limited, demonstrate local resilience in the absence of formal support systems.

By weaving together these thematic areas, the situational analysis provides a comprehensive baseline for understanding Remba Island as a living system, one where human settlement, ecological dynamics, and economic survival are inseparable. This integrated scope

ensures that planning for Remba's future is grounded in the realities of its people, geography, and environment

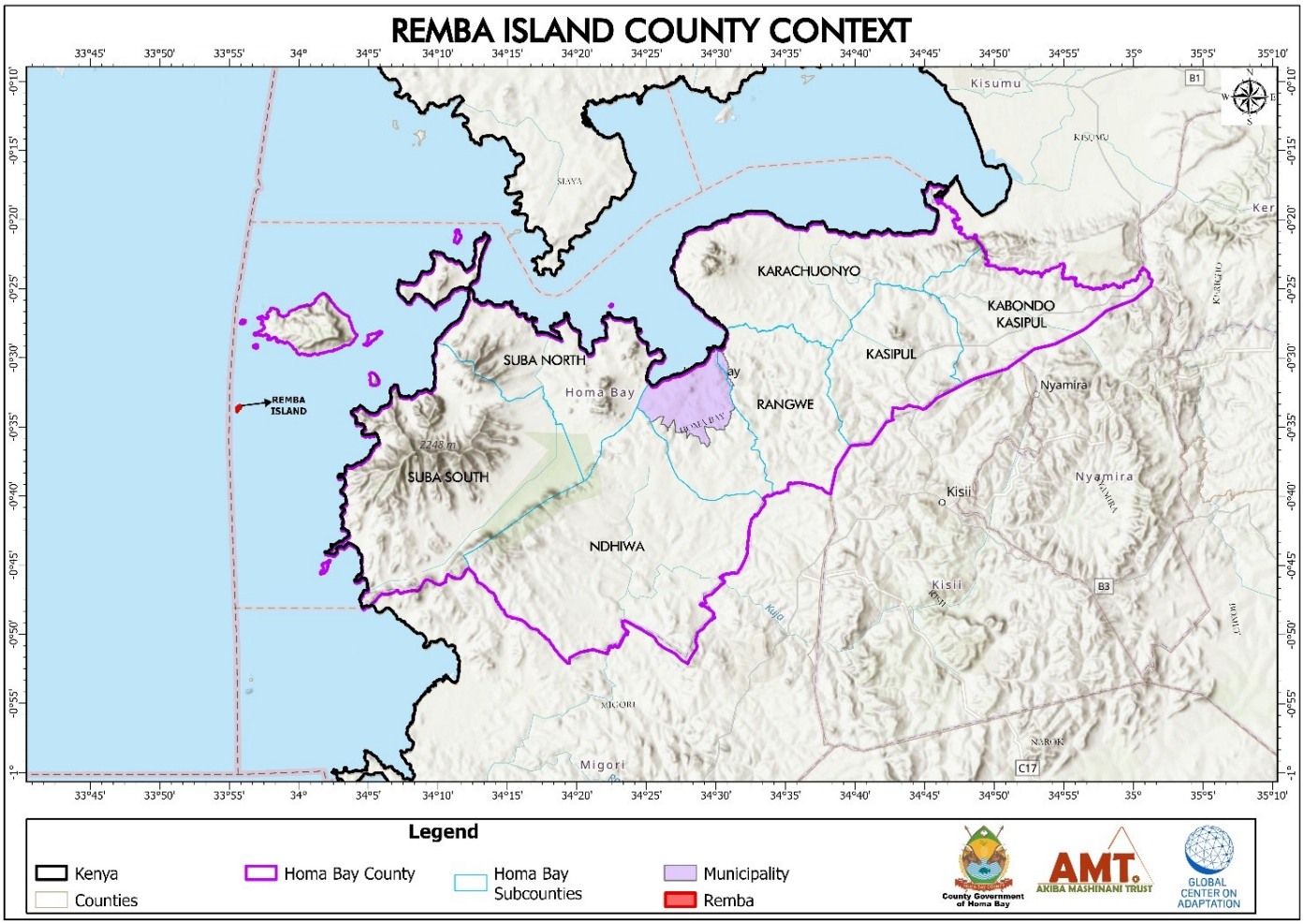
1.4.2 Geographic and Spatial Context

Homa Bay County is located in the western part of Kenya, along the southern shores of Lake Victoria, within the former Nyanza Province. It is one of the counties established under the devolved government system introduced by Kenya's 2010 Constitution, and it plays a key role in the socio-economic and ecological landscape of the Lake Region Economic Bloc (LREB). The county borders Migori, Kisii, Nyamira, Kericho, and Kisumu counties, and is strategically positioned as a hub connecting agricultural highlands and the lake-based economy.



Map 1.1 National Context

Homa Bay County covers an area of approximately 3,154.7 km², with a landscape that includes rolling hills, escarpments, plains, and Lake Victoria's shoreline. The county experiences a tropical climate, with bimodal rainfall and moderate temperatures, making it suitable for both agriculture and fishing. The Ruma National Park, several wetlands, and islands (like Rusinga and Mfangano) contribute to its ecological diversity and tourism potential.

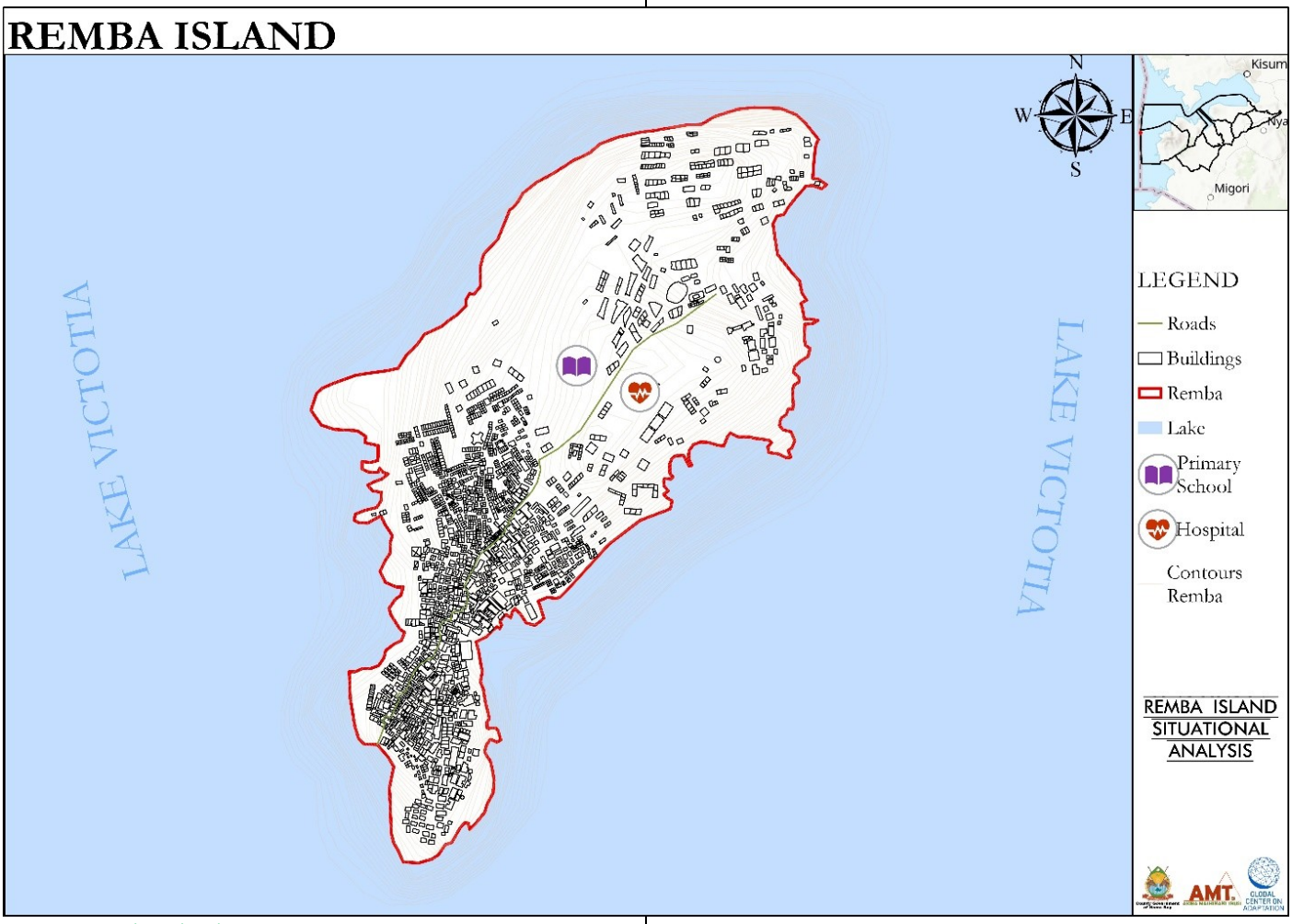


Map 1.2 County Context

Remba Island is situated in Suba North Constituency of Homa Bay County, surrounded entirely by the waters of Lake Victoria. Its land area is small covering an area of 0.22 km^2 and highly constrained, with settlements occupying nearly the entire available space. Unlike many other islands with steeper terrain, Remba's landscape is relatively flat with a gradual rise towards the central plateau. This gentle elevation provides some stability against flooding but offers little room for expansion.

correspond to limited accessibility, steeper slopes, or less desirable land for habitation and trade.

The central corridor between the north and south contains the island's few public service facilities — notably a primary school and a hospital, as indicated on the map. These institutions sit within the less congested interior, possibly chosen for relative safety, open space, and accessibility from multiple directions.



Map 1.3 Remba Island

Most structures are densely clustered along the southern and southeastern shoreline, forming a compact, almost continuous built-up area. This southern concentration marks the core settlement zone, where commercial, residential, and service functions overlap within very limited space. Buildings here are closely packed with minimal open areas, suggesting high population density and intensive land use.

In contrast, the northern and western portions of the island are far more sparsely developed, with buildings scattered in smaller clusters or isolated units. These areas appear to follow the island's slightly elevated terrain and thinner access routes. The reduced density may

1.5 Objectives

1.5.1 General objective

The situational analysis seeks to establish a comprehensive evidence base on the living, environmental, and governance conditions of Remba Island, with the aim of guiding inclusive, sustainable, and climate-resilient upgrading of the settlement. Remba's significance as one of Lake Victoria's most densely inhabited fishing islands makes it a critical site for understanding the intersection of livelihoods, ecology, and informal urbanization in aquatic environments.

1.5.2 Specific Objectives

1. Assess demographic and spatial characteristics- To measure population size, household structure, age and gender distribution, and spatial density across different parts of the island. Remba's population is highly mobile, predominantly male, and heavily concentrated in specific shoreline zones. Quantifying these patterns is essential for planning equitable service provision, managing congestion, and anticipating seasonal population surges linked to the fishing economy.
2. Analyse housing and tenure dynamics- To document housing types, tenancy arrangements, and the implications of insecure or informal land occupation. Nearly all residents live as tenants under informal tenure systems mediated by the Beach Management Unit (BMU). Understanding how housing and land are accessed is vital for addressing vulnerabilities related to overcrowding, eviction risks, and limited investment in durable housing.
3. Evaluate access to basic services and infrastructure-To examine the availability, quality, and spatial distribution of water, sanitation, waste management, energy, transport, and communication facilities. Remba's infrastructure has lagged far behind its rapid growth. Most households depend on untreated lake water, shared sanitation, and off-grid solar energy. A detailed assessment is needed to identify service gaps, public health risks, and priorities for resilient infrastructure upgrading.
4. Investigate socio-economic conditions and livelihoods- To analyse income sources, expenditure patterns, employment structures, and financial vulnerabilities among residents. The island's economy revolves around fishing and related activities such as processing and trade, yet incomes are unstable and seasonally driven. Profiling these dynamics helps to identify entry points for livelihood diversification and strategies for reducing dependence on a single, climate-sensitive resource.
5. Identify environmental pressures and climate-related hazards- To assess the frequency, intensity, and impacts of hazards such as storms, fluctuating lake levels, and waste accumulation. Remba's low-lying terrain and unregulated waste disposal make it acutely vulnerable to flooding and contamination. Understanding these pressures provides the foundation for climate adaptation and ecosystem restoration efforts that safeguard both livelihoods and public health.
6. Document community priorities and coping strategies- To capture local perspectives on needs, aspirations, and adaptive practices that residents already employ in managing risk and scarcity. Remba's residents demonstrate strong informal governance and self-organization through BMU structures. Documenting these practices ensures that interventions build on community strengths and align with lived realities rather than imposing external solutions.
7. Generate evidence-based and climate-responsive recommendations- To synthesize findings into actionable proposals that integrate resilience, equity, and environmental sustainability into future planning and upgrading strategies. Policy and investment decisions for Remba have often been reactive and fragmented. Evidence-driven recommendations will guide county and national authorities—particularly under the Homa Bay County Climate Change Act (2022) and Fisheries Management and Development (Beach Management Units) Regulations (2024)—toward coherent, locally anchored pathways for sustainable island development.

This formulation grounds each objective in Remba's specific ecological, social, and governance realities, turning the situational analysis into a strategic tool for planning, rather than a descriptive exercise.

1.6 Methodology

Approach and Rationale

The analysis adopts a mixed-methods design to capture the complex and interrelated dimensions of life on Remba Island, where livelihoods, housing, and environmental risks are tightly intertwined. Quantitative data were collected through structured household surveys. This was complemented by a spatial enumeration and mapping exercise that recorded every housing unit and delineated settlement cluster, providing the spatial framework for subsequent analysis.

Additionally, it applies LLCA principles adapted from the Mukuru SPA to ensure fishers, traders, landing-beach committees (BMUs), women's groups, youth, elders, and service providers co-create the evidence base. In parallel, it follows the structure and discipline of conventional Kenyan planning processes (surveys, documentation standards, GIS outputs, sectoral syntheses) to produce a clear, verifiable record.

This dual approach ensures the Remba Island profile is:

- Community-centered: Residents, BMUs, and local leadership are embedded in mapping, enumeration, and validation.
- Climate-responsive: Risks linked to lake level variability, intense storms, wave action, shoreline erosion, WASH-related disease, and heat stress are explicitly profiled.
- Data-driven: Primary Island surveys are complemented by fit-for-purpose secondary data

(county, national agencies, fisheries and lake-basin sources).
- Practice-compliant: Methods align with recognized Kenyan planning and documentation norms while remaining non-statutory (profiling, not plan-making).

1.6.1 Data Collection Methods

Data collection blends primary and secondary sources to capture Remba's unique small-island conditions—limited land, high density, fisheries dependence, and lake-borne access.

1.6.1.1 Primary Data Collection

1. Community-Led Data Collection (mapping, numbering, enumeration)

The community-led data collection for Remba Island planning process was designed to integrate participatory mapping, household numbering, and enumeration. This approach ensured that data collection was both community-driven and methodologically rigorous. By involving local residents as enumerators and community researchers, the process not only generated accurate and localized data but also built capacity and ownership among the community members.

To achieve this, a total of 23 enumerators from the local community were engaged in the data collection process. Prior to their fieldwork, the enumerators underwent comprehensive training to equip them with the skills necessary for mapping, household numbering, and conducting surveys. This training was preceded by a strategic meeting between urban planners from Homa Bay County Government and community representatives to agree on a standardized numbering system. This system ensured that each household received a unique identifier, a fundamental step in establishing a structured and verifiable database of residential, commercial, and mixed-use structures within the settlement. The involvement of community members in this exercise was crucial, as research has shown that local mobilizers and co-researchers significantly enhance the reliability and credibility of data collection efforts. This inclusion of local residents in research processes fosters higher community trust, increases response rates, and enhances contextual accuracy (*GCA, 2023*).

Once the training was completed, the enumerators conducted systematic household mapping and numbering, ensuring that each structure within Remba Island was accurately documented. This mapping process provided critical data on the type of structure, its land use (residential, commercial, mixed-use), and its occupancy status (owner-occupied, rented, vacant). The exercise also played an essential role in identifying informal housing units and service gaps, which are often overlooked in conventional urban planning processes. The importance of settlement mapping in informal areas has been widely documented, with studies emphasizing its role in improving service delivery, disaster preparedness, and land tenure security (*GCA, 2022*). By assigning unique household identifiers, the process also ensured traceability and consistency in future surveys, facilitating effective urban planning, infrastructure development, and resource allocation.

Following the household numbering and mapping, enumeration was carried out in collaboration with community research assistants. This involved administering structured questionnaires to every household in collecting data on socio-economic conditions, household demographics, employment patterns, and access to basic services. This step was crucial in capturing both qualitative and quantitative data, providing a comprehensive understanding of the community's needs and vulnerabilities. The importance of household enumeration in urban planning cannot be overstated, as it serves as the foundation for evidence-based decision-making and targeted policy interventions. Systematic enumeration ensures the inclusion of vulnerable populations, enhances the accuracy of service delivery planning, and supports tenure security (*GCA, 2023*). Furthermore, the data collected through enumeration can be used to identify informal workers, women-headed households, and at-risk populations, enabling responsive urban interventions that prioritize the most vulnerable groups.

The success of this methodology was largely attributed to the active participation of the local community. By empowering community members as co-researchers, mappers, and enumerators, the process not only strengthened local capacity in data collection and urban planning but also fostered a sense of ownership and accountability over the planning outcomes. The participatory approach ensured that the collected data was contextually accurate, community-validated, and reflective of local realities, making it a powerful tool for inclusive urban development.

The community-led data collection in Remba demonstrated the effectiveness of locally led climate adaptation strategies and participatory urban planning methodologies. The integration of community mapping, household numbering, and structured enumeration provided a solid evidence base for decision-making, ensuring that future planning efforts are responsive to community needs and aligned with both local and national urban development policies. The success of this approach underscores the importance of engaging local communities in research and planning processes,

reinforcing the principle that sustainable urban development must be driven by the people who live in and understand their settlements best.

2. Infrastructure and Service Mapping

The infrastructure and service mapping process in Homa Bay Municipality, was conducted using geospatial tools, field surveys, and participatory data collection methods to assess the availability, accessibility, and condition of essential services. The mapping covered roads, drainage, water supply, sanitation, and energy access, providing valuable insights into existing infrastructure gaps. Roads were classified based on their type, condition, and connectivity, with an emphasis on identifying unmapped informal access routes that play a crucial role in mobility within the settlement. Drainage mapping focused on stormwater management systems, documenting blocked or poorly maintained channels that contribute to flooding and waterlogging during heavy rains. Additionally, water supply networks were mapped to distinguish between piped connections, boreholes, and community water kiosks, while sanitation assessments detailed the distribution of latrines, shared toilet facilities, and solid waste management practices. Energy access mapping identified grid-connected areas, informal power supply points, and alternative energy sources such as solar, helping to highlight disparities in service provision.

In addition to mapping physical infrastructure, the study also documented the formal and informal service delivery mechanisms that sustain the settlement. Formal service providers included county government agencies responsible for road maintenance, public water utilities, and national electricity suppliers, which offer regulated services but often fail to meet the full demand in low-income areas. Informal service providers, on the other hand, play a crucial role in filling these gaps, with small-scale water vendors, informal waste collectors, and community-led sanitation initiatives emerging as vital alternatives where formal systems are lacking. For example, privately managed public toilets and waste collection services operate on a pay-per-use basis, ensuring basic sanitation access in areas where county-provided services are absent or unreliable. These dynamic highlights the coexistence of both formal and informal service networks, reinforcing the need for urban planning strategies that recognize and integrate community-based solutions into official infrastructure development plans.

The findings from the infrastructure and service mapping exercise underscored the urgent need for targeted investment and policy interventions to enhance service delivery in Shauri Yako. The spatial disparities in access to roads, drainage, and essential utilities highlighted the vulnerability of informal settlements to environmental hazards and socio-economic inequalities. The mapping process also revealed opportunities for strengthening public-private partnerships, upgrading informal service systems, and improving coordination between government authorities and local communities. By incorporating geospatial data and participatory mapping techniques, planners can develop data-driven solutions that address infrastructure deficiencies while ensuring that community priorities are reflected in urban development policies. This approach promotes inclusive, climate-resilient, and sustainable urban growth, ensuring that future planning efforts are informed by both technical expertise and local knowledge.

3. Socio-Economic Profiling

The socio-economic profiling of Remba Island, was conducted through an in-depth analysis of household questionnaires administered to residents. This data collection method will provide valuable insights into income levels, employment trends, informal economic activities, and access to essential social services. By analyzing this information, planners were able to assess economic disparities, identify livelihood challenges, and develop strategies to enhance local economic resilience and social well-being.

The household income and employment patterns was assessed by examining sources of income, employment status, and household expenditure trends. The analysis will distinguish between formal employment, casual labor, self-employment, and subsistence activities, identifying income variations across different socio-economic groups. This information was crucial in understanding economic vulnerabilities, particularly among low-income households and informal workers, and will support the formulation of policies aimed at job creation, skills development, and financial inclusion.

The study will evaluate informal economy and market dynamics, which play a vital role in sustaining livelihoods within the island. The data will capture types of informal businesses, their economic contributions, operational challenges, and regulatory constraints. Understanding these dynamics will help strengthen local markets, improve access to financial services, and create a more inclusive economic environment. Lastly, the availability and accessibility of social services—including education, healthcare, and security—was analyzed to determine service gaps, infrastructure needs, and priority

intervention areas. By integrating these findings into urban planning and policy recommendations, the socio-economic profiling will ensure that future development initiatives are responsive to the needs and realities of the community.

4. Environmental and Land Use Surveys

The collection of primary data on land tenure, land use classification, and environmental degradation in Remba Island, involved a combination of household questionnaires, spatial analysis using ArcGIS, and participatory methods such as focus group discussions (FGDs) and field observations. Household surveys were conducted to gather information on land ownership, tenure security, and land utilization. Structures were updated using google imagery and incorporated into maps. The digitized maps were integrated with data from the mapping and numbering process, ensuring that land use types—residential, commercial, institutional, public spaces, and mixed-use—were accurately represented in GIS. The classification of land uses using ArcGIS enabled planners to analyze land suitability, identify underutilized spaces, and assess the compatibility of existing land uses with urban development goals.

To assess environmental degradation, primary data was collected through focus group discussions (FGDs) with community members and direct field observations. The FGDs engaged residents, local leaders, and environmental stakeholders, allowing them to highlight key environmental challenges such as soil erosion, deforestation, poor drainage, and pollution from unregulated waste disposal. Participants also provided historical perspectives on changing land use patterns and their impact on environmental quality. In addition to discussions, field observations were conducted to document visible signs of environmental degradation, including eroded landscapes, areas with frequent flooding, solid waste accumulation points, and encroachments into riparian zones. This qualitative approach ensured that data collection was grounded in lived community experiences, complementing spatial analysis by providing real-time evidence of environmental vulnerabilities. By integrating FGD insights with GIS-based mapping, the study ensured that land use planning and environmental interventions were responsive to community-identified concerns and spatially verifiable data.

1.6.1.2 Secondary Data Collection

Existing data from government agencies, academic institutions, and development partners will supplement primary findings. Sources include:

1. National and County Government Records

A key source of secondary data was county government records, including the Homa Bay County Integrated Development Plan (CIDP), which outlines development priorities, socio-economic indicators, and strategic interventions across various sectors. Additionally, sectoral reports from different county departments provided technical assessments on land use, infrastructure, environment, and socio-economic conditions. Previous urban plans and spatial frameworks were also reviewed to understand past planning efforts, their implementation challenges, and areas requiring revision.

Demographic and Socio-Economic Context: Baseline indicators from the 2019 Kenya Population and Housing Census and Kenya Integrated Household Budget Survey (2015/16) provide reference points for population structure, income, and expenditure patterns. However, these datasets were downscaled to reflect Remba's uniquely dense, transient, and fishing-dependent population, which diverges sharply from mainland averages. National planning frameworks such as Kenya Vision 2030 and the Kenya Economic Survey (KNBS, 2023) guided interpretation of economic diversification, while the Kenya Institute for Public Policy Research and Analysis (KIPPRA) provided insights on inclusive blue economy strategies.

Land Use, Housing, and Spatial Planning: Analysis of settlement patterns was framed by the Physical and Land Use Planning Act (2019), the National Land Use Policy (2017), and the County Spatial Planning Guidelines (2018), which establish principles for orderly development, tenure governance, and riparian protection. These instruments help classify Remba's land use—residential, commercial, fish-processing, and institutional—within a constrained geography characterized by informal occupation and limited open space.

Environmental and Climate Data: Environmental risk profiling drew on data from NEMA, the Kenya Meteorological Department, and the National Disaster Management Authority (NDMA), aligning with the Climate Change Act (2016) and the National Climate Change Response Strategy (2018). The analysis focused on localized hazards—storms, shoreline erosion, and flooding—exacerbated by waste accumulation and deforestation. The Locally Led Climate Action Programme

(LLCAP, 2023) and Homa Bay County Climate Change Act (2022) provided frameworks for community-based resilience building on the island.

Fisheries and Blue Economy: Given Remba's dependence on fishing, data from the Fisheries Management and Development Act (2016) and its subsidiary Beach Management Units Regulations (Legal Notice No. 121 of 2024) were central in examining governance, catch monitoring, and co-management arrangements. These sources clarify how local BMUs regulate access, ensure compliance, and sustain livelihoods within Kenya's broader Blue Economy Strategy (2022–2032).

Public Health, Education, and Social Services: Health and education data were referenced from the Kenya Health Information System (KHIS), the Universal Health Coverage Policy (2020), and the Basic Education Act (2013). These sources contextualize Remba's limited-service reach, emphasizing the logistical and financial constraints of providing essential services in remote island environments.

Governance and Urban Development: Institutional analysis was guided by the County Governments Act (2012) and the Urban Areas and Cities Act (2011), which outline devolved mandates for planning and service delivery. Remba's governance landscape—anchored by the BMU and local committees—reflects the spirit of participatory management envisioned under Kenya's Devolution Policy (2013) and reinforced by reports from the Council of Governors (2023) on inclusive service delivery for special settlements.

1.6.2 Data Analysis and Synthesis

The data collected in Remba Island, was analyzed using a combination of quantitative and qualitative techniques to ensure a comprehensive and evidence-based understanding of urban planning challenges, climate risks, and socio-economic conditions. This mixed-methods approach integrated spatial analysis, statistical modeling, and sectoral SWOT analysis, allowing for informed decision-making and targeted policy interventions. Each analytical method will provide unique insights into settlement patterns, infrastructure needs, environmental vulnerabilities, and community resilience, forming the foundation for sustainable urban development and adaptation planning.

The spatial analysis was conducted using Geographic Information Systems (GIS) and remote sensing techniques to map land use patterns, and service accessibility gaps. Through this process, planners were able to evaluate infrastructure distribution, and pinpoint environmental risks such as flood-prone areas and land degradation. The use of GIS-based land suitability assessments ensured that the classification of land uses—residential, commercial, institutional, and mixed-use—reflects actual settlement trends and policy guidelines.

To complement spatial mapping, statistical analysis was employed to process quantitative socio-economic data, using software such as Excel and SPSS. This analysis focused on income distribution, employment patterns, access to essential services, and demographic trends, providing a numerical basis for understanding economic inequalities and service provision disparities. Additionally, trend forecasting was conducted to assess urbanization pressures and future infrastructure needs, ensuring that the island is prepared for demographic shifts and resource demands in the coming years.

A sectoral Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis was conducted across multiple planning sectors to identify key policy gaps, investment opportunities, and structural challenges. The analysis will cover water, irrigation, sanitation, energy, environment, forestry, and climate change, focusing on access to clean water, sustainable energy solutions, and environmental conservation strategies. It will also assess agriculture, livestock, fisheries, the blue economy, mining, digital infrastructure, and cooperatives, examining food security, rural livelihoods, and technological advancements in economic development. The trade, industry, tourism, and marketing sector was analyzed to determine market access challenges, industrial growth prospects, and opportunities for tourism-driven economic expansion. Furthermore, the study will examine land use planning, housing, and urban development, highlighting issues such as informal settlements, land tenure security, and housing affordability. Public service sectors, including public health and medical services, was reviewed to assess healthcare accessibility and disease burden trends, while education, human capital development, and vocational training was analyzed to identify skills gaps and workforce preparedness levels.

By employing spatial analysis, statistical modeling and a sectoral SWOT analysis, this methodology ensures that urban planning and adaptation strategies in Homa Bay Municipality are data-driven, inclusive, and sustainable. The integration of GIS mapping, demographic trends, and sectoral performance assessments will provide a solid foundation for evidence-based policy formulation, ensuring that urban development efforts align with

national planning frameworks while addressing the unique needs of local communities.

1.6.3 Data Validation and Stakeholder Engagement

The process of collecting, validating, and analyzing data on Remba Island faced a number of challenges that had the potential to affect both the accuracy and the comprehensiveness of the profiling exercise. Unlike larger urban centers, the island's small size, isolation, and reliance on a fisheries-driven economy meant that available secondary data was scarce, while official county records often did not capture the unique realities of such a dense and transient settlement.

One of the key limitations was the presence of data gaps in county records, particularly relating to climate risks, environmental degradation, and socio-economic indicators specific to the island. These gaps were mitigated by relying heavily on community-sourced data. Participatory mapping, focus group discussions, and household enumeration provided localized insights and helped identify shoreline erosion points, waste accumulation zones, and other environmental stress areas. Together, these approaches ensured that the profile remained grounded in local realities even when government datasets were limited.

Stakeholder coordination also presented challenges. Given the geographical remoteness of Remba, aligning communication between community structures, beach management units, and county departments required deliberate effort. To address this, county focal points and BMU leaders were identified to act as communication bridges, helping to streamline information flow and ensure that findings were validated collectively.

Table 1 Limitations and Mitigation Strategies

Challenge	Mitigation Strategy
Data gaps in county records	Use community-sourced data and remote sensing to fill gaps
Stakeholder coordination challenges	Strengthen communication through county focal points and BMU leadership
Resource constraints for field surveys	Leverage partnerships with universities and NGOs
Limited GIS skills among community mappers	Provide training and mentorship

Resource constraints further limited the scope of fieldwork, as extended survey exercises are costly to conduct on a remote island with limited infrastructure. To mitigate this, the profiling process leveraged partnerships with local universities, NGOs, and technical experts who provided both human and technical resources.

Another challenge involved limited GIS and digital mapping skills among community participants. While community members were central to the mapping and enumeration process, many required technical support to handle spatial data effectively. To overcome this barrier, training sessions and hands-on mentorship were provided, equipping local enumerators and BMU members with practical skills in mapping and data recording. This not only improved the quality of the data collected but also built local capacity for future exercises.

These mitigation strategies ensured that, despite the challenges, the Remba Island profiling remained robust, credible, and inclusive, capturing both the physical and socio-economic dimensions of life on the island.

Preliminary results were validated through a community feedback meeting, which brought together community residents, county government representatives, and local leadership through the Beach Management Unit. The session provided an opportunity for residents to review the data, identify gaps, and contribute additional information. It also enabled participants to develop a clearer understanding of their current situation, strengthening both the accuracy and legitimacy of the analysis.

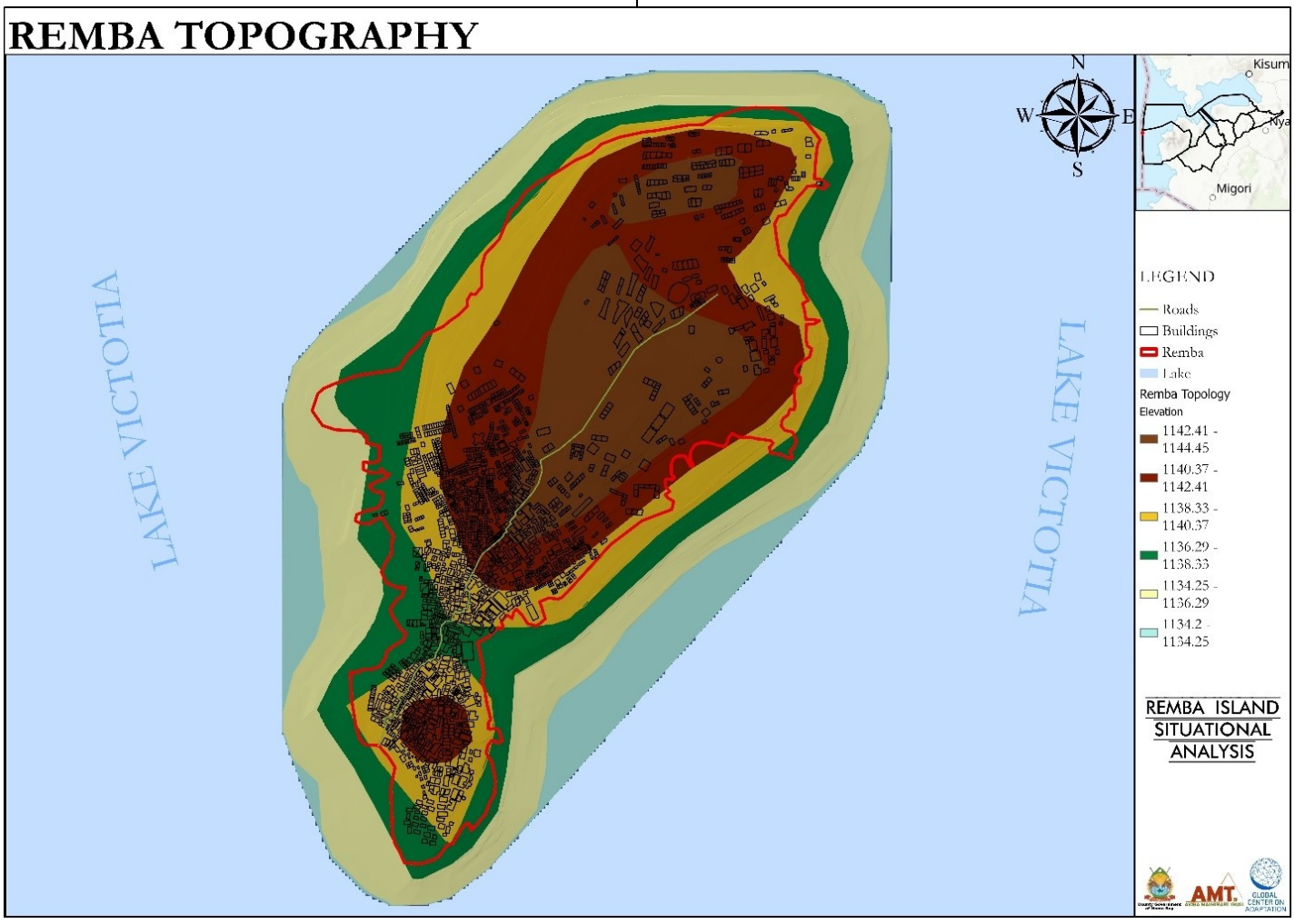
2 PHYSICAL ENVIRONMENT

2.1 Topography

Elevation and Terrain Features

The Digital Elevation Model (DEM) of Remba Island, illustrated in the topographical map, shows elevations ranging from approximately 1,134.2 meters to 1,144.45 meters above sea level. This variation creates three distinct terrain zones—lowland, midland, and highland—each with unique implications for settlement, development, and environmental management.

The lowland zones, represented in light blue and yellow along the lakefront, lie at the lowest elevations. Their proximity to Lake Victoria makes them highly vulnerable to flooding and waterlogging, particularly during the long rainy season. Community feedback highlight that these areas have experienced more frequent flooding in recent years, often affecting the densely packed informal settlements visible in these low-lying sections of the island.



Map 2.1: Topography

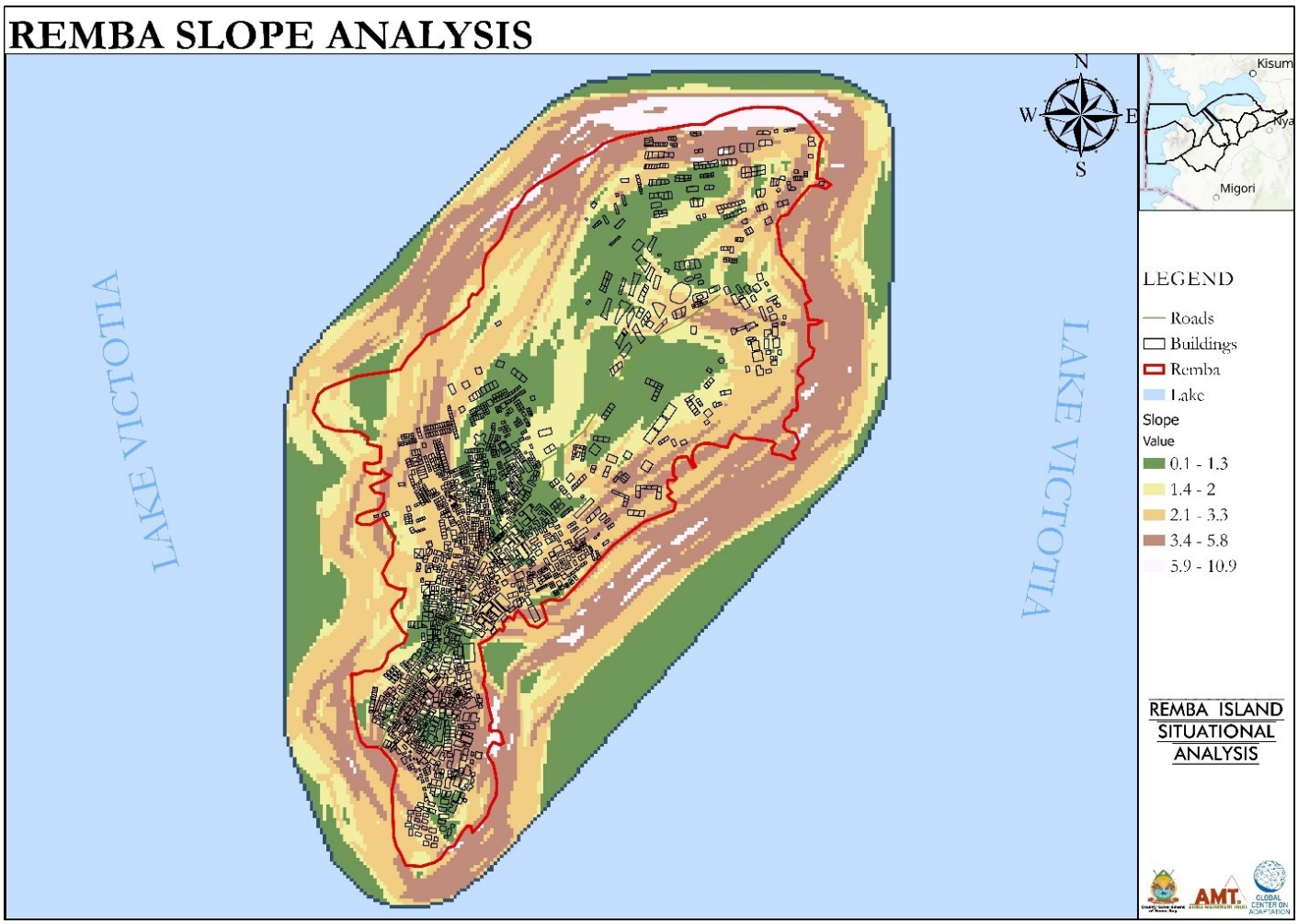
The midland zones, shown in green through orange, cover much of the island's central sections. These areas experience fewer flood events but are prone to soil erosion on moderate slopes. Validation meetings note that midland terrain offers more stable ground for planned urban growth, making it the most suitable zone for structured expansion and infrastructure development.

In contrast, the highland zones, shown in dark brown and maroon, are located in the eastern and southern parts of the island. These areas form relatively level plateaus with only a gentle rise above the surrounding midland terrain. While they are less exposed to flooding, they still face challenges such as gradual soil degradation and reduced vegetation cover. Community feedback highlights

concern over erosion and the need for improved road infrastructure, though the risk of landslides is considerably lower than in steeper landscapes.

Together, these elevation bands reveal how Remba Island's topography directly shapes patterns of settlement, disaster risk, and opportunities for sustainable land use planning.

Slope Analysis



Map 2.2 Slope Analysis

The slope analysis of Remba Island reveals that most human settlement and infrastructure are concentrated in the central and southern zones, where slopes range between 0–2%. These flatter areas provide favourable conditions for dense urban cores, explaining the clustering of buildings and the alignment of most road networks within these gentler gradients. As the slopes increase toward the island's periphery, particularly in the 5–10% range, settlement becomes more scattered, and the terrain presents greater challenges for development. The steepest slopes, concentrated mainly along the island's edges, remain less occupied but are highly vulnerable to erosion and instability.

Table 2 Slope Gradient Categories

Slope Category (% rise)	Map Observation on Remba	Land Use Suitability	Planning Implications
0–2% (green)	Found in the central core and southern tip, where most buildings are clustered	Ideal for all development types	Prioritize urban expansion, roads, and services here
2.1–5% (yellow)	Extensive in suburban spread around the dense core	Suitable for most developments	Requires stormwater drainage and moderate grading

	and into mid-island		
5.1–8% (orange-brown)	Appears as bands around the mid-outer slopes	Suitable with engineering controls	Introduce erosion control, retaining walls for housing expansion
8.1–15% (light brown patches)	Scattered mainly near the island edges	Marginal for dense development	Limit construction, promote green buffers and conservation
15.1–25% (dark brown strips)	Narrow areas at steep margins	Unsuitable for most development	Restrict heavy use; consider reforestation, soil stabilization
>25% (not dominant in map)	Very rare, if at all, on Remba	Prohibit development	Protect for conservation and minimize disturbance

The flatter central and southern zones offer the most suitable land for urban expansion, social amenities, and infrastructure investment. These areas should be prioritized for future growth since they allow efficient construction with minimal earthworks. Infrastructure such as roads and utilities should be strategically aligned within the 0–5% slope zones to reduce construction costs and minimize maintenance challenges. However, as urban pressures push into areas with slopes above 5%, engineering interventions such as slope stabilization, erosion control, and well-planned drainage systems will become necessary to safeguard settlements. Beyond 8% slopes, especially along the coastal margins, land should be reserved for conservation, vegetation buffers, and climate resilience measures to protect against shoreline erosion from Lake Victoria. Slopes above 15% are unsuitable for settlement and should be strictly regulated for low-impact uses such as eco-tourism, reforestation, or community conservation initiatives.

While Remba Island's current settlement pattern is well-aligned with the gentlest slopes, careful planning is required to direct future growth toward stable zones, introduce engineering controls in moderate slopes, and preserve steep peripheries for environmental protection and sustainable land use.

2.2 Hydrology and drainage

Surface Water Resources

Remba Island is heavily reliant on surface water from Lake Victoria, which provides the main source for drinking, cooking, sanitation, and fishing—activities that form the foundation of both daily life and the local economy. The lake's extensive shoreline, inlets, wetlands, and shallow bays create a complex hydrological system that sustains biodiversity and livelihoods. However, despite this natural abundance, the quality of water has been steadily declining due to nutrient loading, sedimentation, and pollution resulting from human activities such as waste disposal and runoff from the settlements.

On the island itself, the growing population and limited sanitation infrastructure intensify these risks. Many pit latrines are poorly constructed and often located close to water points, creating direct pathways for contamination. The field survey has identified surface water contamination with 28.16% of households dumping solid waste and 28.93% disposing toilet waste into the lake. This is a critical challenge, worsened by inadequate spatial planning and the rising demand for freshwater. Remba Island lacks such infrastructure and remains dependent on untreated lake water for drinking (13.11%). This situation reflects a disparity between the abundance of water in terms of quantity and its declining safety in terms of quality.

The implications of this dependence are far-reaching. Continued reliance on contaminated surface water increases the risk of waterborne diseases, affecting 54.57% of households, such as cholera, typhoid, and dysentery. Degradation of water quality also undermines the sustainability of fishing, the island's economic lifeline, as polluted waters reduce fish breeding capacity. Over the long term, the combined effects of declining health, environmental stress, and reduced economic opportunities may weaken the viability of human settlement on the island altogether.

Addressing these challenges requires strategic interventions that balance immediate health concerns with long-term sustainability. Community-level water treatment systems, such as affordable filtration or chlorination, could provide safer household water use. Improving sanitation facilities through the replacement of poorly sited pit latrines with eco-friendly or raised alternatives would reduce contamination risks, while the establishment of buffer zones and vegetation cover around water points would help filter runoff. Strengthening spatial planning and local by-laws to regulate settlement expansion and sanitation siting is equally critical. Finally, awareness campaigns aimed at improving water handling and hygiene practices can empower residents to take preventive measures, reducing

health risks and contributing to the resilience of the island's water resources.

Drainage Systems and Flood Risk Areas

Remba Island relies almost entirely on its natural drainage system to manage surface runoff and reduce flood risks, yet the absence of formal drainage infrastructure means that flooding remains a persistent challenge. A household survey conducted in 2025 revealed that 23 percent of households had been directly affected by flooding, while nearly half, at 47 percent, reported being impacted by rising lake water levels.

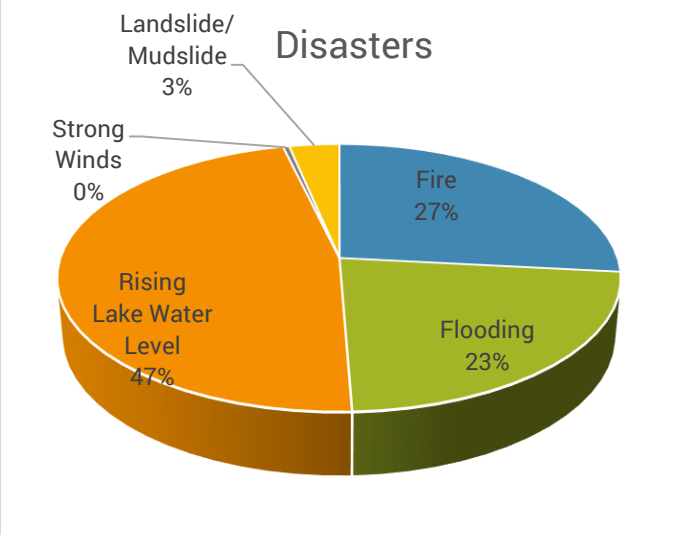


Figure 1 Disasters Facing Remba

The problem is most severe during the long rains between March and May and the short rains between October and December, when recurrent inundation disrupts community life. Several factors contribute to this flooding, including poor soil permeability, blocked natural drainage channels, encroachment into riparian areas, and unplanned development that restricts the natural flow of water. The effects of climate change have further exacerbated these risks by intensifying rainfall events, reducing permeable surfaces, and encouraging the expansion of informal settlements into vulnerable zones.

Landslides and mudslides are relatively rare phenomena on Remba Island, with only about 3% of community respondents reporting any experience of such events. According to local accounts, these incidents occurred primarily during the early stages of the island's settlement, when vegetation cover was sparse and soil disturbance was high due to initial construction and land clearing. Over time, as the community stabilized and vegetation gradually re-established, the frequency of such slope failures declined significantly.

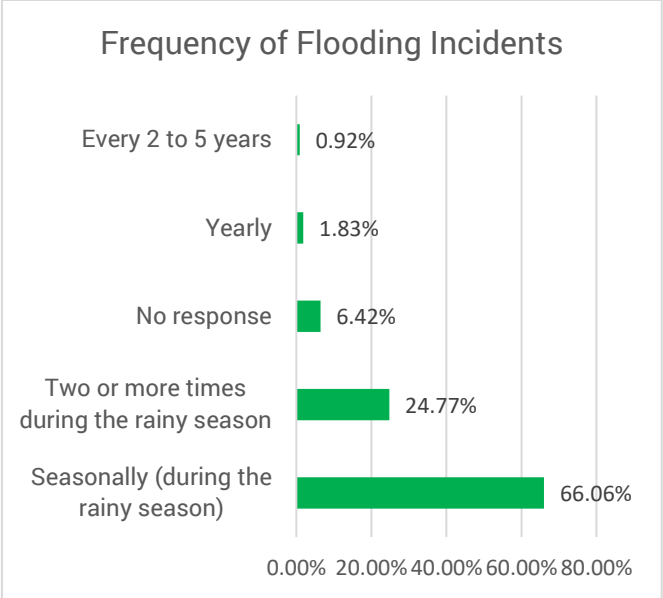


Figure 2 Frequency of Flooding

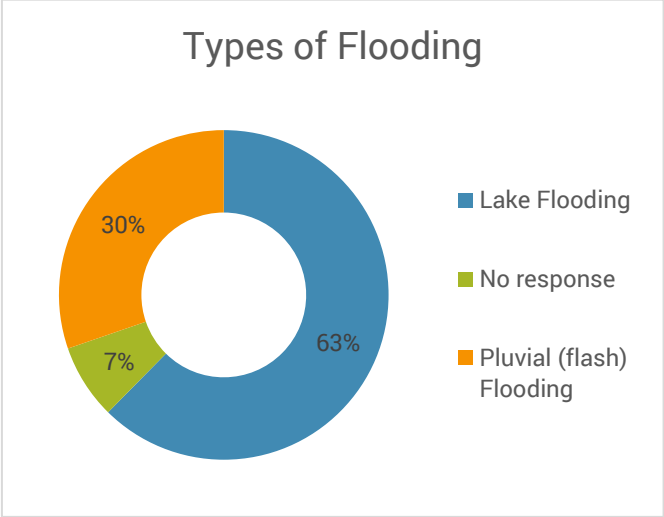


Figure 3 Types of Flooding

The data collected underscores the dominance of lake flooding, which accounts for 63 percent of flood cases on the island. This occurs when water from Lake Victoria overflows into residential areas, making the community highly vulnerable given its close proximity to the lake and the lack of shoreline protection measures. Pluvial or flash flooding, caused by short bursts of intense rainfall, is the second most common type, affecting 29 percent of households and highlighting the island's limited drainage capacity to absorb heavy rains.

Floods damage infrastructure, displace residents, destroy crops, and increase the spread of waterborne diseases, especially in areas with inadequate sanitation.

Households reported that floods caused damage to buildings and dwellings (48.06%), loss of property (28.68%) and displacement (15.50%).

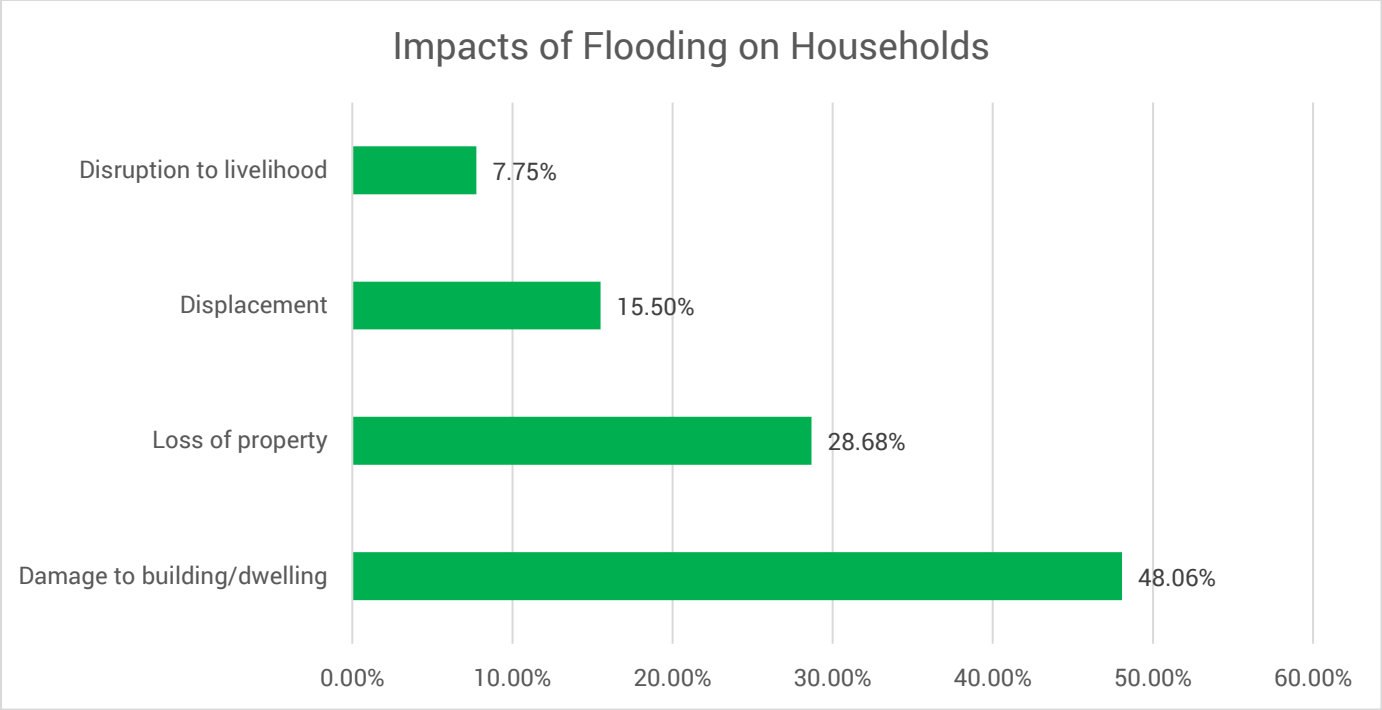


Figure 4 Impacts of Flooding

Relocation has become a recurrent coping strategy, with 28.44 percent of households moving temporarily every rainy season and a further 22.94 percent relocating permanently to safer areas. Smaller proportions relocate every other rainy season, while only 15.60 percent have never been forced to move due to flooding.

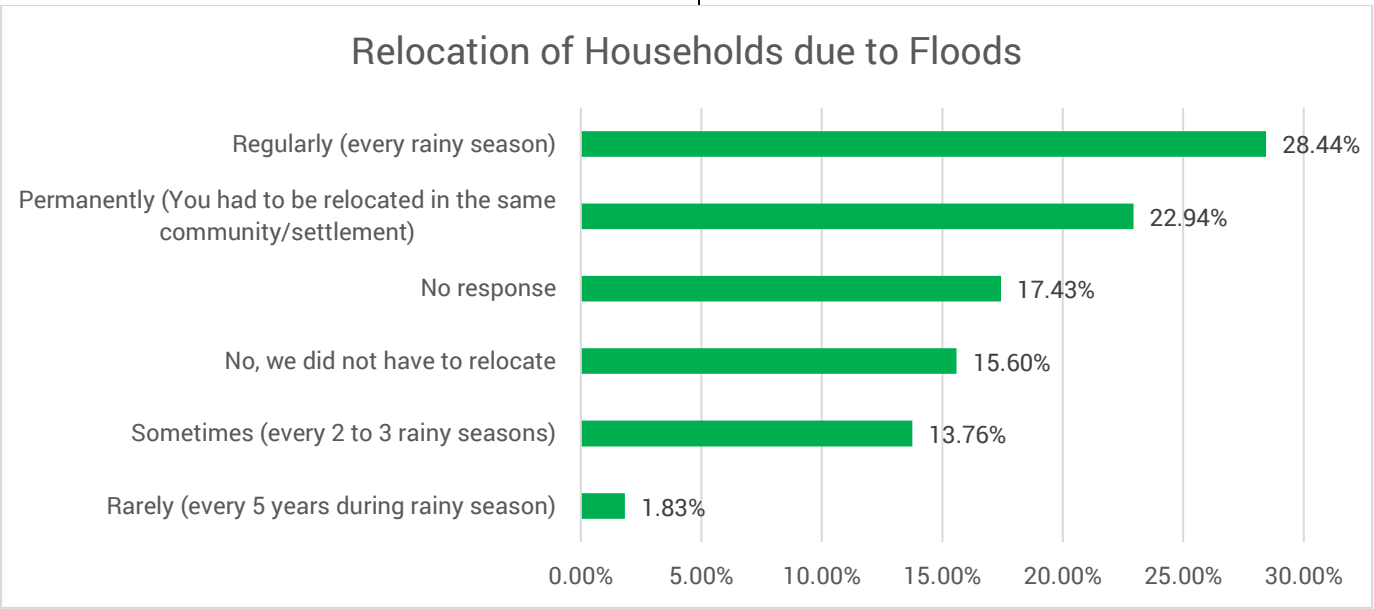


Figure 5 Relocation Due to Floods

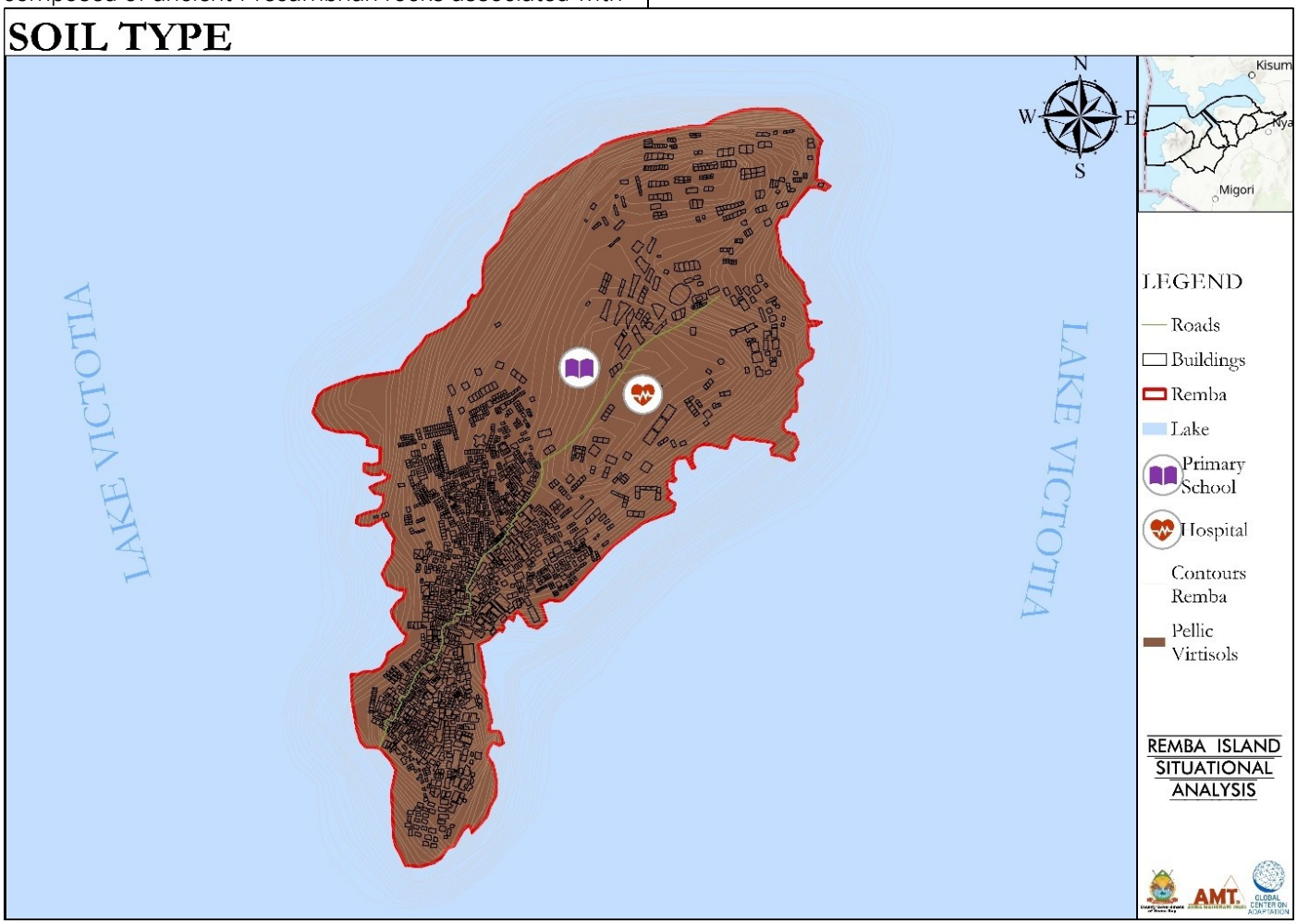
Such frequent displacement not only disrupts livelihoods but also undermines community stability and social cohesion, leaving residents in a cycle of vulnerability. The consequences extend beyond physical damage, as floods destroy crops, damage infrastructure, and increase the transmission of waterborne diseases in areas already struggling with inadequate sanitation. Comparatively, while flooding is a challenge for many settlements around Lake Victoria, the unique geographic and infrastructural vulnerabilities of Remba make its risks disproportionately severe.

The Rapid Climate Risk Assessment recommends integrated flood management approaches to address these challenges. Improved maintenance of natural drainage systems and the construction of stormwater infrastructure would provide essential short-term relief. In the long term, nature-based solutions such as wetland restoration could enhance water absorption and reduce surface runoff. Equally important is the incorporation of flood risk mapping and early warning systems into municipal planning, coupled with community awareness initiatives that empower residents to prepare and respond

effectively. By combining structural interventions with community-led strategies, Remba Island can build greater resilience to recurrent flooding while safeguarding both livelihoods and ecosystems.

2.3 Geology and soil characteristics

Remba Island, located within Homa Bay County in Lake Victoria, exhibits geological formations primarily composed of ancient Precambrian rocks associated with the Basement System. These formations consist mainly of granites, gneisses, and schists, which have undergone extensive weathering over time. The island's undulating terrain and exposure to intense rainfall and surface runoff have contributed to the development of shallow, well-drained soils in most areas, interspersed with rocky outcrops. The combination of these geological processes and topographic variation gives rise to distinct soil profiles that influence land use, vegetation cover, and settlement distribution.



Map 2.3: Soil Type

Soil Types and Land Suitability

The dominant soil type on Remba Island is the pellic virtisols, characterized by dark clayey textures, high base saturation, and strong shrink-swell properties. These soils are typically heavy and plastic when wet but form deep cracks during dry periods. Their high clay content allows them to retain moisture effectively, which can be advantageous for certain crops, particularly those tolerant to waterlogging. However, the same properties make them difficult to till and prone to drainage challenges, especially on flat or poorly sloped areas.

Key characteristics and implications include:

- **Fertility**: Vertisols are generally fertile due to a high clay content and mineral reserves. However, their agricultural potential on Remba is constrained by the shallow soil depth overlying hard igneous rock, limited land availability, and the dominance of fishing as the primary livelihood.
- **Workability**: These soils are difficult to manage. In wet conditions, they become sticky and poorly drained, hampering cultivation and construction. In dry periods, they harden and crack, posing challenges for infrastructure stability.
- **Drainage**: Poor internal drainage increases susceptibility to **waterlogging** in flat coastal zones, particularly after heavy rains. This contributes to localized flooding and standing water, which can exacerbate health risks.

- Erosion and degradation: On slopes, the combination of clay soils and deforested land cover accelerates erosion, especially where paths and informal housing disturb the surface.

2.4 Climate

Remba Island experiences a distinct but moderated tropical climate shaped by the vast lake around it. Its climatic patterns are broadly similar to those of nearby islands such as Ringiti and Mfangano, though its small size and exposure to open water give it subtle microclimatic differences. The following synthesis draws from regional meteorological data (primarily from Homa Bay and the Lake Victoria basin) and community observations to describe the island's temperature, rainfall, wind, and climate change dynamics.

2.4.1 Temperature Trends and Seasonal Variations

The temperature on Remba Island is typically warm and stable throughout the year, moderated by the influence of Lake Victoria. Mean daily temperatures range between 20°C and 23°C, with daytime highs commonly reaching 28–30°C during the warmer months of February and March, and dipping slightly to around 26–27°C in the cooler months between June and August (Weather and Climate, 2024). Nighttime temperatures usually remain mild, often between 14°C and 16°C, which makes extreme cold events almost unknown on the island (Weather2Visit, 2024).

The annual temperature variation is small—typically only about three to four degrees between the hottest and coolest months—because the lake acts as a giant thermal regulator. This stability supports consistent living and agricultural conditions year-round, though the warmth and humidity can intensify during prolonged calm periods.

In terms of long-term trends, Remba's temperatures are gradually rising, consistent with broader regional patterns documented across western Kenya. The Kenya Meteorological Department (2023) notes an increase in mean annual temperatures and a reduction in the number of cool nights across the Lake Victoria basin. These changes may be more noticeable in recent decades as built-up surfaces and vegetation loss locally amplify heat retention. The community on Remba has also observed warmer nights and longer hot spells, subtle but important indicators of climate change at the local scale.

2.4.2 Rainfall Patterns and Distribution

Rainfall is the defining climatic feature of Remba Island, driving everything from vegetation growth to soil stability and freshwater availability. The island follows a bimodal rainfall pattern typical of the Lake Victoria basin, characterized by two distinct rainy seasons. The long rains occur between March and May, peaking in April when monthly totals can exceed 200 mm, while the short rains arrive between October and December, often delivering between 100 mm and 150 mm per month. The driest months are usually July and February, though even these months still receive light showers.

On average, Remba Island receives about 1,300 to 1,400 mm of rain annually (Weather Atlas, 2024). Rainfall is rarely absent for long, as the lake's influence promotes frequent convective showers and thunderstorms. However, year-to-year variability is high—some seasons bring heavy, sustained rainfall that can saturate the soils, while others are marked by irregular or delayed rains. The lake effect can also create local contrasts: storms may form over open water and release intense rainfall over the island while leaving nearby mainland areas relatively dry.

Community members have noted that heavy rainfall events are often concentrated in short bursts, producing intense surface runoff and occasional flash flooding in low-lying parts of the island. However, with improved vegetation cover and drainage management, these impacts have been reduced in recent years. Overall, Remba's rainfall regime ensures generally lush vegetation but also demands careful land management to prevent erosion and maintain slope stability.

2.4.3 Wind and Air Quality

Wind patterns around Remba Island are shaped by the daily temperature differences between land and lake, creating alternating land and lake breezes. During the day, cooler air from the lake moves inland, providing steady ventilation that moderates temperature and humidity. At night, the flow reverses, with gentle offshore winds. Average wind speeds across the year are moderate, generally ranging between 6 and 8 km/h (Weather Atlas, 2024). Although the island occasionally experiences strong gusts during thunderstorms, prolonged high winds are rare.

These breezes contribute significantly to maintaining good air quality. The island's isolation from major industrial or vehicular pollution sources ensures that the air remains clean for most of the year. Any degradation in air quality typically results from local human activities, such as open burning, cooking fires, or dust raised during dry spells and construction. Community members recall that dust and haze were more common during the early

settlement period when vegetation cover was sparse, but as the island has become greener, air clarity and freshness have noticeably improved. The interplay between moderate winds and lake humidity creates a generally comfortable microclimate that supports both habitation and ecological balance.

2.4.4 Climate Variability and Indicators

Remba Island exhibits early signs of the wider climate shifts affecting western Kenya and the Lake Victoria basin. Residents have observed subtle but cumulative changes—slightly warmer nights, more erratic rainfall patterns, and longer dry intervals between rainy periods. These observations align with regional climate analyses by the Kenya Meteorological Department (2023), which highlight rising mean temperatures, increased rainfall variability, and a greater frequency of extreme weather events across the country.

One of the clearest indicators of climate change in Remba's setting is the changing rhythm of the rainy seasons. Communities report that rains sometimes arrive later than expected or end abruptly, reducing the reliability of traditional planting calendars. Intense rainfall episodes have also become more common, producing rapid surface runoff that challenges drainage systems and erodes shorelines. The stabilization of vegetation and soil has helped buffer against landslides—once reported during early settlement—but the underlying climatic drivers of erosion risk remain active.

At the same time, lake-level fluctuations have become more pronounced, with occasional high-water periods inundating parts of the shoreline and low levels exposing previously submerged areas. These oscillations, influenced by regional rainfall and temperature patterns, illustrate how climate variability propagates through the lake system. Taken together, these shifts signal that Remba's climate is slowly but perceptibly evolving toward higher temperatures, less predictable rainfall, and more frequent short-term extremes—patterns consistent with global climate change.

2.5 Environmental Conservation and Sustainability Measures

Environmental conservation and sustainability practices on Remba Island remain limited, reflecting both the island's rapid and unplanned settlement history and the everyday survival pressures faced by its residents. As one of the most densely populated islands in Lake Victoria, Remba has grown organically over time, with little formal planning or enforcement of environmental regulations. The combination of high population density, limited space, and dependence on natural resources has placed immense strain on the island's fragile ecosystem.

Vegetation cover on Remba is sparse, largely due to continuous land clearing for housing, small-scale cultivation, and firewood collection. Much of the original vegetation was removed during the early years of settlement, leaving bare soils vulnerable to erosion, especially during the heavy rains that characterize the long rainy season. Without sustained reforestation or soil stabilization initiatives, the land continues to degrade gradually, and the natural capacity of vegetation to anchor soil and moderate runoff has been weakened. Community members recall that the few landslides and mudslides that occurred in the island's early years were directly linked to this widespread clearing and lack of vegetation.

Waste management poses another significant environmental challenge. There are no organized systems for solid waste collection or sewage disposal on the island. Household and fishing-related waste—particularly plastic materials, discarded fishing gear, and organic refuse—often ends up in open spaces or directly in the lake. This not only pollutes the local environment but also contributes to water contamination, affecting both the island's inhabitants and the broader Lake Victoria ecosystem. The proximity of settlements to the shoreline exacerbates this issue, as waste and runoff easily enter the water during heavy rainfall events.

Fishing, the main livelihood for most residents, is carried out with minimal regard for long-term sustainability. Overfishing and the use of illegal fishing gear have been reported in the surrounding waters, reducing fish stocks and disrupting aquatic biodiversity. The absence of enforcement mechanisms or community-led resource management systems has allowed unsustainable practices to persist. Moreover, the reliance on wood for cooking fuel continues to drive deforestation, creating a feedback loop where environmental degradation further limits the island's resilience to climate stressors.

Efforts to promote environmental awareness or conservation are sporadic and largely driven by external organizations rather than local initiatives. While some NGOs and county programs have attempted to introduce waste management or tree planting projects, these efforts often falter due to limited community ownership, lack of coordination, and scarce resources. The Homa Bay County Climate Change Act (2022) outlines a framework for local adaptation and resilience-building, but its implementation on small, remote islands like Remba remains minimal.

In essence, Remba Island faces a classic sustainability dilemma: immediate livelihood needs take precedence over long-term environmental management. The island's environmental challenges are visible and pressing—deforestation, waste pollution, shoreline erosion, and

declining fisheries—but without coordinated interventions and community-driven stewardship, these problems risk deepening. Addressing them will require not only technical solutions but also the cultivation of local environmental consciousness and institutional support to embed conservation into daily life.

Deforestation and Land Use Change

Deforestation and land use change on Remba Island have been gradual but significant processes shaped by human settlement, livelihood activities, and the island's limited land area. When the first settlers arrived, much of the island was covered with natural vegetation—mainly shrubs, grasses, and scattered trees adapted to the rocky terrain and lake-side conditions. As population pressure increased, especially with the influx of fishing communities drawn to the rich waters of Lake Victoria, land use began to shift rapidly. Trees and shrubs were cleared to create space for housing, footpaths, and drying areas for fish. The need for fuelwood and construction materials further accelerated the removal of vegetation, leaving slopes and open spaces bare.

In the early years of settlement, this rapid deforestation exposed the island's fragile soils to erosion and minor landslides, particularly during the long rains when runoff was intense. Community elders recall that these early disturbances were more frequent when vegetation cover was minimal and soil compaction from foot traffic and construction was high. Over time, however, the community became aware of the environmental costs of continuous clearing. Small-scale replanting efforts and natural regrowth have since helped to stabilize parts of the island's surface, though the landscape remains much less vegetated than it once was.

Land use on Remba today is dominated by dense residential clusters, temporary fishing shelters, and drying racks that occupy much of the limited available space. The high population density—compounded by the absence of formal planning—has left little room for green cover or designated conservation zones. Open areas are often converted into informal dumpsites or makeshift marketplaces, further altering land composition. Meanwhile, the steep slopes that ring parts of the island continue to face pressure from runoff and soil loss, as vegetation buffers remain patchy and fragmented.

The ecological consequences of deforestation on such a small island are magnified by its isolation. Without sufficient tree cover, there is reduced shading, increased heat absorption by bare ground and rooftops, and lower soil moisture retention. This has subtle but measurable effects on local microclimates, contributing to slightly higher surface temperatures and faster drying of topsoil after rainfall. Additionally, the loss of vegetation reduces the natural filtering of runoff, allowing waste and sediment to wash directly into the lake—an issue of growing concern for both human health and aquatic ecosystems.

Efforts to restore vegetation on Remba have encountered practical challenges. Space constraints, competing land uses, and the transient nature of many residents—most of whom are fishermen who migrate seasonally—make long-term reforestation difficult. Nevertheless, community initiatives supported by local organizations and the county environment office have encouraged tree planting around communal spaces, schools, and along eroded paths. These small steps, though limited in scale, are essential for improving soil stability, reducing surface runoff, and moderating local temperatures.

Overall, deforestation and land use change on Remba Island illustrate the delicate balance between livelihood needs and ecological resilience in small island environments. The community's experience shows how rapid settlement and resource use can transform landscapes within a single generation, but also how awareness and collective management can slowly rebuild environmental stability. Protecting what remains of Remba's vegetation—and integrating sustainable land management into local planning—will be critical for ensuring that the island remains habitable and ecologically stable in the face of continued human pressure and a changing climate.

2.6 Climate Impacts Adaptation and Resilience Initiatives

Remba Island's exposure to the shifting conditions of Lake Victoria has made climate resilience not an abstract goal but an everyday necessity. The island endures a mix of environmental pressures, rising lake levels, intense storms, powerful winds, and recurring dry spells, that combine to produce a constant cycle of damage and recovery. The flooding of 2020 remains a collective reference point: water levels rose abruptly, inundating homes and fish bandas (cold storage facilities utilized on the island), destroying shoreline latrines, and displacing dozens of families. When the waters finally receded, the island was left physically scarred and economically strained. Yet flooding was only one side of the hazard equation. Increasingly, residents describe the wind as a more frequent and unpredictable threat, violent gusts that sweep in from the open lake and strike without warning, often at night. These winds peel off roofs, topple fragile houses, and scatter fishing gear into the water. Over time, this repetitive destruction has deepened household insecurity, forcing residents into a pattern of constant rebuilding and recovery.

Remba's housing conditions amplify this vulnerability. The majority of homes are temporary or semi-permanent, built

from lightweight materials such as timber frames, corrugated iron sheets, and plastic sheeting. These materials are easy to source and affordable for a population with low and unstable incomes, but they offer little resistance to strong winds or prolonged moisture. Floors are often unpaved, foundations shallow, and roofs loosely anchored. Many houses double as commercial spaces or sleeping quarters for groups of workers, leading to overcrowding and rapid deterioration. With limited space for proper drainage or repair, the physical fabric of the settlement remains fragile, exposed to both structural failure and public health risks whenever storms strike.

Current coping measures on Remba rely heavily on improvisation and community effort. Residents frequently reinforce walls with wooden stakes, tie down roofs using ropes or sandbags, and relocate belongings to higher ground during floods. Informal waste clearing groups maintain basic drainage channels, while the Beach Management Unit coordinates shoreline cleanup and emergency alerts when lake levels rise. Some households collect rainwater in jerrycans or small tanks to reduce dependence on untreated lake water, and a few community groups engage in tree planting for shade and wind buffering. These strategies demonstrate adaptability but remain short-term, limited by financial constraints and the absence of formal infrastructure investment.

Potential measures, in contrast, aim to transform these ad hoc responses into sustained resilience. Improving water security through larger communal rainwater harvesting systems and affordable filtration technologies would lessen dependence on contaminated sources and reduce disease outbreaks. Erosion and wind control can be achieved by establishing vegetative buffers along the shoreline—using species like vetiver grass—and by introducing low-profile, wind-resistant building designs that anchor roofs more securely. Community windbreaks, such as fencing made from recycled materials or strategic tree planting, could reduce gust intensity across built areas. On the livelihood front, diversification into aquaculture, small-scale trade, or eco-tourism would ease pressure on overfished waters, aligning with Kenya's Blue Economy Strategy (2022–2032) and the Fisheries Management and Development (Beach Management Units) Regulations, 2024.

Health adaptation must also evolve from reaction to prevention. Strengthening local health outreach under the Universal Health Coverage Policy (2020)—including vector control, waterborne disease monitoring, and psychosocial support after disasters—would protect residents from the cumulative stresses of environmental shocks. Policy alignment with the Homa Bay County Climate Change Act (2022) provides a framework for embedding these efforts in county planning, while national instruments such as the Climate Change Act (2016) and the Locally Led Climate Action Programme (LLCAP, 2023) can channel financial and technical resources to community-driven initiatives.

Ultimately, Remba's resilience depends on balancing community ingenuity with institutional support. Residents already display creative problem-solving, from rearranging structures to minimize wind exposure to experimenting with stronger jointing methods. County agencies, NGOs, and national programmes can build on these efforts by investing in durable housing prototypes, training local builders in safer construction, and extending climate financing to small island settlements. Moving from reactive rebuilding to proactive planning would allow Remba to live more safely and sustainably within the natural rhythms and growing uncertainties of Lake Victoria.

3 POPULATION AND DEMOGRAPHIC CHARACTERISTICS

3.1 Population Size, Distribution & Density

Remba Island's population was captured through an enumeration exercise conducted in 2025 by the County Government of Homa Bay in collaboration with AMT. This process provided a detailed, community-level estimate of 2,297 residents, achieved through 100 percent household coverage using direct household mapping and interviews. The comprehensiveness of this approach ensured that the data reflected the realities of all households on the island, giving planners an accurate demographic foundation for decision-making.

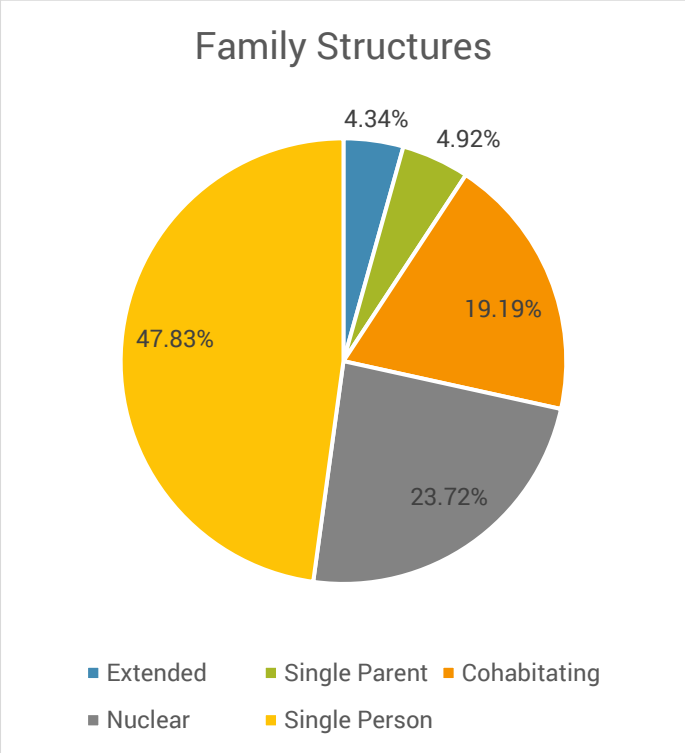


Figure 6 Family Structures

With a population density of 10,441 persons per square kilometer, Remba Island stands out as one of the most densely settled areas in Homa Bay County, underscoring its importance as an economic hub. Such high levels of concentration highlight both opportunities and challenges: on one hand, density supports vibrant economic interactions and fishing-related enterprises, while on the other, it exerts significant pressure on land, housing, infrastructure, and basic services.

These dynamics call for carefully balanced planning interventions to ensure that the island's economic potential can be sustained without compromising the quality of life. The data therefore provides not only an insight into current demographic patterns but also a strong basis for guiding service delivery, infrastructure development, and land-use prioritization.

3.2 Household Characteristics

As part of this plan, an enumeration of 1,037 households was conducted, achieving full participation through direct interviews. The survey revealed that the average household size on Remba Island is 2.2 persons, a relatively small figure that reflects the island's unique demographic and socio-economic dynamics.

Table 3 Population

Total Population	Area (km 2)	Population Density	Households	Average Household Size
2,297	0.22	10,441 persons/km²	2,476	2.2

The chart reveals a settlement structure dominated by smaller and more transient living arrangements. The largest share of households' 47.83 percent consists of single-person households, reflecting the island's highly mobile and work-oriented population, where many residents are temporary migrants engaged in fishing or related activities.

Nuclear households account for 23.72 percent, representing more stable family units, though still fewer than those living alone. Cohabiting households make up 19.19 percent, indicating the prevalence of informal and non-marital partnerships common in transient fishing communities. Single-parent households constitute 4.92 percent, while extended family households—those including relatives beyond the immediate family—form only 4.34 percent of the total.

Overall, the data highlights a community characterized by individualized and flexible living arrangements, shaped by economic necessity and the temporary nature of settlement on the island. The dominance of single-person and cohabiting households underscores both the economic impermanence of Remba's residents and the social dynamics of a settlement closely tied to the rhythms of Lake Victoria's fishing economy.

The pie chart shows the gender distribution of household heads on Remba Island, where male-headed households dominate overwhelmingly at 73 percent, compared to 26 percent female-headed households and 1 percent of respondents who preferred not to disclose. This pattern reflects the strongly gendered nature of Remba's fishing economy and the transient character of the settlement.

Fishing on Lake Victoria is a male-dominated occupation, with men typically controlling the boats, fishing gear, and earnings from the catch. As a result, most households are organized around male income earners who migrate to the island seasonally or semi-permanently for work. Women, on the other hand, are more often engaged in post-harvest activities such as fish processing, vending, or running small businesses, which tend to offer lower and less stable returns. These roles are economically vital but rarely translate into formal household headship.

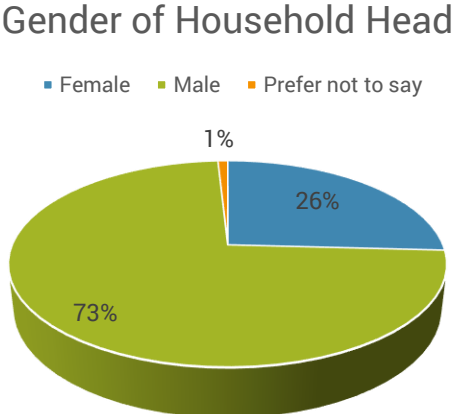


Figure 7 Gender of Household Head

The high proportion of male-headed households also stems from the transitory and non-family-based settlement structure of Remba. Many residents live alone or in cohabiting arrangements rather than permanent family units. Men frequently relocate between landing sites following fish availability, while women are more likely to remain on the mainland where family and support networks are stronger.

Cultural norms further reinforce male household leadership, as men are traditionally recognized as primary decision-makers and land or asset holders—even where women contribute significantly to household income. The combination of economic roles, mobility patterns, and social expectations thus explains the predominance of male-headed households on the island.

However, the 26 percent of female-headed households is still significant and points to shifting dynamics—especially among widows, single mothers, and women traders who have taken on leadership roles within households in the absence or instability of male partners. These women play a crucial role in sustaining livelihoods and social stability within Remba's highly fluid community.

3.3 Gender and Age Composition

Remba Island exhibits a slightly skewed gender structure with a modest male predominance, as revealed by the AMT 2025 household enumeration. Of the 2,297 residents recorded through direct household interviews, 46.97 percent (1,079 individuals) were female, while 53.03 percent (1,218 individuals) were male.

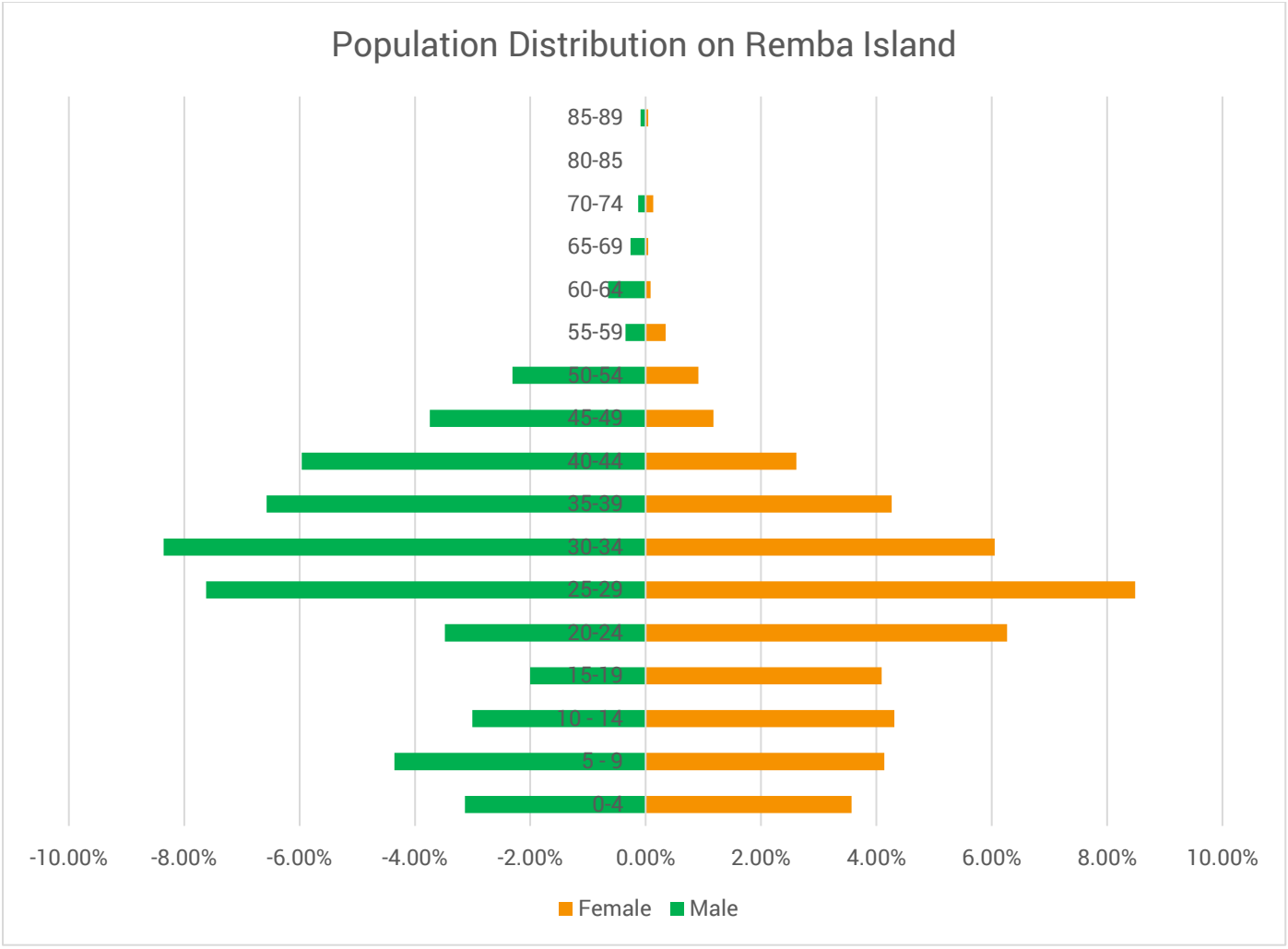


Figure 8 Population Distribution

The slightly male-skewed gender ratio carries implications for planning and service delivery. A higher proportion of men often corresponds with migration linked to fishing and other economic activities, which dominate the island's economy. At the same time, the nearly balanced gender structure underscores the need for equitable access to resources, services, and opportunities, particularly in relation to education, healthcare, and livelihoods, where women and girls may still face structural disadvantages despite their substantial representation in the population.

Remba Island has a distinctly youthful population, reflecting both demographic trends and the economic pull of the fishing industry. The largest age cohort is composed of residents between 25 and 29 years, numbering 370 individuals, followed closely by the 30–34 age group with 331 individuals and the 20–24 cohort with 224 individuals. Children under the age of ten account for a significant portion of the population as well, with 349 recorded out of a total of 2,295 people.

This concentration of young adults highlights the island's role as an economic hub that attracts working-age individuals, particularly men engaged in fishing and related activities. At the same time, the presence of a sizeable child population underscores the importance of investing in health, education, and childcare services, which are already under strain given the island's limited infrastructure.

The youthful structure also signals opportunities and challenges for the future. On one hand, a young population provides a strong labor base to sustain the local economy. On the other, it raises concerns about job creation, skill development, and long-term sustainability, especially in an environment where housing, water, sanitation, and health services are overstretched. Planning for this demographic reality requires proactive strategies to harness the economic potential of the youth while addressing their social needs.

3.4 Migration and Vulnerability

Migration plays a defining role in shaping the demographic and social character of Remba Island. According to the AMT 2025 household enumeration, 89% of the island's residents are migrants who have moved from other parts of Homa Bay County, neighboring counties, or across international borders. This overwhelming proportion underscores the island's identity as a transient and economically driven settlement.

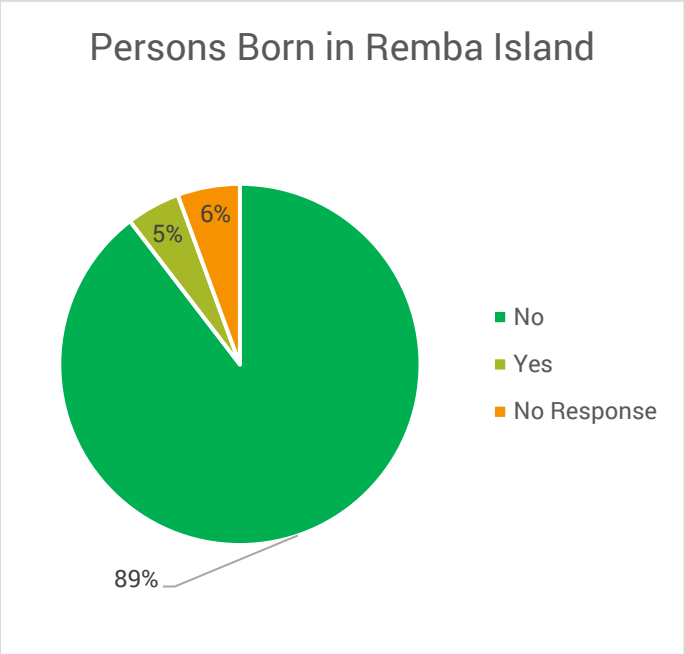


Figure 9 Persons' Born in Remba Island

The majority of residents—56.10%—are inter-county migrants, reflecting the island's strong regional draw, particularly for fishermen and traders. Intra-county migrants, at 30.30%, highlight the internal mobility within Homa Bay, much of it tied to the search for employment. International migrants account for 11.46%, originating from countries such as Tanzania, Uganda, and Rwanda. These groups include returnees, refugees, and diaspora settlers, emphasizing Remba Island's strategic role as a cross-border node within the Lake Victoria region.

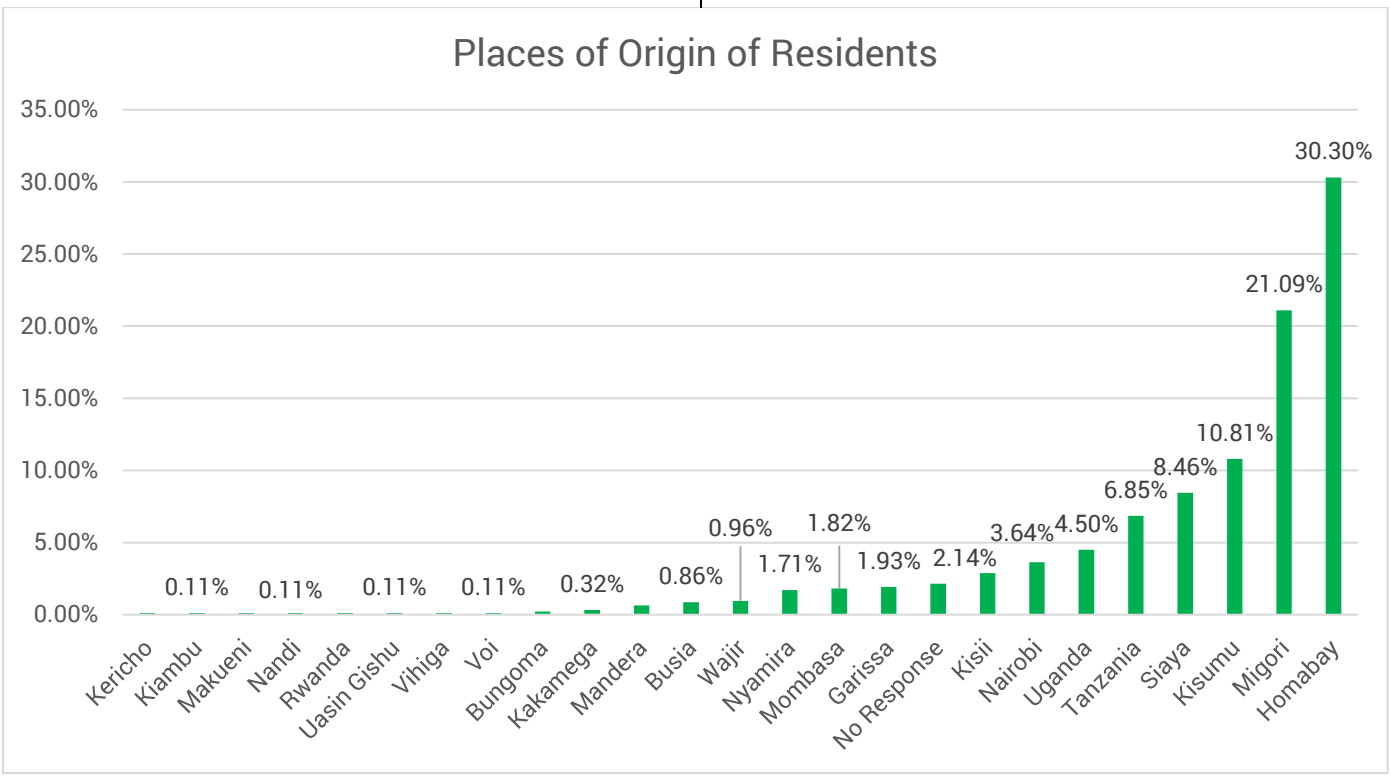


Figure 10 Places of Origin

Migration to the island has been accelerating in recent years. The five-year period between 2021 and 2025 saw the highest rate of new arrivals at 39.40%, followed by 23.90% between 2016 and 2020. This sharp influx illustrates the growing demand for both social and physical infrastructure, as the island continues to absorb new populations at a rapid pace.

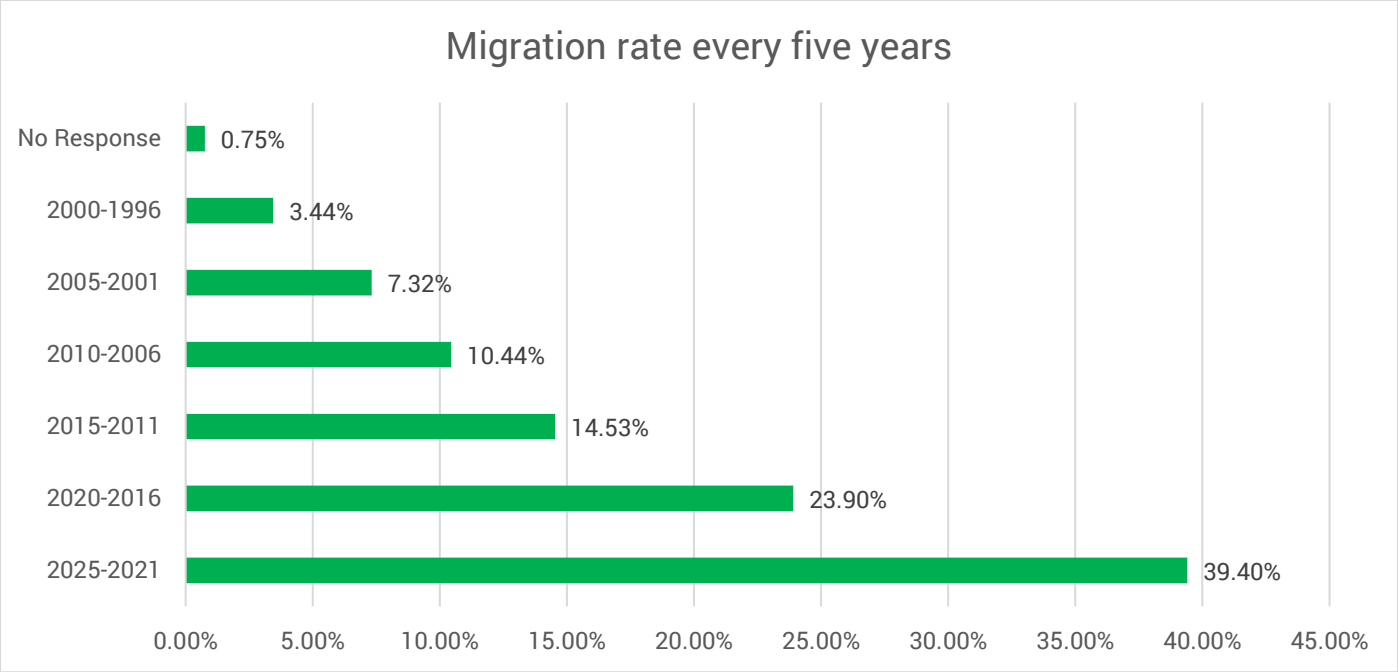


Figure 11 Migration Rate

The drivers of migration are primarily economic. Among the migrant population, 40.97% reported moving to Remba to engage in fishing activities, while 31.94% cited employment opportunities. Business ventures accounted for 19.64% of migration decisions, while family reunification made up 3.77%. Fewer than 2% of migrants moved in search of educational facilities or other social services, underscoring the inadequacy of such infrastructure on the island and its limited role in attracting new residents.

While migration fuels Remba's economic activity, it also places immense pressure on essential services such as water supply, solid waste management, health, and education. The influx amplifies existing vulnerabilities, particularly among marginalized groups. Data from the enumeration indicates that 26% of all households are female-headed—a demographic often linked with higher economic strain, especially in informal settlements.

Settlements with high concentrations of in-migration are further marked by overcrowding, poor housing quality, and limited access to infrastructure. These dynamics reveal a complex challenge for urban planning: how to accommodate economic migrants while safeguarding the wellbeing of vulnerable populations. Addressing this requires targeted interventions that balance economic integration with social inclusion, ensuring that Remba Island remains both a vibrant economic hub and a livable community.

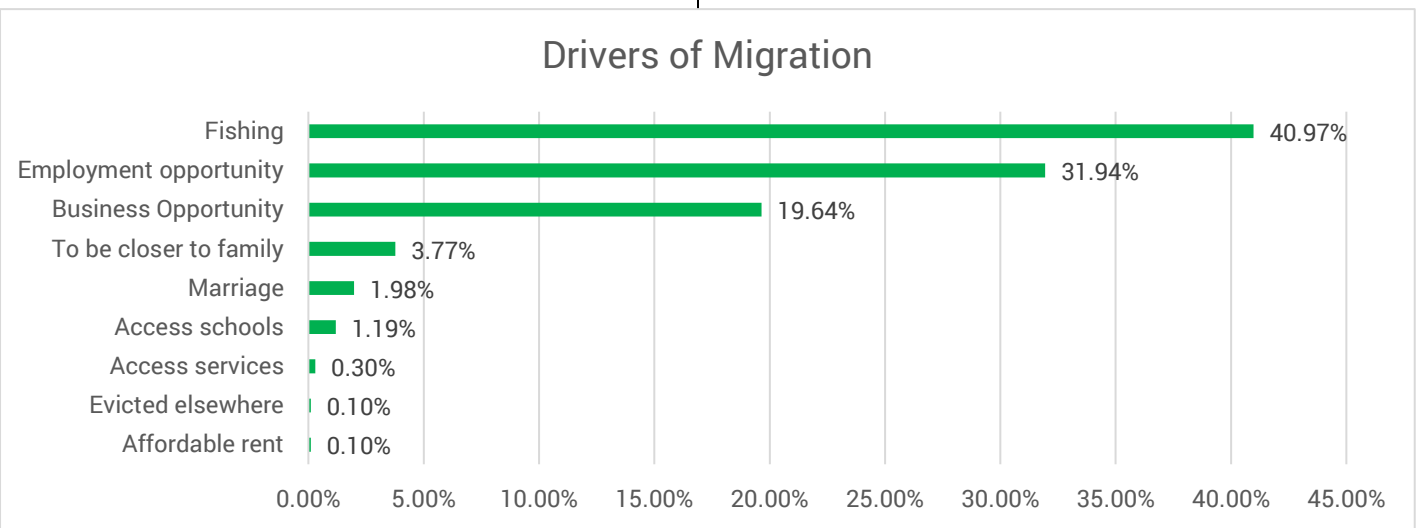


Figure 12 Drivers of Migration

3.5 Growth Trends

Remba Island's population growth over the coming decades reflects both demographic momentum and economic attraction—particularly from the expanding fishing industry on Lake Victoria. The 2025 enumeration places the island's population at 2,295 residents. This high population highlights the island's growing appeal as a centre for fishing, trade, and small-scale commerce within Homa Bay County's Lake zone.

Table 4 Growth Trends

Year	2025 Enumeration (782)
2025	2,295
2030	2,758
2035	3,316
2040	3,986
2045	4,792

The projected population trend for Remba Island indicates a steady and significant increase over the next two decades, rising from an estimated 2,295 residents in 2025 to approximately 4,792 by 2045. This near-doubling of population within twenty years reflects the application of a 3.75 percent annual growth rate, which corresponds to Kenya's national urban population growth rate.

Using this benchmark is justified because, despite its small size and isolation, Remba exhibits characteristics typical of rapidly growing informal urban settlements rather than rural villages. The island's population expansion is driven by migration linked to fishing and trade, not natural increase. Much like Kenya's urban centres, Remba attracts a transient labour force seeking economic opportunity—especially men involved in fishing, transport, and fish processing. Seasonal workers from across the Lake Victoria region migrate in and out, contributing to consistent demographic turnover and growth.

This urban-equivalent growth rate is also appropriate given Remba's density and service demands, which mirror those of small urban centres. The island's limited land area, coupled with high in-migration and limited outflow, translates to rising congestion, strain on water and sanitation systems, and growing pressure on local governance structures such as the Beach Management Unit. The economic pull of fishing stimulates the establishment of new households, informal markets, and service enterprises—from ice supply chains to small eateries catering to fishermen. However, this growth also brings pressure on the island's limited land and fragile ecosystem. As the population expands alongside the fishing industry, challenges such as overcrowding, waste disposal, and declining water quality are likely to intensify. Sustainable management of both human settlement and fishing practices will therefore be central to ensuring that Remba's growth remains viable and resilient in the decades ahead.

If the 3.75 percent rate persists, Remba's population will continue to expand rapidly, intensifying challenges in housing, waste management, and public health. However, it also signals economic dynamism and the island's ongoing importance as a regional fishing hub within Lake Victoria. This projection thus captures both the opportunities and constraints of a settlement evolving along an urban trajectory within a fragile ecological setting.

4 LAND TENURE AND LAND USE ANALYSIS

4.1 Land Use Analysis

The analysis of land use distribution on Remba Island reveals a settlement pattern overwhelmingly dominated by residential functions. Residential purposes account for 78.01% of all building use and 69.92% of compound use, a clear indicator of the island's dense and overcrowded character. Most of the available land is devoted to housing, leaving very limited space for supporting amenities, economic activities, or community facilities.

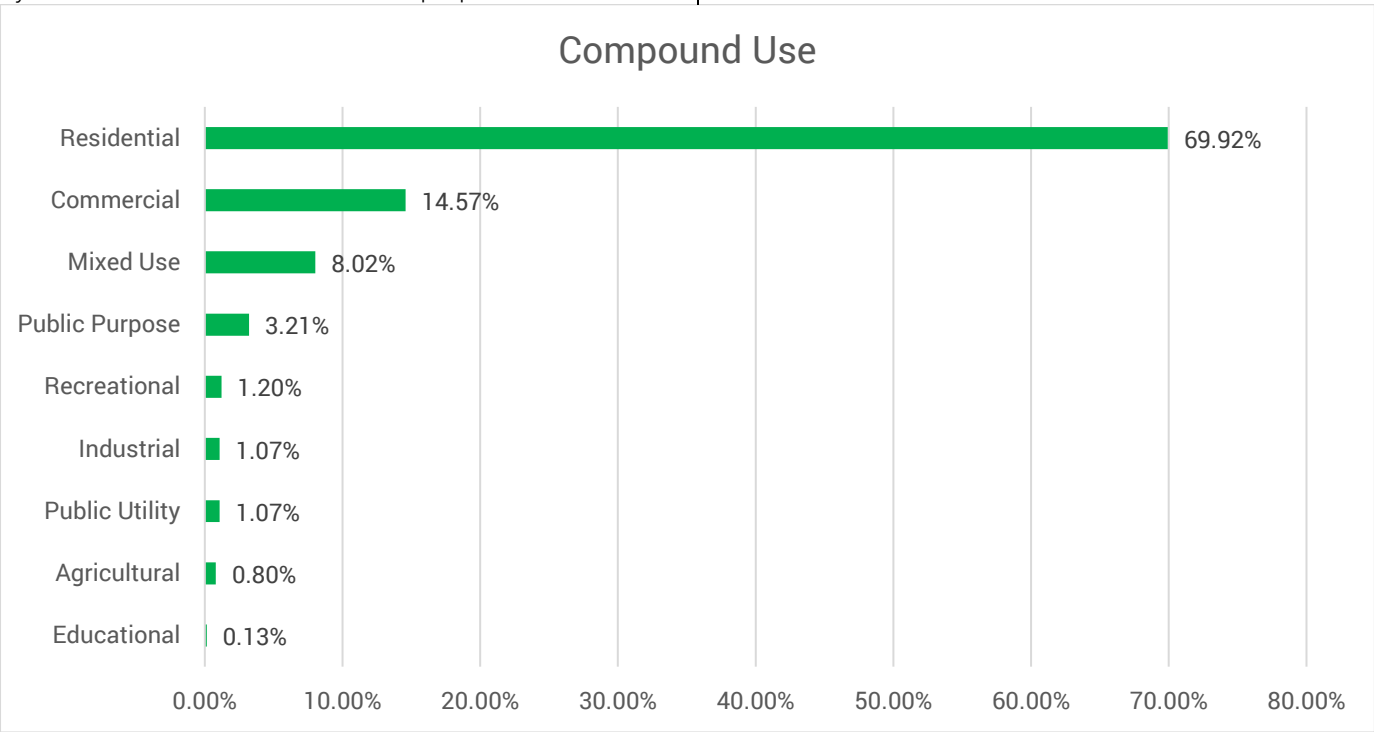


Figure 13 Compound Use

A compound is a piece of land that contains one or more buildings or structures enclosed within a common boundary—usually a fence, wall, or hedge—and used as a single unit. It typically includes a main dwelling along with associated facilities such as kitchens, toilets, storage spaces, or small business structures that belong to one household or a group of related occupants.

On Remba, a compound consists of several small rental units arranged around a shared courtyard or corridor, and lack formal boundaries. These compounds serve as the basic spatial and social units of the settlement, reflecting patterns of tenancy, shared amenities, and communal living shaped by limited land and high population density.

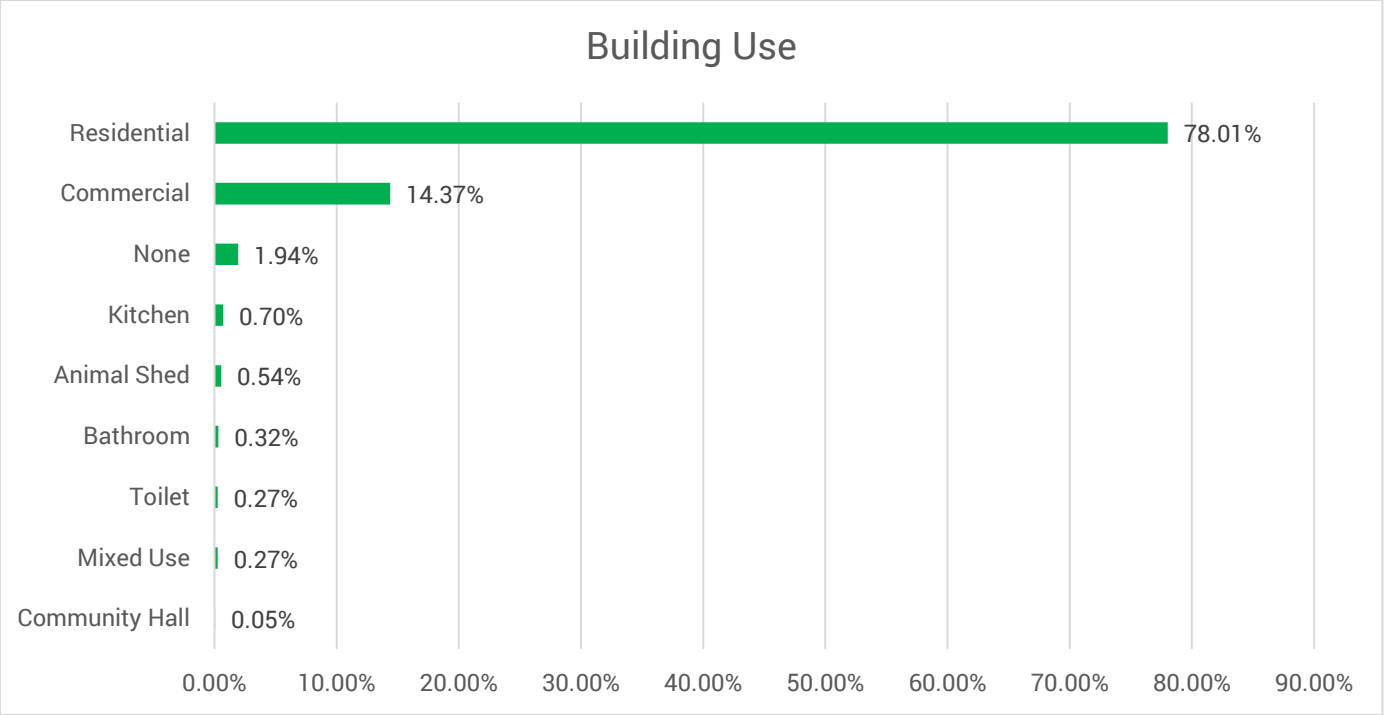


Figure 14 Building Use

Commercial activities make up 14.37% of building use but only 1.20% of compound use. This suggests that businesses are largely concentrated within built structures, with minimal outdoor space allocation, a reflection of both high land scarcity and the demand for compact commercial premises. In contrast, public purpose and mixed-use functions remain negligible, comprising only 0.05% and 0.27% of building use respectively. Their slightly higher share of compound use points to the presence of small-scale institutions or multifunctional activities, though their contribution remains too limited to support the needs of a rapidly growing settlement.

Recreational land use is critically constrained, with no allocation for building use and only 1.20% of compound use. This absence of open or designated spaces for leisure and social interaction is alarming in a context of such high population density. Similarly, educational facilities are severely underrepresented: the island hosts only one primary school with an Early Childhood Development Education (ECDE) center. The lack of secondary schools and post-primary institutions forces families to send children off the island for further studies, often at significant financial and social cost. Establishing a secondary school or a technical and vocational education and training (TVET) center would therefore be a critical step in addressing local educational needs.

Industrial and agricultural land uses are nearly absent, with shares of less than 1% in both categories. This reflects the limited opportunities for localized production and processing activities, leaving residents heavily dependent on external markets for goods and services. Public utilities such as the police station and health facility are present but minimal, while vacant land accounts for only 1.94%, underscoring how little room is available for future expansion or reorganization without deliberate planning interventions.

Table 5 Land Use Distribution

Land Use Category	Share of Building Use (%)	Share of Compound Use (%)	Key Issues Observed
Residential	78.01	69.92	Informal housing with tenure insecurity
Commercial	14.37	1.20	Lack of proper market facilities
Public Purpose	0.05	3.21	One Police station and public health facility
Mixed Use	0.27	8.02	
Educational	0	0.13	Presence of only one Primary school and ECDE center
Industrial	0	1.07	

Agricultural	0.54	0.80	
Recreational	0	1.20	

Public Utility	0.59	1.07	
Vacant	1.94	-	

Underlying these patterns is the issue of land tenure insecurity. Only 9.65% of residents possess allotment letters, while a significant 65.09% occupy public land without formal documentation. This lack of formal cadastral systems not only exposes residents to displacement risks but also limits investment in durable housing and infrastructure.

Together, the dominance of informal residential use, the absence of recreational and industrial spaces, limited educational facilities, and insecure tenure arrangements highlight Remba Island's vulnerability to poor service delivery and unsustainable development. The settlement's growth trajectory, if unaddressed, risks entrenching overcrowding, reducing socio-economic opportunities, and undermining long-term resilience.

4.2 Land Tenure System

The graph below illustrates community views on how land is owned and managed on Remba Island. The data clearly shows that the overwhelming majority—65.09% of respondents—perceive the island as public or government land. This aligns with the official classification of Remba as public land under national and county jurisdiction, meaning no individual or community holds formal ownership rights.

A smaller proportion, 15.81%, consider the land to be community-owned, reflecting the social reality that residents often manage space collectively for housing, fishing, and trade despite lacking formal titles. Meanwhile, 9.55% of respondents believe the land is privately owned, a perception likely influenced by informal transactions and land demarcations within settlement zones.

The remaining categories—5.30% providing no response, 4.15% stating they "do not know," and only 0.10% identifying land as ancestral—suggest limited clarity and awareness about legal tenure arrangements. The near absence of ancestral claims also reflects Remba's unique history as a relatively new settlement, established primarily for fishing rather than through traditional inheritance systems.

Overall, the data underscores a shared community understanding that Remba is essentially public land, with informal land use practices evolving around fishing and trade activities. This perception has significant implications for governance, as it highlights the need for clear land management frameworks that balance the island's public status with the community's practical need for security of tenure and sustainable settlement planning.

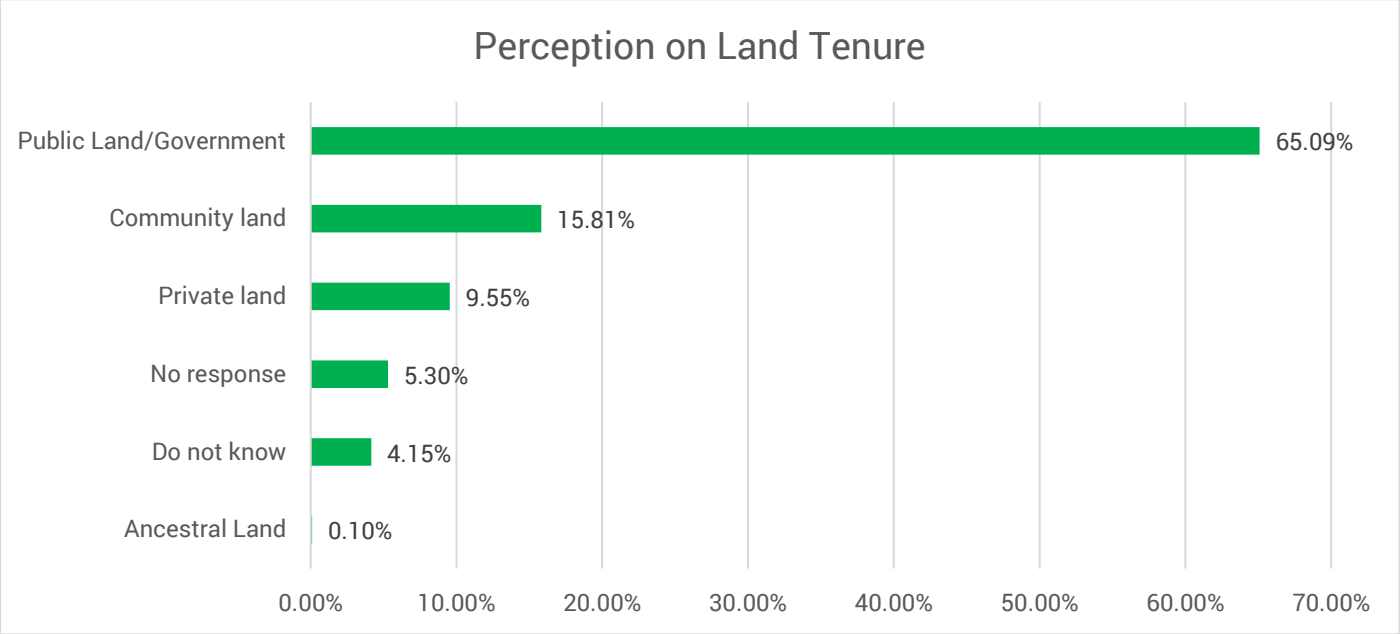


Figure 15 Perception on Land Tenure

Housing Tenure and Security of Occupation

Housing tenure data highlights the precariousness of settlement arrangements on the island. The enumeration revealed that 84.57% of residents are tenants, often renting informally, while just 7.23% own the homes they occupy. A further 0.48% reside in family houses—typically inherited or shared by extended kin but not formally subdivided—while less than 2% are squatters or caretakers with the most insecure forms of tenure. These figures reveal very low levels of homeownership and a heavy reliance on rental housing, shaped by high population density, migration-driven demand, and the scarcity of formally planned plots.

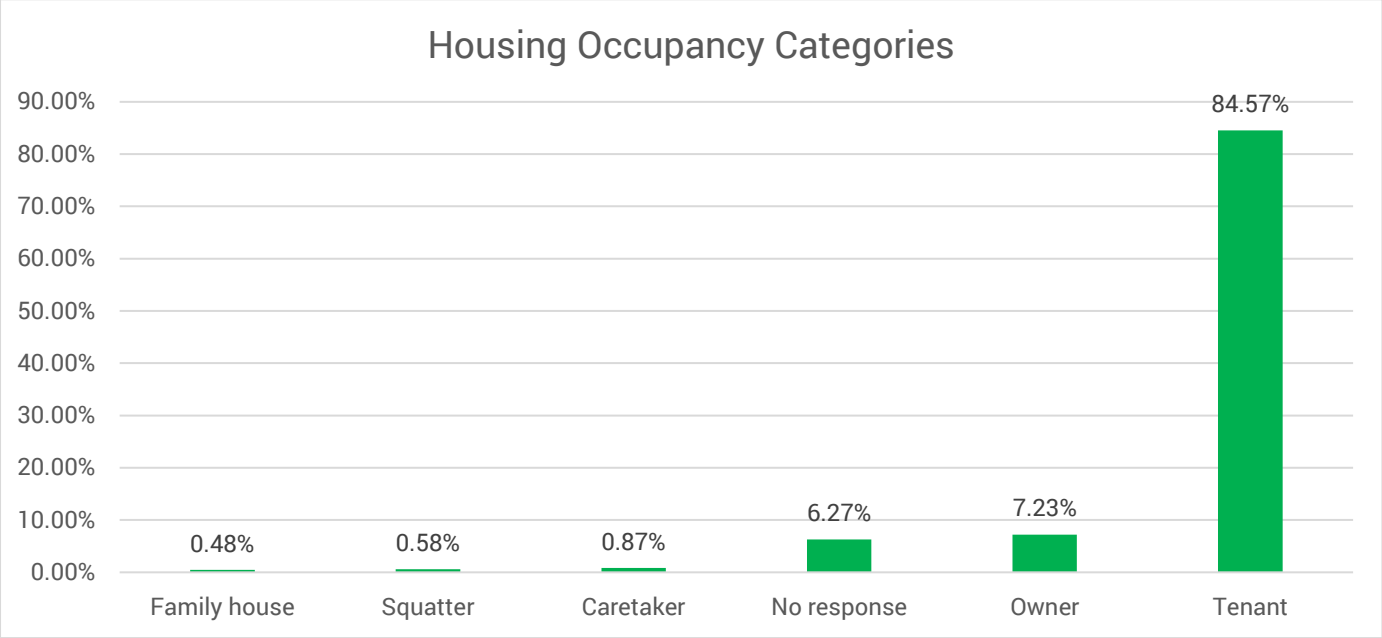


Figure 16 Housing Occupancy Categories

Table 6 Occupancy Status

Occupancy Status	Share of Households (%)	Description
Owner Occupied	7.23	Primary residence is legally or customarily owned
Tenant	84.57	Renting, formally or informally
Family House	0.48	Shared/inherited property, often undocumented
Caretaker/Squatter	0.87	Temporary, informal, or insecure arrangements

Land Ownership Documentation and Risks

The chart illustrates the distribution of households on Remba Island with formal proof of land or plot allocation. These ownership documents primarily refer to registration letters issued by the Beach Management Unit (BMU) Land Committee, which functions as the local authority managing settlement and land use on the island.

According to the data, 63% of households reported having such ownership documents, suggesting that a majority of residents possess some form of recognized local registration for their plots. This reflects the BMU's central role in maintaining order and legitimacy in land allocation, despite the island being officially classified as public land. The presence of these letters provides residents with a sense of tenure security, even though the documents are not equivalent to formal land titles under national law.

Meanwhile, 33% of households stated that they do not have ownership documents, indicating a considerable portion of residents who occupy land informally or through verbal agreements. This situation can contribute to disputes or uncertainty, especially as population pressure on Remba continues to grow. The remaining 4% did not respond, possibly reflecting either reluctance to disclose land status or lack of awareness of the BMU registration process.

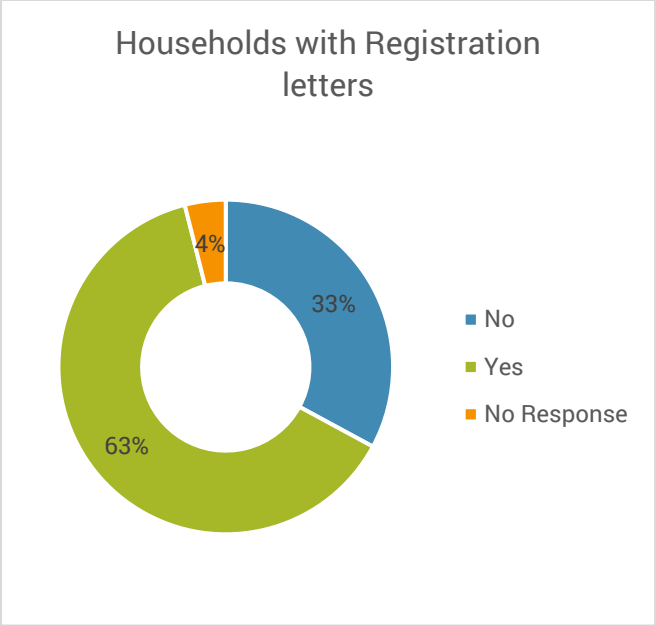


Figure 17 Households with Registration Letters

Overall, the data reveals a semi-formal land tenure system—rooted in community and BMU structures—that has evolved to fill the governance gap in Remba's unique public-land context. While it offers short-term stability, the reliance on BMU-issued letters also underscores the need for stronger institutional frameworks to ensure long-term land security and sustainable settlement management.

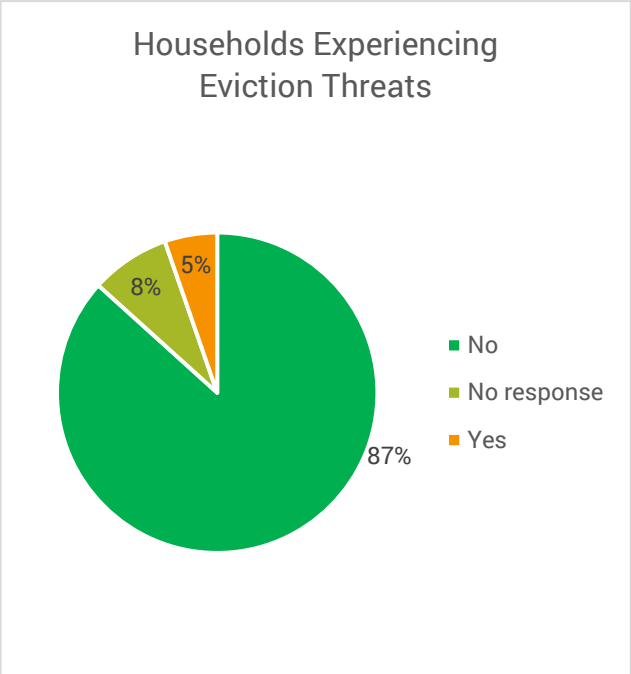


Figure 18 Eviction Threats

The risks of tenure insecurity are already visible. An estimated 5.30% of households reported facing eviction threats. Of these, 70.9% are located on public land, reflecting ongoing conflicts between occupiers and state institutions. Another 18.18% are situated on contested private land, where disputes between long-term occupants and legal titleholders are common.

These dynamics illustrate the fragility of settlement arrangements on Remba Island, where tenure insecurity not only increases the likelihood of displacement but also undermines household stability and investment in housing quality.

Figure18 illustrates the perceived causes or agents of eviction insecurity among residents of Remba Island. The data reveal that the most significant perceived threat originates from landlords or self-identified land "owners," cited by 34.55% of respondents. This reflects the informal nature of land occupation on the island, where individuals who first settled or acquired space through the Beach Management Unit (BMU) or informal transactions sometimes assert ownership and threaten eviction of newer occupants.

The government is the second most cited source of eviction threats, accounting for 21.82%. This concern likely stems from Remba's legal classification as public land, meaning that, technically, all residents are occupying government property. Periodic enforcement actions or rumours of relocation from the authorities may therefore create uncertainty and fear of displacement among the community.

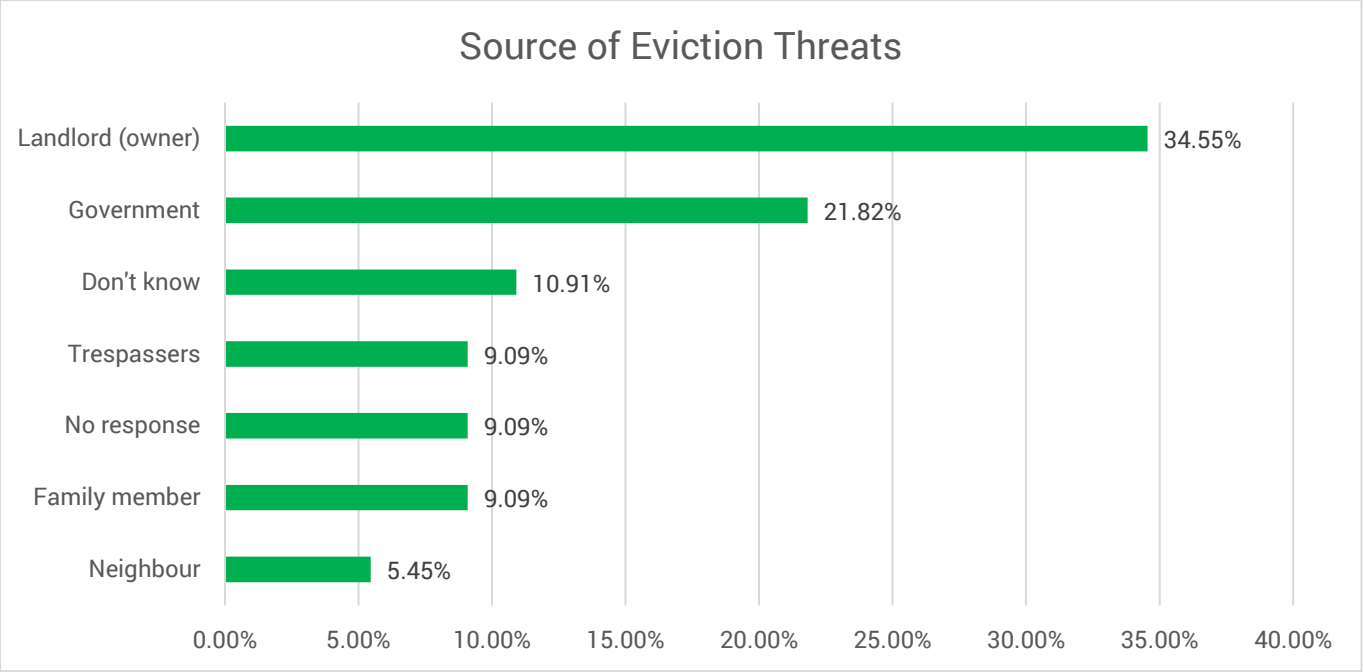


Figure 19 Sources of Eviction Threats

Smaller but notable portion of respondents attributed eviction threats to trespassers, family members, or neighbours (each about 9.09%), showing that disputes can also arise at the household or community level, often over unclear plot boundaries or overlapping claims. Additionally, 10.91% of respondents said they "don't know" the source of threats, while 9.09% gave no response, possibly reflecting confusion or reluctance to discuss sensitive land issues.

Overall, Remba Island's land tenure system reflects an environment of uncertainty, shaped by the dominance of public land, the prevalence of informal renting, and weak documentation. This situation calls for interventions such as improved land registration systems, tenure awareness programs, and affordable pathways to secure homeownership. Strengthening tenure security would not only reduce vulnerability to eviction but also encourage investment in housing, infrastructure, and community resilience.

These findings highlight the fragility of tenure arrangements on Remba Island. Even where documentation exists, its validity may be disputed, and large proportions of the population remain vulnerable to eviction. Strengthening land registration systems, increasing community awareness of legal rights, and providing affordable mechanisms for formalization of tenure are therefore critical to reducing disputes and improving household stability.

4.3 Land Ownership and Tenure Categories

Gender and Land Access Disparities:

The 2025 enumeration highlights persistent gender disparities in access to housing and land ownership on Remba Island. Only 1.65% of female respondents reported owning the homes they live in, compared to 5.64% of men. Men also dominate tenancy arrangements, with 62.94% identifying as tenants compared to 22.37% of women. By contrast, women are more likely to live in family-owned homes or as dependents, with very limited representation in independent tenancy or ownership categories.

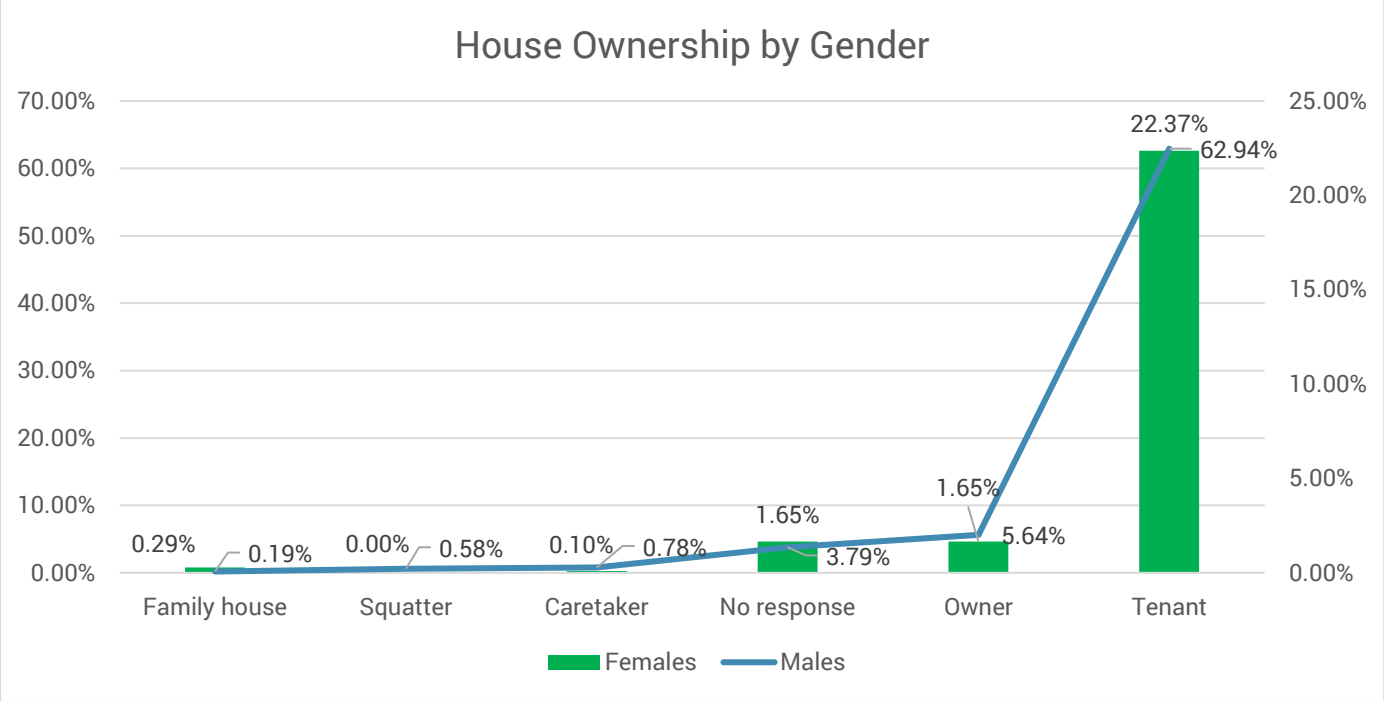


Figure 20 House Ownership by Gender

These differences reveal deep-seated structural barriers that limit women's access to property. Customary inheritance practices, unequal access to financial resources, and low awareness of land rights continue to disadvantage women in both ownership and tenancy markets. The absence of independent control over property places women at higher risk of eviction, poverty, and displacement, particularly within informal settlement contexts where tenure security is already fragile. Addressing these gender gaps will require not only institutional reforms but also deliberate inclusion of women in housing policies, land allocation programs, and financial empowerment initiatives.

4.4 Land Cadaster and Documentation Coverage

Remba Island's land cadaster shows relatively strong coverage of formal documentation, with 64% of landowners holding legal records such as registration letters. This suggests a functional land administration system capable of providing tenure security in many cases. However, the remaining 32% of households lack documentation, leaving them vulnerable to disputes, eviction, and exclusion from services or financial opportunities tied to land ownership.

The gaps are most evident on public land, which accounts for 65.09% of all occupied parcels. Much of this land remains under-documented, particularly in areas without structured governance or registration systems. This creates conditions for land disputes, unauthorized sales, and speculative claims, further complicating settlement planning. The limited coverage of formal documentation in such high-density contexts highlights the urgency of strengthening cadaster systems, promoting community-level awareness, and ensuring equitable access to secure tenure arrangements.

Constraints and Opportunities in Land Use Management

The findings from the land use analysis underscore the structural challenges facing Remba Island's settlement development. Residential land dominates the landscape, while institutional, industrial, and utility allocations remain minimal. This imbalance reflects uncoordinated growth driven largely by informality, where only 9.65% of residents hold registration letters and 65.09% occupy public land without documentation. The absence of a formal cadaster has entrenched tenure insecurity, weakened regulation, and

contributed to overcrowding, with residential expansion encroaching upon spaces that might otherwise have been set aside for communal, educational, or productive uses. High population density magnifies this challenge, exerting pressure on the already limited land resource base. This has resulted in encroachment onto wetlands and public reserves, undermining both environmental sustainability and future land management options. Additionally, gender disparities in ownership (M:F ratio of 4:2) reinforce unequal access to land, limiting women's participation in land-based investment and decision-making.

Despite these constraints, opportunities exist that could be leveraged to redirect growth towards sustainability. The presence of some formal allocations provides a foundation for structured land regularization, enhancing tenure security and incentivizing household investment in housing and infrastructure. Planned densification and mixed-use development present viable solutions to the residential dominance, allowing integration of commercial activity and services in compact but orderly formats.

The community's strong reliance on fishing and trade also opens pathways for strategic investment in supportive infrastructure, including cold storage, processing plants, and market spaces. Similarly, the limited institutional land could be addressed by prioritizing expansion into educational and recreational facilities—such as a secondary school, TVET center, or structured play spaces—which would not only improve quality of life but also strengthen social resilience. The underutilization of industrial (1.07%) and utility (1.07%) land suggests untapped potential for diversifying the economy and providing essential services if proper planning frameworks are applied.

With participatory land management strategies, there is significant scope to transition Remba Island away from its current trajectory of unregulated growth. A coordinated framework that balances human needs with orderly land use can reinforce tenure security, enhance service delivery, and unlock inclusive socio-economic development for the community.

Table 7 Land Use Constraints and Opportunities

Opportunities	Constraints
Potential for planned densification and mixed-use development	Gender disparity in land ownership (M: F = 4:2)
Strong public land base (75.6%)	Low industrial (1.07%) and utility (1.07%) land
Community-led potential for tenure upgrades	Encroachment on wetlands and public land
Opportunities to integrate supportive infrastructure (markets, cold storage, and processing facilities) to strengthen the fishing-based economy.	Lack of a formal cadaster leading to unregulated and uncoordinated land use.
	Tenure insecurity, with only 9.65% of residents holding allotment letters while 65.09% occupy public land without documents.
	Limited provision for educational facilities, with only one primary school and an ECDE center.

5 HUMAN SETTLEMENTS AND HOUSING

5.1 Human Settlement Patterns

The settlement landscape of Remba Island reflects a distinctly urban informal character. Findings from the 2025 enumeration indicate a densely built environment dominated by contiguous structures, with little evidence of planned growth. Residential development is largely unregulated, producing irregular and earthen street networks, limited connectivity, and inadequate allocation of land for public amenities. The island hosts one informal market, but access to essential services—including schools, sewerage systems, potable water, and formalized road infrastructure—remains severely constrained.

Remba's building distribution reveals a distinct spatial hierarchy: a densely built southern hub that anchors economic and social activity, tapering into less developed peripheral zones toward the north and west. This spatial pattern illustrates how settlement growth has been shaped by fishing-based livelihoods, proximity to the lake, and the limited availability of flat land suitable for construction.

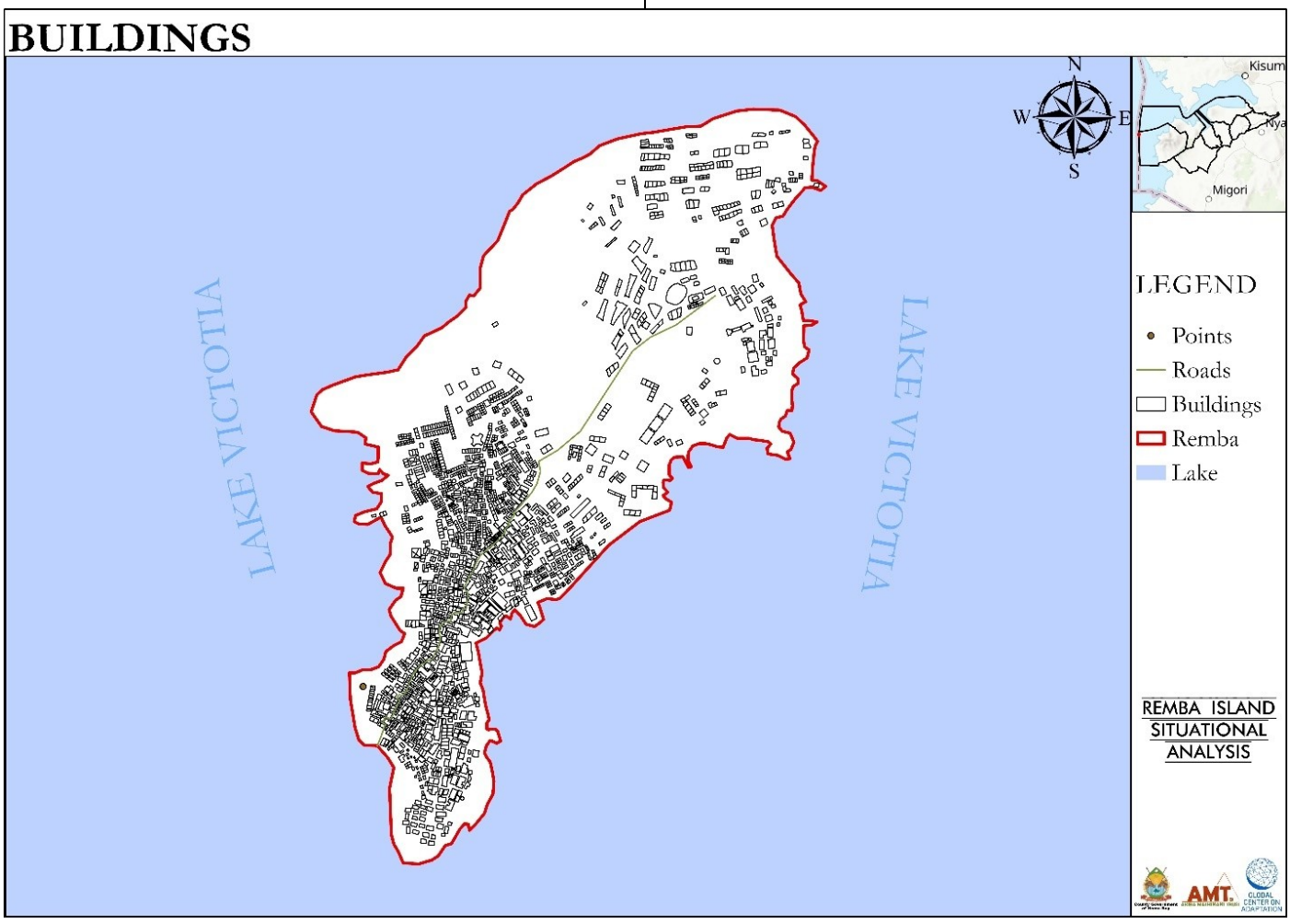


Figure 21 Building Distribution

High population densities place significant pressure on the limited land resource, while the fishing economy continues to draw migrants and sustain settlement expansion. However, the lack of structured planning undermines service delivery and amplifies social vulnerability, signaling an urgent need for integrated spatial planning interventions.

Informality dominates Remba Island's housing ecosystem, it is typically composed of temporary or semi-permanent structures with limited or no access to water, sanitation, or organized road networks. These settlements reflect both necessity and opportunity—housing largely for lower-income households and new migrants drawn by the fishing economy.

While unplanned layouts and insecure tenure compromise living standards, informal settlements also underpin the island's dynamic social and economic fabric. They sustain its role as a hub of trade and resilience but also pose complex challenges for service delivery, regulation, and environmental sustainability.

This configuration also underscores the island's vulnerability — intense density in low-lying coastal areas heightens exposure to flooding, poor sanitation, and environmental degradation, while limited expansion space constrains future planning and service deliver

The spatial growth of Remba Island indicates that regulatory oversight is weak and environmental risks are high. Informal expansion has encroached on public lands, riparian zones, and even steep slopes, increasing vulnerability to flooding, pollution, and landslides. These trends call for upgrading programs, service provision, and tenure regularization to prevent further degradation and social vulnerability.

Encroachment on Lake Riparian Zones

Environmental degradation has emerged as one of the most pressing challenges of unregulated growth. Settlements increasingly extend into wetlands, riparian buffers, and steep slopes—zones critical for biodiversity, flood management, and erosion control. Land reclamation for housing has altered natural floodplains and obstructed drainage systems, exacerbating risks of flooding and erosion.

On steep slopes and hillsides, vegetation clearance to make way for housing and small-scale cultivation has accelerated soil erosion and heightened landslide vulnerability. The loss of public green and open spaces to informal development has further eroded live-ability and resilience, undermining opportunities for recreation, ecological balance, and climate adaptation.

5.2 Development Trend Analysis

Growth of Settlements Over Time

Settlement expansion in Remba Island has accelerated over the past two decades due to rising migration from other parts of Homabay County and neighboring counties. According to the 2025 enumeration, the majority of migrants (56.10%) are inter-county migrants, reflecting the island's regional draw, particularly for fishermen, and traders. Counties such as Migori, Kisumu, and Siaya have a combined rate of 40.36%. 30.30% are intra-county migrants indicating strong internal mobility within Homa Bay driven by access to employment.

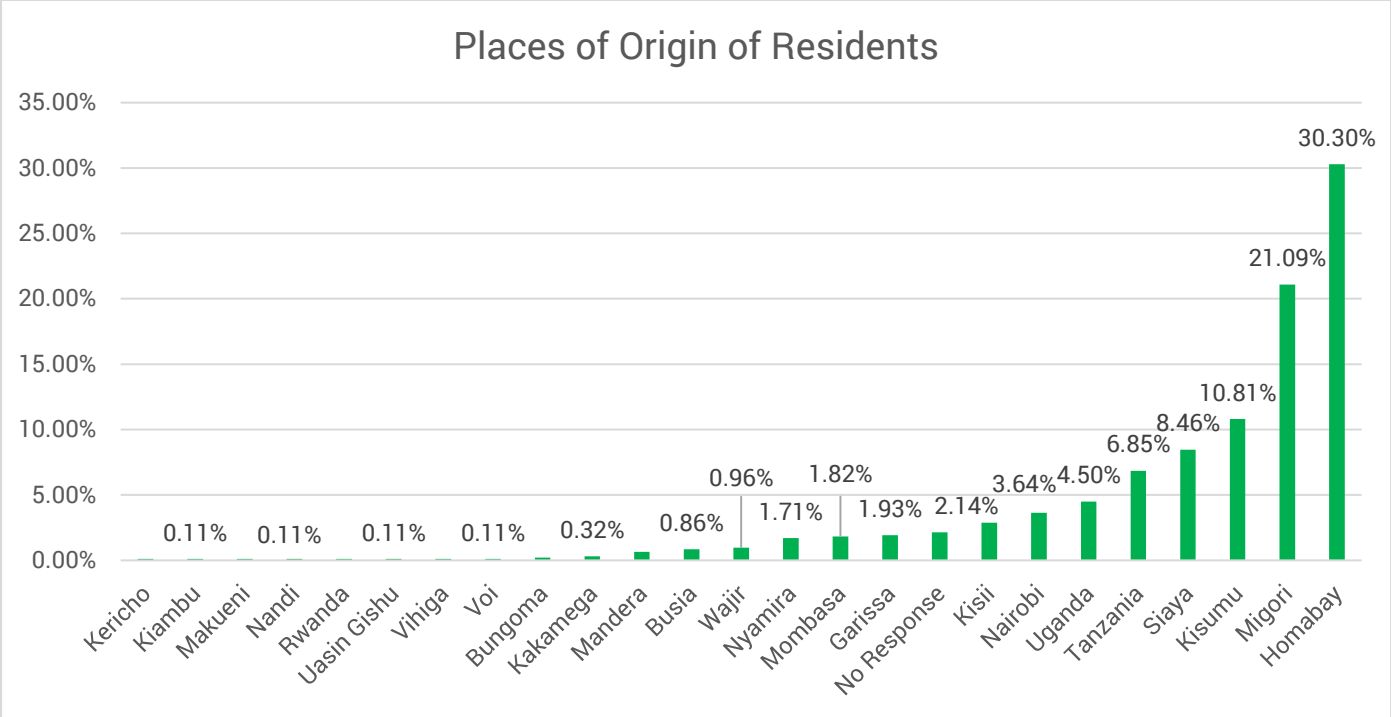


Figure 22 Places of Origin of Residents

A significant number (11.46%) are international migrants from Tanzania, Uganda, and Rwanda, likely including returnees, refugees, or diaspora settlers. These figures emphasize Remba Island's growing role as a regional and economic node in the Lake Victoria Region.

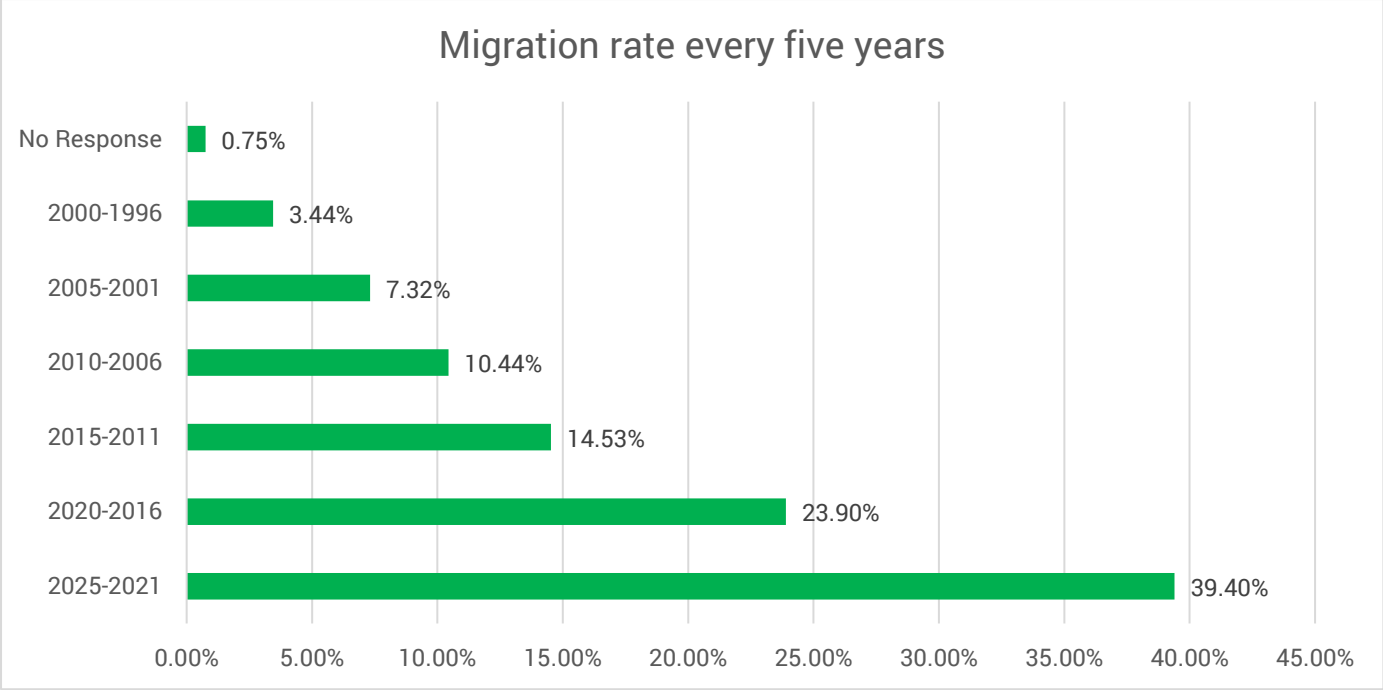


Figure 23 Migration Rate

The last 5 years (2021 -2025) have seen the highest rate (39.40%) of migration onto the island followed by the period between 2016 and 2020 with 23.90%. This highlights a growing need for both social and physical infrastructure development to support the growing population.

The drivers of migration are mostly economic. Among the migrant population, 40.97% reported moving to Remba Island to undertake fishing activities, while 31.94% noted employment as their primary reason. Others moved to pursue business opportunities (19.64%), or to be closer to family (3.77%). Less than 2% moved to access both educational facilities or other social services on the island. This is an indicator that the quality and quantity of social infrastructure is inadequate, therefore attractive a negligible percentage of immigrants.

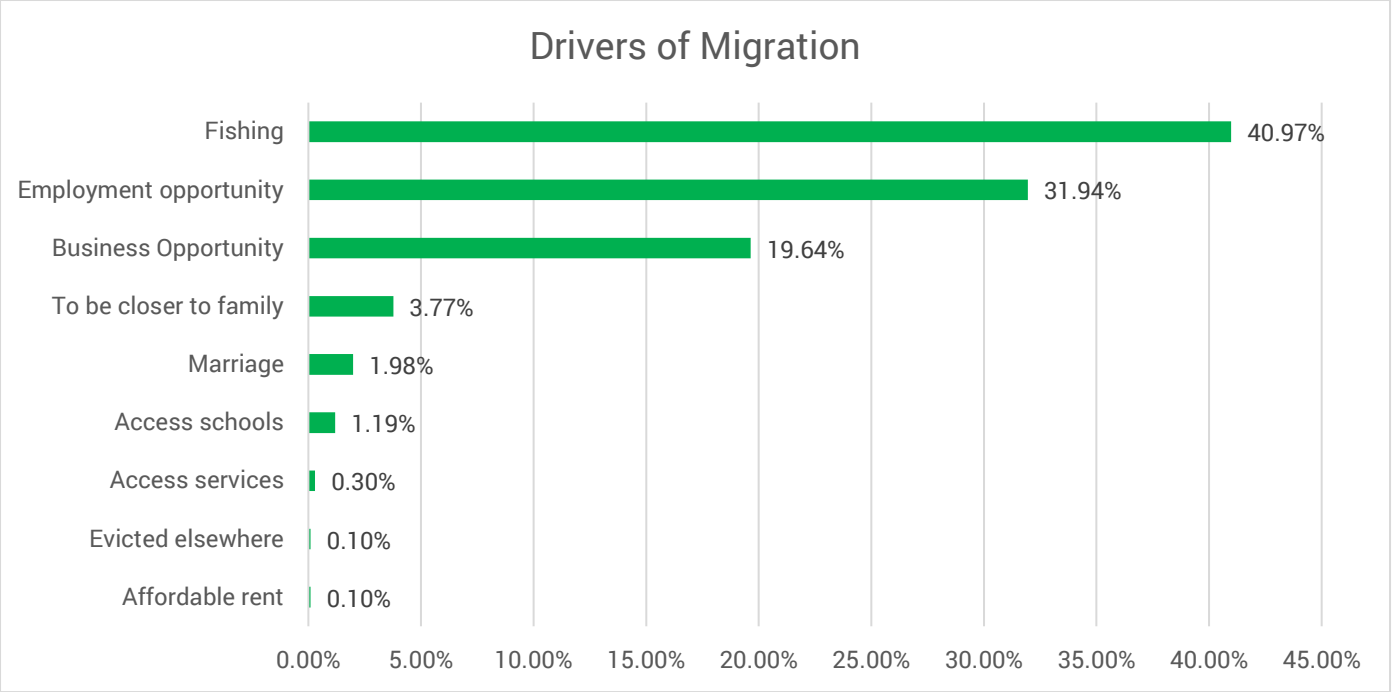


Figure 24 Drivers of Migration

The island not only absorbs a large share of the new population but also face increased pressure on essential services such as water supply, solid waste management, health, and education facilities. Migration also amplifies the visibility of vulnerable groups within the island.

As population influx continues, so does the demand for land, resulting in a notable transformation of land use. This has pushed fishing zones further outward, increased dependency on external supply chains, and degradation of riparian zones. The island is now witnessing horizontal sprawl, where unplanned developments expand beyond planned urban footprints and onto the Lake Victoria riparian reserve. These developments often lack basic services and are built in ecologically vulnerable areas. This shift calls for better land-use control mechanisms, upgrading of informal areas, and forward-looking planning to balance population growth with sustainability.

5.3 Housing Typologies

The 2025 enumeration revealed that housing structures in Remba Island are diverse, reflecting disparities in income levels, land access, and enforcement of planning regulations. The dominant housing form is row houses (59.00%)- row houses are narrow, single-room structures arranged closely in linear blocks, built from lightweight materials such as timber, iron sheets, or offcuts. This layout maximizes limited land while accommodating many tenants, but it also contributes to high density, poor ventilation, and limited access to open space, making them particularly vulnerable to fire, flooding, and wind damage.

Bungalows and cottages (39.85%) and this are more permanent and higher-quality dwelling compared to the temporary or row housing common in the settlement. The structures are built with stronger materials like brick, stone, or reinforced timber and belong to better-off residents, traders, and local administrators.

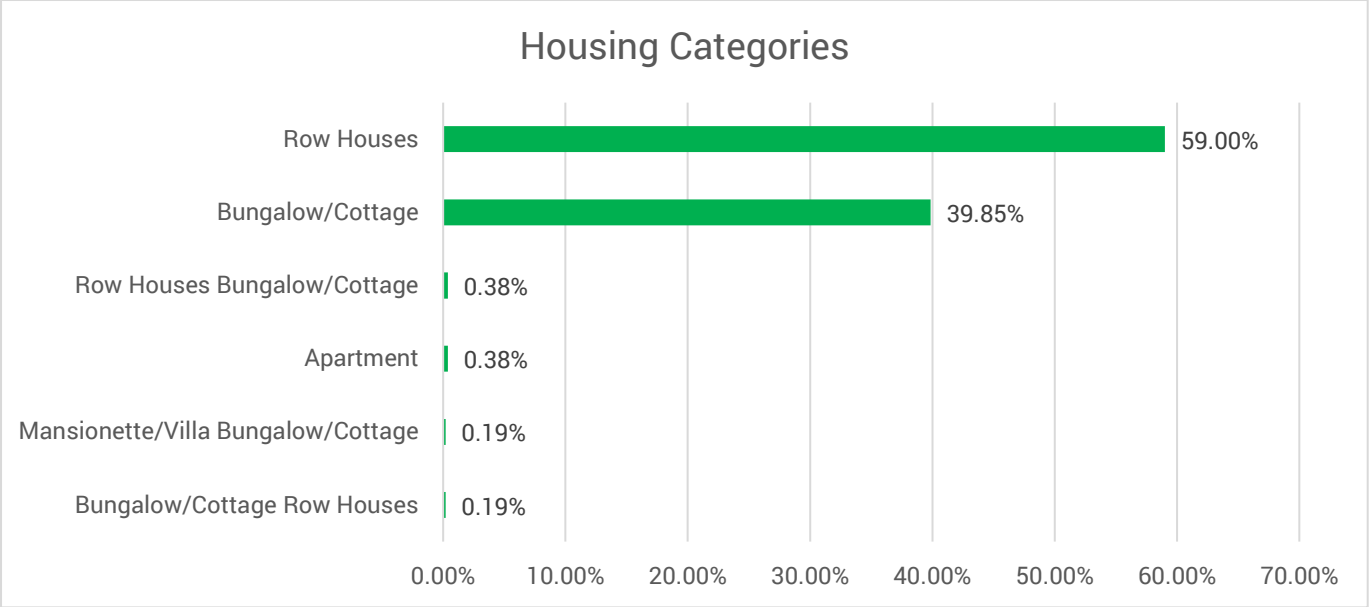


Figure 25 House Typologies

5.3.1 Building Materials

Building materials strongly influence the durability of homes and residents' vulnerability to hazards. Iron sheet roofing dominates (97.68%), reflecting affordability and ease of installation, though it contributes to excessive heat and noise.

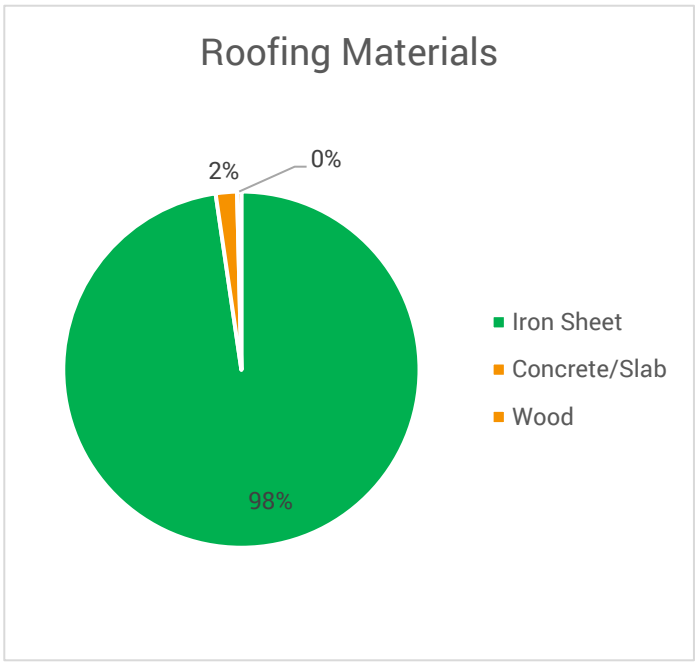
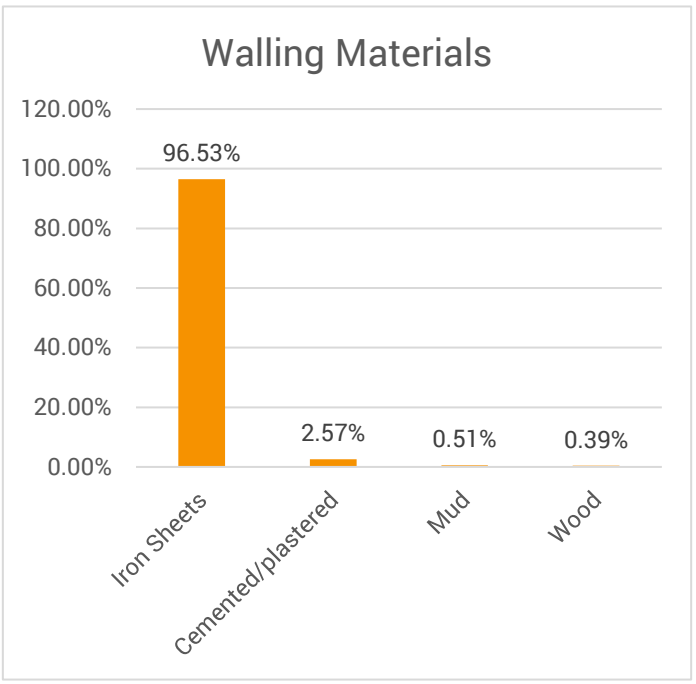


Figure 27 Roofing Materials



Similarly, walls are overwhelmingly made of iron sheets (96.53%), while cemented/plastered walls (2.57%), mud (0.51%), and wood (0.39%) remain rare.

Figure 26 Walling Materials

Flooring shows greater variation: concrete/cement floors (71.94%) dominate, but mud (11.58%) and earth floors (13.77%) are still common in low-income areas. This reliance on non-durable materials underscores limited affordability and access to construction financing.

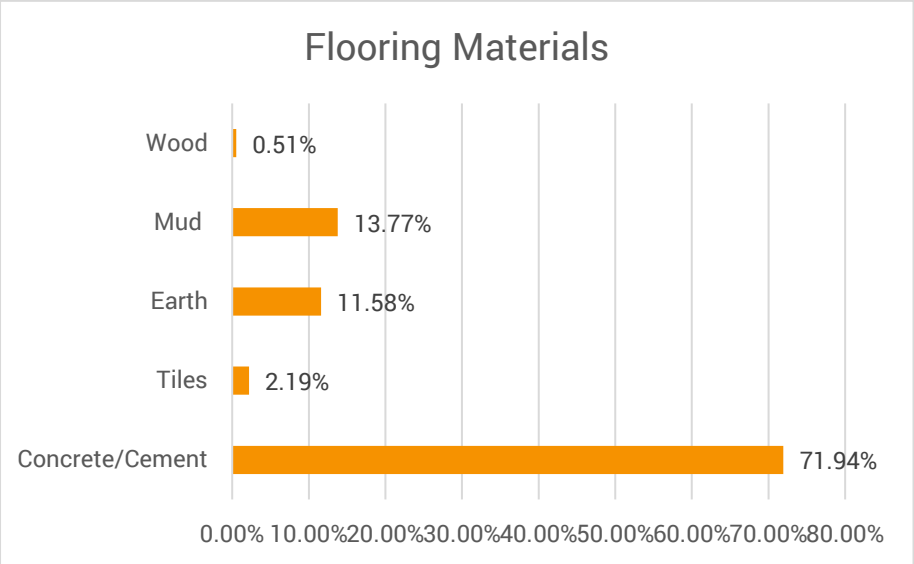


Figure 28 Flooring Materials

The combination of materials determines housing permanence. Fewer than 4% of buildings qualify as permanent, while 96.14% are semi-permanent or temporary. These structures are particularly susceptible to flooding, fires, and collapse, pointing to urgent needs for slum upgrading, subsidized access to durable materials, and enforcement of basic building standards.

Photo 1 Housing

Household overcrowding compounds housing vulnerabilities. The majority (73.10%) live in conditions where 1–2 persons share a room, while 17.45% experience 3–5 persons per room. More extreme cases include 3.86% with 5–6 persons, 1.93% with 7–8 persons, and 0.19% with 10 persons per room. Only 3.47% of households fall below one person per room, indicating relatively less congested living. These occupancy levels reflect limited land availability, low affordability, and reliance on small, semi-permanent structures. Overcrowding undermines health, privacy, and overall quality of life, reinforcing the island's profile as a settlement in urgent need of upgrading.

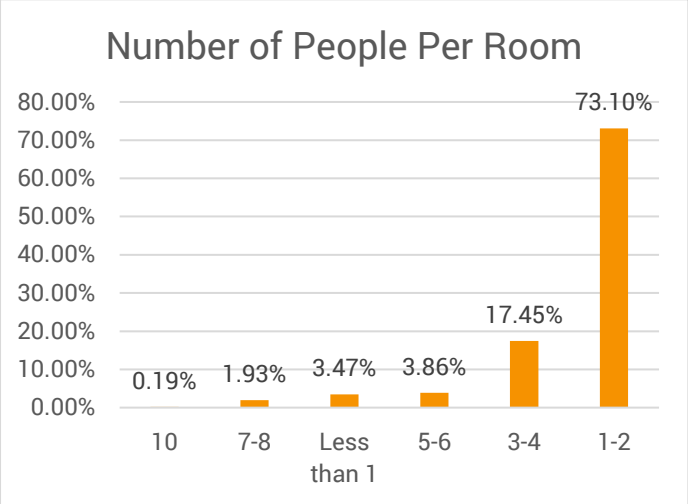


Figure 29 Number of People Per Room

Overall, the data shows that a significant proportion of residents experience high room occupancy rates, which directly impacts health, privacy, and quality of life. Such levels of overcrowding are consistent with the island's informal settlement characteristics, limited land availability, and inadequate housing infrastructure. This points to the need for better housing planning, upgrading initiatives, and allocation of space to reduce pressure on living conditions and improve habitability.

5.4 Cost of Housing

Housing costs in Remba Island reveal affordability challenges despite generally low rents. A large majority (84.62% of tenants) pay below Ksh 2,000 per month, with the average rent at Ksh 1,439. Although 66.7% of households spend less than 30% of their income on rent (meeting the global affordability benchmark), 33.28% exceed this threshold, indicating severe housing stress. This strain is especially acute among the 87.48% of households earning less than Ksh 4,800 per month, who cannot meet rent without compromising basic needs.

9.7% of households earn below Ksh 2,000, and 10.3% report irregular or no income, excluding them from credit and formal housing finance. Without social housing programs, this population is locked into unsafe, overcrowded, and poorly serviced dwellings.

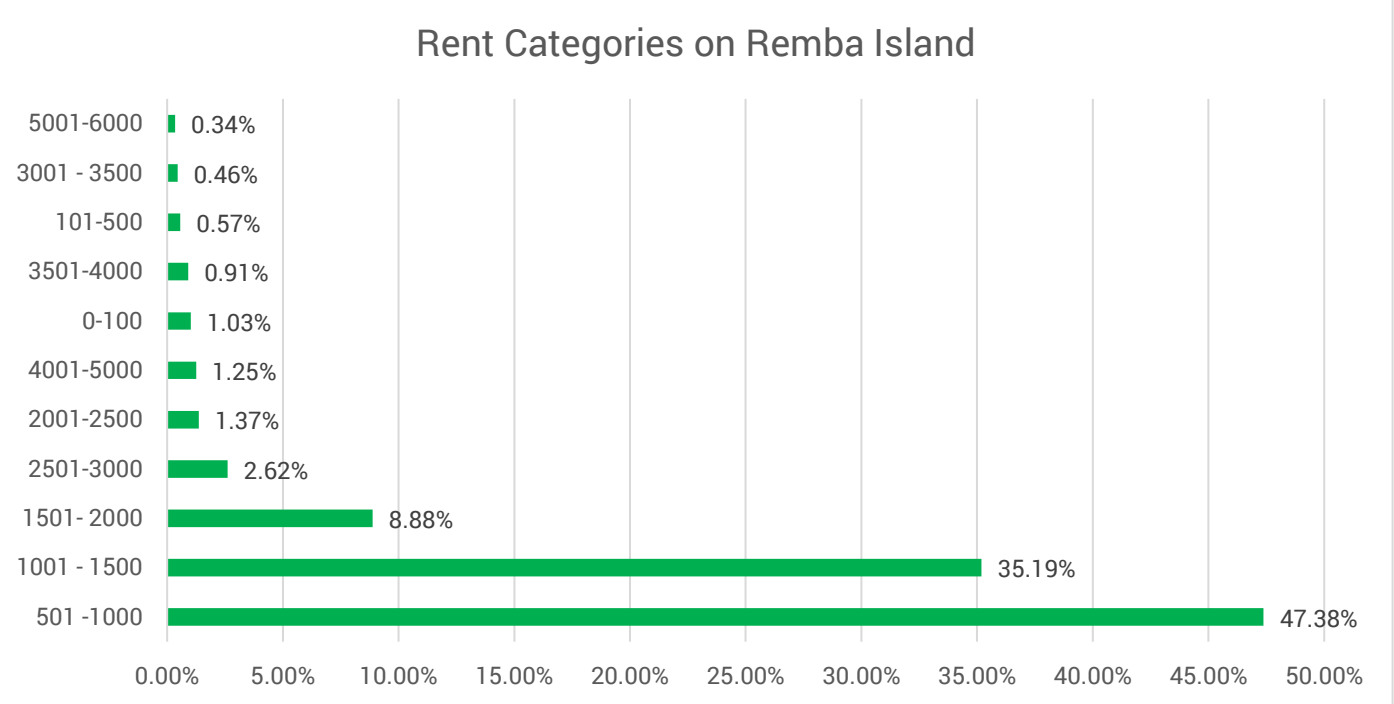


Figure 30 Rent Categories

Although rent prices are relatively low with over 66.7% spending a maximum of 30% of their income on rent, affordability is still a critical challenge across the island as an alarming 33.28% of tenants spend over 30% of their income on rent, the global affordability benchmark.

With the average rent at Ksh 1,439, households earning less than Ksh 4,800 per month—who represent 87.48% of the population—face severe housing stress. According to the global benchmark, rent should not exceed 30% of a household's income. By that standard, a minimum monthly income of Ksh 4,800 is required to afford the average rent without compromising other basic needs.

These households face a double bind: they cannot afford formal housing yet are excluded from financing mechanisms for homeownership or improvement due to the cost of the units as social housing is not provided, forcing many into overcrowded, unsafe, and poorly serviced dwellings.

The financial barriers to homeownership and housing upgrades are compounded by irregular incomes and lack of access to credit. As of 2025, 9.7% of households earn less than Ksh 2,000 per month, while 10.3% report irregular or no income. This severely limits their ability to save, qualify for loans, or invest in incremental housing improvements.

For tenants, the instability of rent prices and tenure insecurity further discourage investment in long-term housing quality. Addressing this challenge will require a multi-pronged approach that includes the expansion of affordable housing finance, introduction of micro-loan programs, and public private partnership rental housing initiatives targeted at low-income populations.

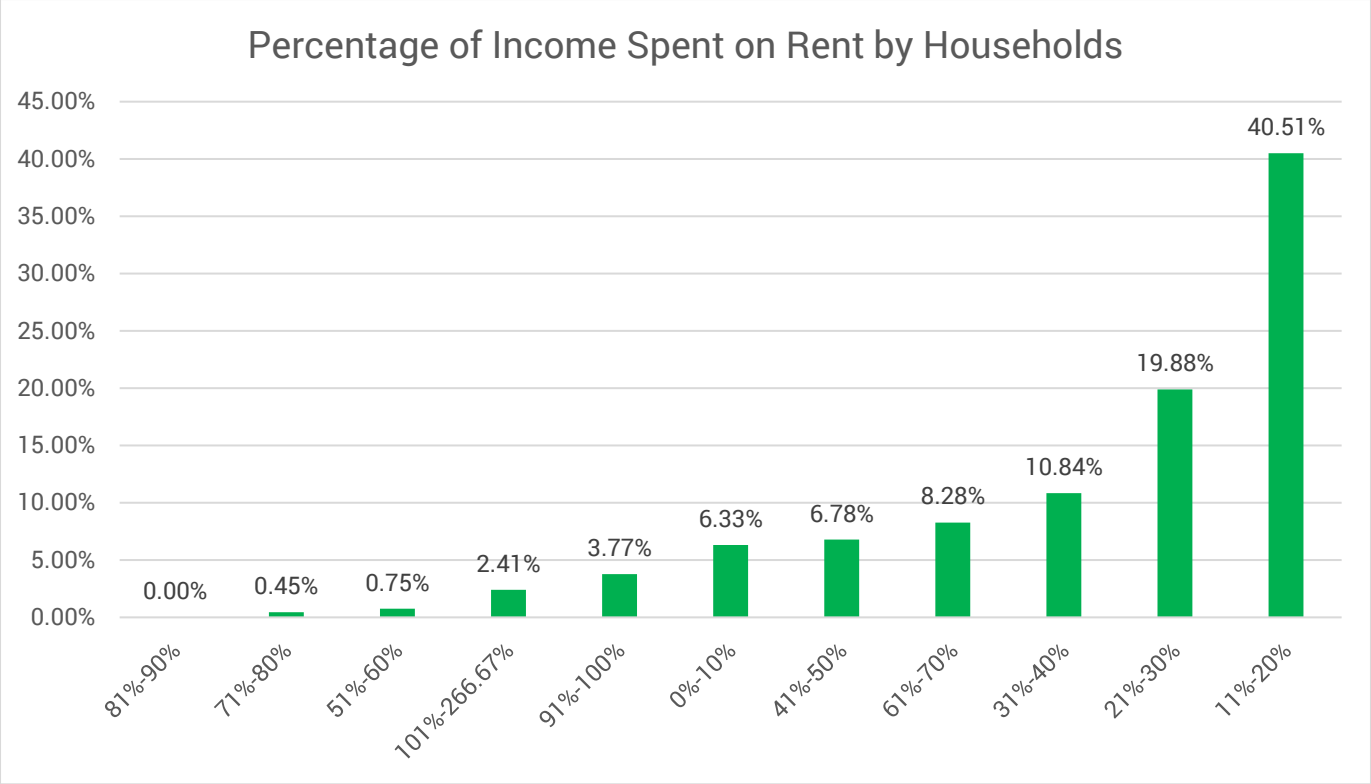


Figure 31 Percent of Income Spent on Rent

6 PHYSICAL INFRASTRUCTURE

6.1 Modes of Transportation

The transportation network on Remba Island is defined by its dependence on non-motorized and water-based systems, each carrying both opportunities and limitations for mobility and economic development.

Non-Motorized Road Transport

Non-motorized transport (NMT) is the dominant form of movement within the island's compact 0.22 km² On Remba Island, non-motorized transport (NMT) constitutes the primary mode of mobility, with walking and cycling serving as the dominant means of movement across its compact 0.22 km² area. This reliance on NMT is partly due to the island's small size, its socio-economic context, and the absence of motorized road infrastructure. However, despite its importance, NMT faces significant challenges that undermine safety, accessibility, and efficiency.

Photo 2 Existing Pathways

The existing paths on the island remain largely earthen, narrow, and undesignated, leaving them susceptible to congestion, erosion, and unsafe conditions for users. Seasonal flooding affects approximately 23% of households, further disrupting the usability of these paths, while rising lake water levels threaten another 47%. In addition, occasional landslides—though affecting only 3% of households—pose a serious risk in specific vulnerable areas, particularly on steeper slopes. These environmental pressures create frequent disruptions to daily mobility, reducing access to schools, healthcare facilities, and markets. The fishing economy, which forms the backbone of livelihoods on Remba, is especially compromised when mobility networks are cut off, as transporting fish to landing sites or moving supplies across the island becomes difficult.

The limitations of current NMT infrastructure also exacerbate safety risks. Lack of proper drainage along pathways often leads to pooling of stagnant water, creating slippery and hazardous walking conditions. At night, the absence of adequate street lighting compounds insecurity and discourages movement, particularly for women, children, and the elderly. Furthermore, congestion on the few shared paths—used simultaneously by pedestrians, bicycles, and motorcycles—raises the risk of accidents. These conditions collectively erode the habitability of the island and limit socio-economic opportunities.

To address these gaps, prioritizing investment in NMT infrastructure is critical. Interventions could include designating and upgrading pedestrian and cycling paths, constructing raised walkways in flood-prone zones, and developing an effective drainage system to reduce seasonal disruption. The installation of solar-powered street lighting would enhance both safety and accessibility after dark. Importantly, these interventions should be participatory, integrating local knowledge and community involvement to ensure affordability, sustainability, and ownership. Strengthening NMT infrastructure would not only improve safety and reliability but also enhance the island's resilience to climate-related shocks, boost economic productivity, and significantly improve the overall quality of life for residents.

Water Transport

Water transport remains the lifeline of Remba Island, connecting its residents to the mainland and to other islands on Lake Victoria. Within Homa Bay County, water transport is anchored by the Waterbus service, which provides relatively affordable, regular, and reliable ferry connections. The Waterbus operates along major routes, including the Homa Bay Northwest line, which serves destinations such as Sukru, Sota, Odango, Kisaka, Sikri, and Uwii, and the Homa Bay–Asembo Bay route, linking the town to Siaya County with stops at Kamito, Kunya, Doho, Mainuga, Banana, and Kajimo. It functions on a fixed schedule, typically four times a week, and serves not only passengers but also motorcycles, providing a critical

linkage for both people and goods. At a fixed fare of KSh 350 from Mbita West to Remba Island—equivalent to about 5.6% of the average household income—the Waterbus remains the most accessible formal transport option for most residents.

Beyond the Waterbus, other forms of water transport—particularly canoes and privately operated boats—play a central role in the daily functioning of the fishing economy. Small canoes enable short-distance movements, facilitate fishing activities, and provide immediate though limited transport options between nearby landing sites. Privately operated motorboats and speedboats, while faster and more flexible, remain prohibitively expensive, with fares ranging between KSh 2,500 and KSh 3,500 per trip. These costs often exceed half of the average household income on Remba Island, rendering such services inaccessible to most residents except in cases of urgent need, such as emergencies, trade expeditions, or travel to neighboring countries like Tanzania and Uganda.

Photo 3 Water Transport

While water transport is indispensable, it faces challenges of affordability, safety, and infrastructure. Over-reliance on informal operators has led to fare unpredictability and poor regulation, exposing residents to both economic and safety risks. Inadequate docking facilities further exacerbate the situation, as many landing sites are rudimentary and prone to flooding or damage during rough weather, limiting the efficiency and security of transport operations. In emergencies, the lack of reliable and affordable rapid response water transport worsens community vulnerability, particularly in relation to healthcare access.

Strategic interventions to strengthen water transport should focus on investment in modern landing sites and jetties to improve safety, efficiency, and climate resilience. Regulation and standardization of private boat fares would reduce exploitation and improve predictability for users. In addition, promoting community-managed transport cooperatives could increase affordability and provide residents with a sense of ownership over services. Together, these measures would create a more inclusive, affordable, and reliable water transport system that strengthens both the island's economic resilience and its social well-being.

Public Transport Accessibility

Despite the centrality of water transport, public transport accessibility on Remba Island remains severely limited. The Waterbus, while affordable, operates only four times a week, leaving large gaps in connectivity. This limited frequency means that residents must carefully plan their movements around the Waterbus schedule, often leading

to delays in accessing essential services. For low-income households, who already struggle with the cumulative cost of transport, the infrequency of affordable public options forces reliance on expensive private boats, thereby deepening economic strain.

The implications of limited accessibility are far-reaching. In healthcare, emergencies present a major challenge. With only one under-equipped health facility on the island—a shortfall highlighted by 48.79% of surveyed households—patients requiring advanced medical care face delays and significant risks. Evacuation by private boats is often prohibitively expensive, limiting timely access to lifesaving services. Education is similarly constrained. While the island has one primary school with a single ECDE center, secondary and tertiary learners must travel off the island to pursue further studies. The costs associated with frequent travel, combined with limited public transport options, result in many children completing only primary education, thereby curtailing long-term opportunities for human capital development.

Beyond health and education, the limited accessibility also undermines broader socio-economic mobility. Residents struggle to reach markets on the mainland, access government services, or participate in off-island employment opportunities. These barriers reinforce cycles of poverty and exclusion, leaving Remba's population marginalized despite their reliance on regional trade networks.

Addressing these challenges calls for an inclusive and sustainable approach to public transport planning. Strengthening partnerships between service providers, local authorities, and the community could help expand the frequency of Waterbus operations to meet daily needs. Subsidy schemes or targeted support for vulnerable groups such as students and patients could reduce affordability constraints. Furthermore, investing in emergency response boats or partnerships with NGOs and health service providers could significantly enhance resilience during crises. Ultimately, improving public transport accessibility would not only support socio-economic development but also reinforce equity, ensuring that mobility becomes a right rather than a privilege for Remba Island residents.

6.2 Energy

Electricity Supply and Access

Electricity access on Remba Island is entirely off-grid, as no household is connected to the national power grid. Instead, the majority of residents rely on local solar energy systems, primarily supplied by the Remba Island solar plant, which serves as the island's main source of electricity. A smaller portion of households continue to depend on alternative and less reliable sources such as kerosene lamps, batteries, flashlights, and candles for lighting. This situation underscores the island's isolation from national energy infrastructure and its growing reliance on decentralized, community-based solar power to meet daily energy needs.

Among the off-grid households, solar power emerges as the most widely used energy source, with 40.69% adopting solar panels for lighting. Solar's prominence can be attributed to its affordability relative to grid connection fees, its flexibility for small-scale adoption, and its accessibility through local vendors. However, its uptake is still constrained by several barriers. High initial costs of panels and batteries discourage adoption among low-income households, while unreliable vendors and lack of technical support result in frequent cases of malfunctioning or low-quality products. As a result, while solar power offers a cleaner, renewable, and potentially sustainable energy solution, its full potential is yet to be realized on the island.

Photo 4 Solar Lighting Supply

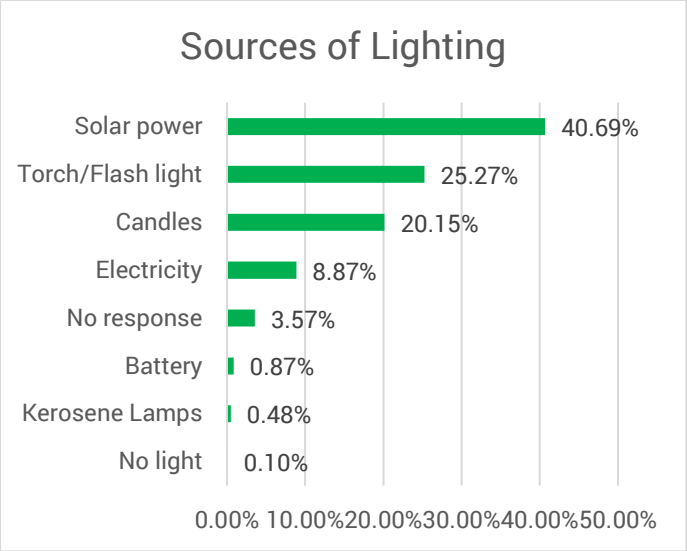


Figure 32 Sources of Lighting

Flashlights, which account for 25.27% of household lighting, represent another common alternative. While inexpensive and portable, they are heavily reliant on disposable batteries, making them environmentally unsustainable and economically inefficient in the long term. Meanwhile, about 20.15% of households rely on candles for lighting—a practice that signals both limited access to reliable electricity and heightened vulnerability. Candle use not only poses fire hazards, especially in congested housing environments, but also contributes to poor indoor air quality. The risks are particularly severe for children and the elderly, who are more prone to burns, respiratory irritation, and other health complications.

Overall, the energy landscape reflects an urgent need for interventions aimed at expanding both on-grid and off-grid electricity access. Investment in grid extension would enhance reliability and affordability in the long term, but given the logistical and financial challenges of extending grid infrastructure to remote islands, off-grid renewable solutions—particularly community-based solar micro-grids—may offer more immediate and sustainable gains. Policy support, financial incentives such as micro-credit schemes, and partnerships with reliable vendors could significantly enhance solar adoption. Such measures would not only reduce dependence on unsafe alternatives like candles and kerosene but also improve household safety, reduce indoor pollution, and enhance socio-economic opportunities, including the ability to support evening study, power small businesses, and facilitate communication technologies.

Cooking Energy and Indoor Air Pollution

Cooking energy patterns on Remba Island are dominated by the widespread use of solid fuels. Charcoal is by far the most prevalent cooking fuel, relied upon by 84.47% of households. Its popularity is largely due to its affordability, ready availability, and cultural familiarity. However, charcoal use carries severe implications for both human health and environmental sustainability. Burning charcoal indoors releases smoke and fine particulate matter, contributing to household air pollution. Prolonged exposure has been strongly linked to respiratory illnesses such as chronic bronchitis, asthma, and pneumonia, as well as eye irritation and other health risks. These effects disproportionately affect women and children, who typically spend more time around cooking areas.

Some households (2.60%) have adopted improved charcoal stoves, which burn fuel more efficiently and reduce emissions compared to traditional stoves. While these provide some health and environmental benefits, their overall effectiveness depends heavily on ventilation within homes and consistent proper use. Many cooking spaces in Remba's informal settlements lack adequate ventilation, limiting the impact of these stoves on reducing indoor air pollution.

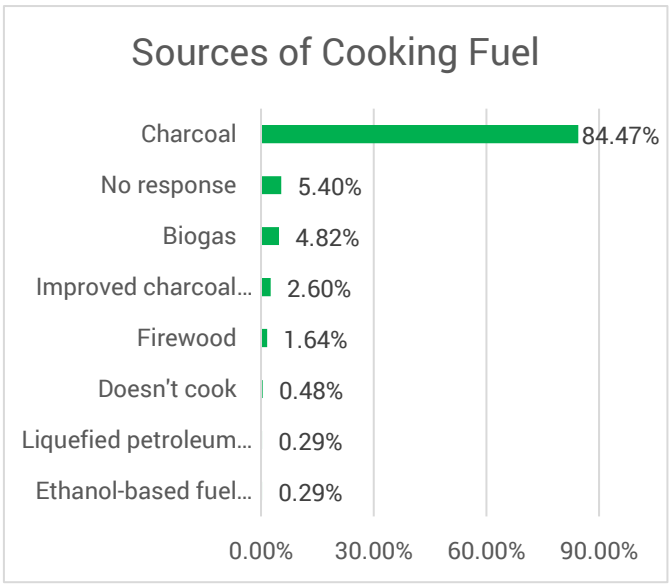


Figure 33 Sources of Cooking Fuel

Cleaner cooking alternatives are present but remain underutilized. Only 0.29% of households use liquefied petroleum gas (LPG), while 4.82% report using biogas. Both of these options offer significant advantages in terms of efficiency, cleaner combustion, and reduced health risks. However, adoption remains constrained by high upfront costs, limited distribution networks, and lack of awareness or technical knowledge. Other alternatives such as electricity, ethanol, solar cookers, and briquettes have negligible penetration on the island, likely reflecting both affordability challenges and insufficient supply chains.

The reliance on charcoal and other solid fuels also has broader ecological consequences. Unsustainable harvesting of wood for charcoal contributes to deforestation, which threatens the already fragile ecosystems around Lake Victoria. Given Remba Island's high population density and limited land area, such unsustainable practices exacerbate environmental

degradation and reduce the island's resilience to climate change impacts, including flooding and soil erosion.

Addressing these challenges requires a multifaceted approach. Expanding access to cleaner fuels such as LPG, ethanol, and biogas could significantly reduce health burdens, provided that affordability and supply chain issues are addressed. Promoting improved stove technologies alongside ventilation awareness campaigns could further mitigate risks where households continue to use solid fuels. In the longer term, investment in renewable energy-based cooking technologies such as solar cookers and biomass briquettes could offer sustainable solutions aligned with both health and environmental objectives. Partnerships between government agencies, NGOs, and private actors will be crucial in scaling up these cleaner energy alternatives and ensuring their accessibility to the island's low-income households.

6.3 Water

Water access on Remba Island reflects a blend of formal and informal systems, shaped by infrastructural gaps, affordability challenges, and local adaptations. The vast majority of households (75.22%) depend directly on Lake Victoria for their domestic water needs, a reliance that exposes residents to serious health and environmental risks due to contamination and fluctuating water quality. Only 0.48% of households are served by the public utility HOMAWASCO, underscoring the limited penetration of formal water infrastructure.

Alternative sources include communal taps (9.55%), water kiosks (8.20%), vendors (0.87%), and tankers (0.19%). While these options fill service gaps, they vary in cost, reliability, and quality. Communal taps and kiosks are particularly important for households seeking safer drinking water.

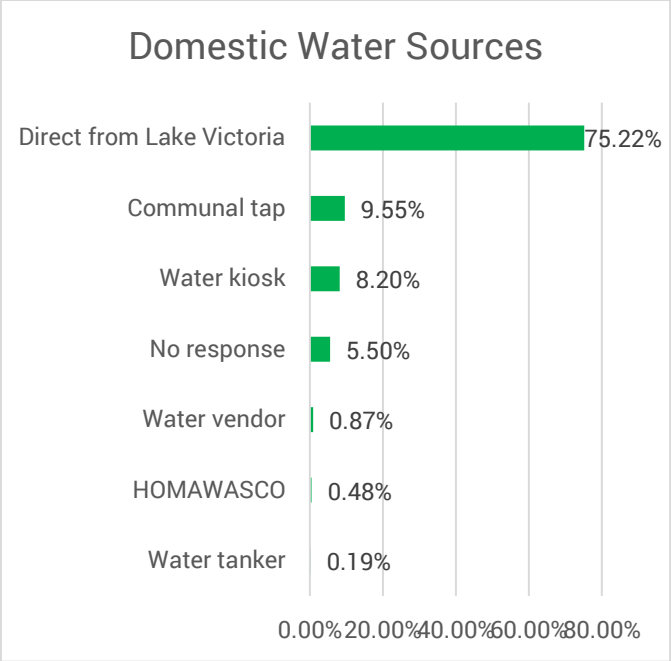


Figure 34 Domestic Water Sources

When asked specifically about drinking water, most households reported preferring these safer alternatives: 49.37% rely on communal taps, 18.13% on kiosks, 13.11% on Lake Victoria, and 7.91%

on vendors. Rainwater harvesting, though less common, is also practiced by a small number of households as a supplementary source.

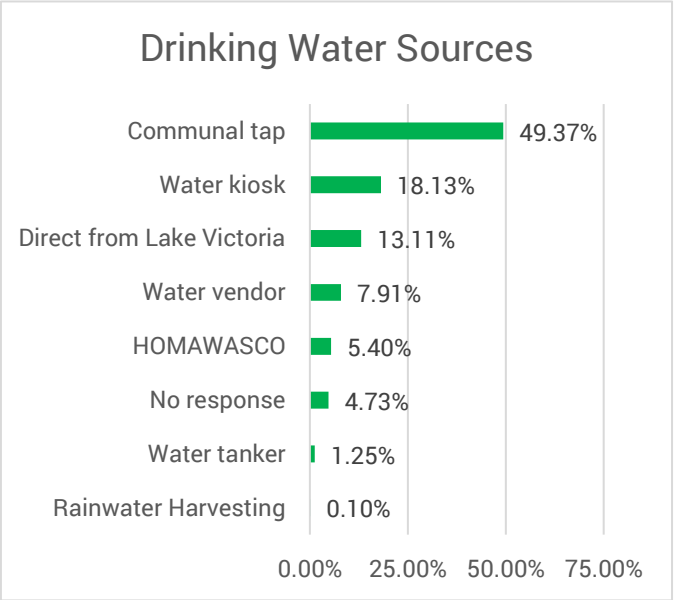


Figure 35 Drinking Water Sources

Photo 5 Water Provision

This dual pattern—lake water for general domestic use but safer communal sources for drinking—highlights residents' awareness of water quality risks and their attempts to mitigate them. At the same time, it underscores the insufficiency of current infrastructure to guarantee safe and reliable drinking water.

Water Quality and Safety

Perceptions of water safety vary widely. A majority of households (63.07%) consider their drinking water safe, while 28.74% report it as unsafe, and the remainder are uncertain or did not respond. To mitigate risks, 44.30% of households treat their water before consumption, while 54.36% do not treat it—often due to perceived safety of certain sources (like taps), lack of awareness, or inability to afford treatment methods.

Among those who treat water, boiling is the most common method (61.07%), followed by chemical disinfection (36.64%) with chlorine tablets, and only 2% use filtration systems. This heavy reliance on boiling reflects both the limited availability of filtration technologies and the affordability of locally accessible methods. However, consistent boiling also implies added pressure on already strained household energy resources, especially in a community where charcoal is the dominant cooking fuel.

The data signals a public health concern: households consuming untreated water—particularly those relying on Lake Victoria or informal vendors—are at heightened risk of waterborne diseases (54.57% of households are already affected) such as cholera, dysentery, and typhoid. Public education on water safety, distribution of low-cost filtration technologies, and improved monitoring of supply systems would significantly reduce these risks.

Water Accessibility and Distance

Distance to water sources is a key determinant of daily convenience and household labor allocation. Only 1.16% of households enjoy piped water within their compounds. The majority (54.10%) walk less than five minutes to fetch water, while 29.13% walk between five and ten minutes. A smaller proportion (11.18%) travel over ten minutes, reflecting unequal access across the island.

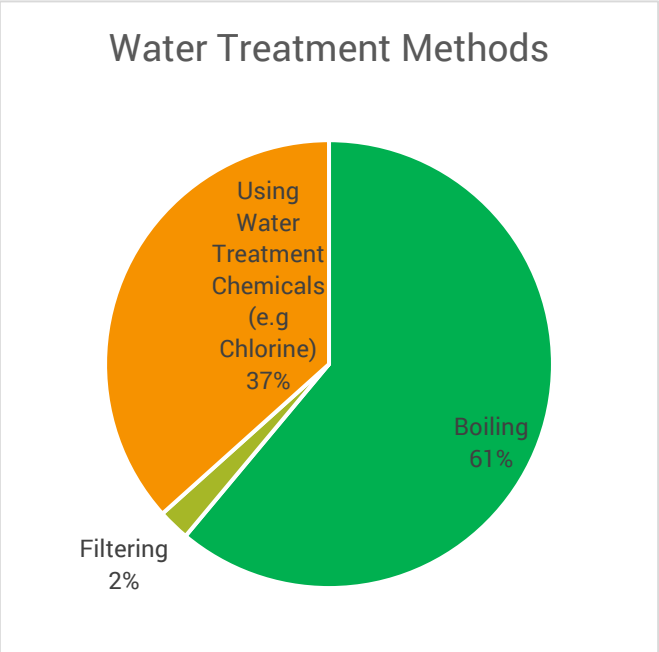


Figure 36 Water Treatment Methods

For households with longer distances, water collection consumes valuable time that could otherwise be dedicated to work, school, or caregiving. Moreover, the burden often falls disproportionately on women and children, reinforcing gendered inequalities. While distance may not be the greatest barrier compared to cost or quality, it remains a critical factor for vulnerable groups.

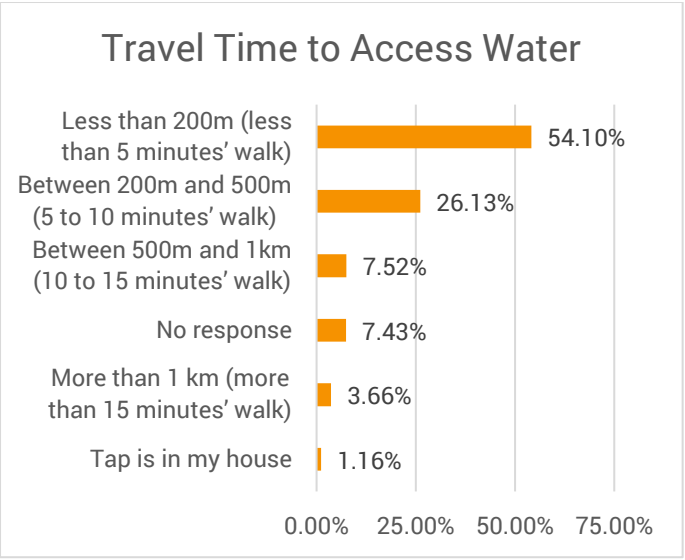


Figure 37 Travel Time to Access Water

Cost of Water

Over 89% of households use between 20 to 100 liters of water per day, only 10.04% use more than 100 liters. Water costs vary dramatically by source, often creating inequities in affordability. Water from regulated public kiosks averages Ksh 16 per 20-liter jerrican, representing 23.97% of a low earner's daily income. Tanker water is even more prohibitive, at Ksh 123 per 20 liters, consuming about 19.20% of a daily income. Communal taps are slightly cheaper at Ksh 13 per jerrican (18.46% of daily income). Paradoxically, water vendors—despite often being informal and unregulated—charge the lowest rates, averaging just Ksh 2 per jerrican, though quality is typically questionable.

By contrast, HOMAWASCO's official tariff is far cheaper, at only Ksh 3 per 20 liters, translating to about Ksh 7 per month for an average household consumption of 129.24 liters per day. Yet in practice, households in informal settlements pay Ksh 600–1,200 per month for the same volume of water, meaning residents often pay between 200% and 500% more than the official utility rate. This "poverty penalty" illustrates how marginalized communities pay disproportionately higher prices for water of lower quality.

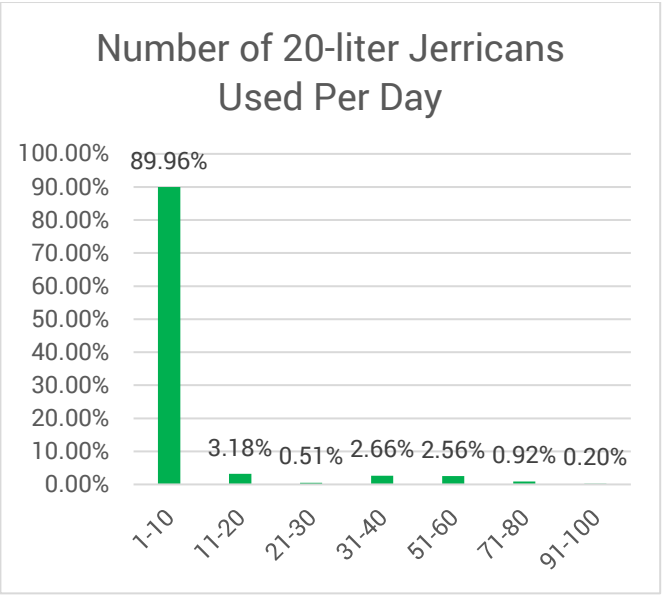


Figure 38 Number of 20-liter Jerricans Used Per Day

Water Reliability

Reliability is another critical dimension of water access. Around 38.86% of households report frequent interruptions in supply. Most commonly, households face disruptions lasting **1–3 days (65.51%)**, but a significant portion (29.53%) endure outages of more than three days to over a week. A smaller group (3.72%) experience prolonged interruptions of up to a month. These supply gaps disrupt household routines, compromise hygiene, and exacerbate food and water insecurity. They also force households to turn to unsafe emergency alternatives such as untreated lake water.

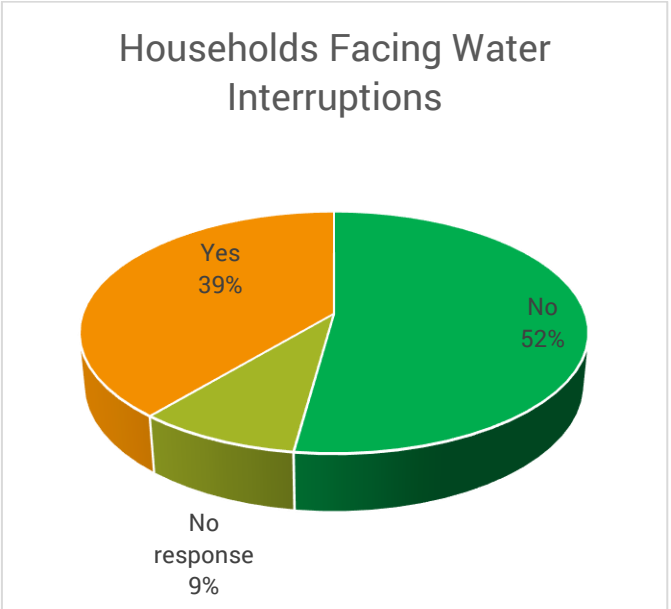


Figure 39 Households Facing Water Interruptions

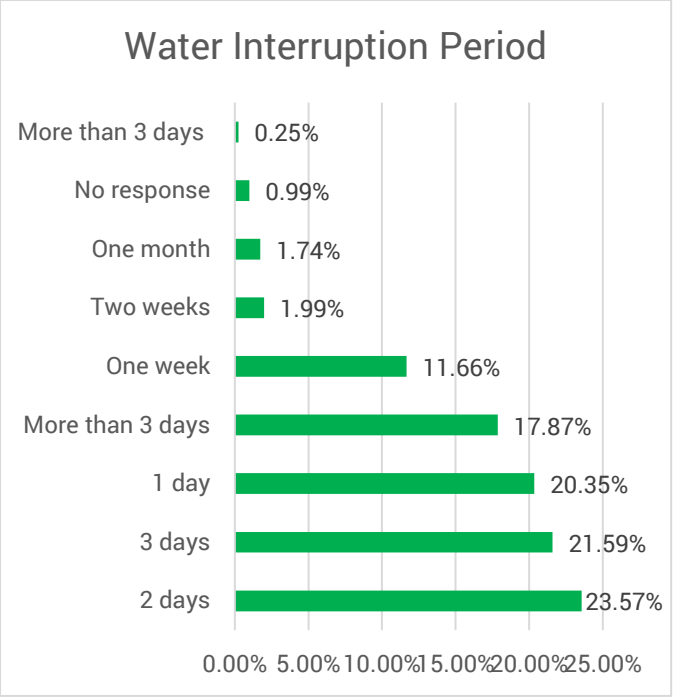


Figure 40 Water Interruption Period

The contrast between the highest and lowest reported durations underscores the uneven nature of water supply reliability across the island. Overall, the situation reflects an urgent need for investment in resilient water systems and better contingency planning, especially for communities vulnerable to prolonged shortages.

Challenges Affecting Water Provision

The most significant challenge reported by households is water contamination (32.96%), highlighting serious public health risks. This is followed by irregular supply (27.81%), which undermines trust in existing systems. High cost (14.85%), inadequate storage (9.87%), and dependence on unregulated vendors (3.69%) add to the complexity of water insecurity. Notably, only 0.09% cited distance as their main challenge, confirming that quality, cost, and reliability far outweigh proximity as barriers.

These findings point to the urgent need for comprehensive water interventions: upgrading infrastructure, enforcing regulation of informal providers, subsidizing safe water for low-income households, and investing in storage facilities to mitigate supply gaps. Long-term strategies should also include water treatment plants, community water cooperatives, and stronger partnerships between HOMAWASCO, county authorities, and development partners to ensure equitable access.

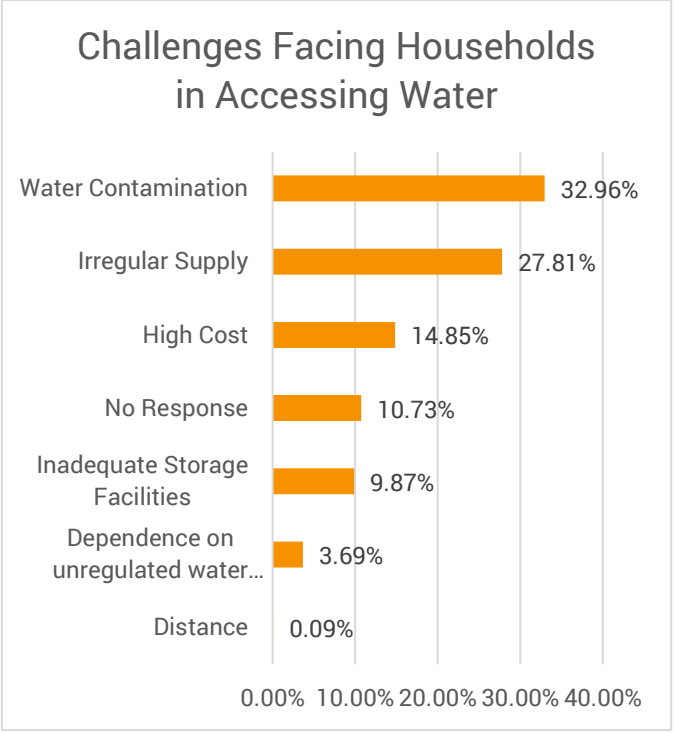


Figure 41 Challenges Facing Water Access

6.4 Sanitation

Sanitation on Remba Island is marked by severe infrastructural deficits and heavy reliance on unsafe, informal arrangements. The household survey shows that the island is not connected to any sewer system, forcing households to depend on alternatives such as pit latrines (55.06%) and, worryingly, open defecation within the settlement (17.26%). An additional 9.16% of households defecate directly into Lake Victoria, while only a small proportion of residents have access to relatively improved sanitation: 3.66% use flush toilets connected to septic tanks, and 2.99% use flush toilets not connected to any septic system or sewer. These figures illustrate the scale of sanitation deprivation and its direct contribution to environmental contamination, health risks, and deteriorating water quality.

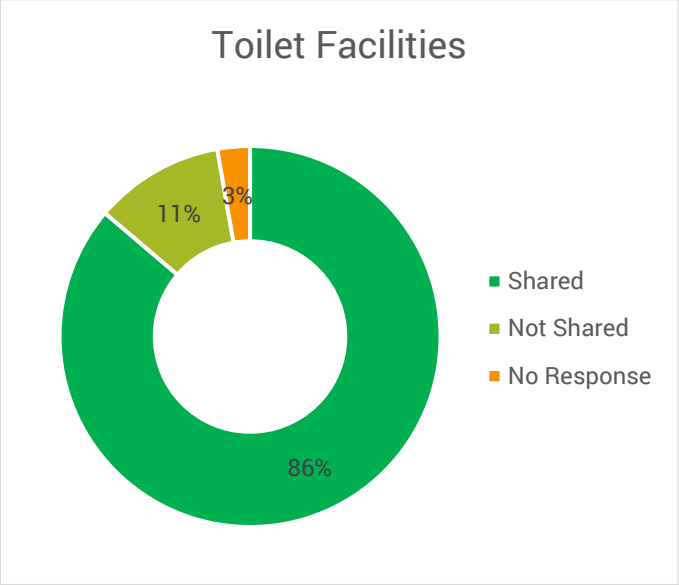


Figure 42 Toilet Facilities

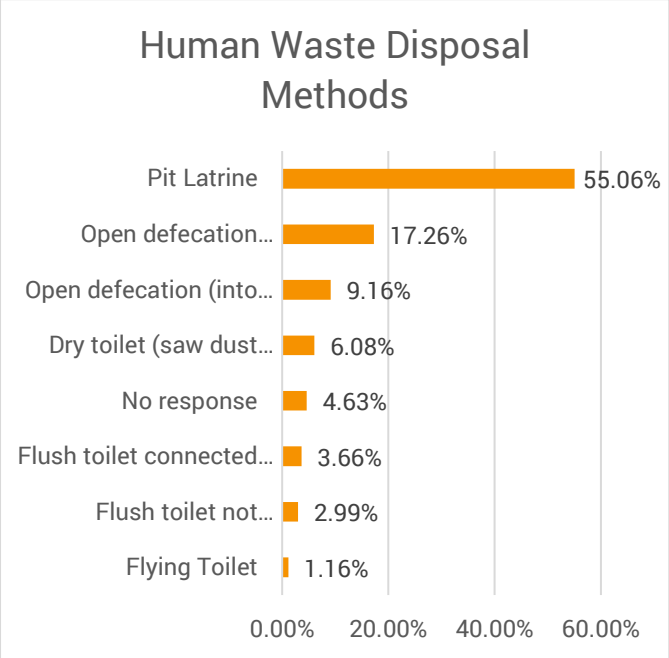


Figure 43 Human Waste Disposal Methods

Shared sanitation dominates the island's service landscape, with 86.22% of households depending on communal facilities. Of these, the vast majority (81.13%) use pay-per-use toilets, while smaller groups rely on less structured solutions such as open defecation within the settlement (5.94%), plot-level toilets (4.87%), free public toilets (4.41%), or community-managed shared toilets (3.35%). While shared sanitation fills a critical gap, its widespread use also raises concerns around hygiene, overcrowding, and gender-based safety. Indeed, nearly half of households (48.70%) reported feeling unsafe when accessing toilets, an indicator of both social vulnerability and gaps in facility design, lighting, and security measures.

Photo 6 Toilet Facilities

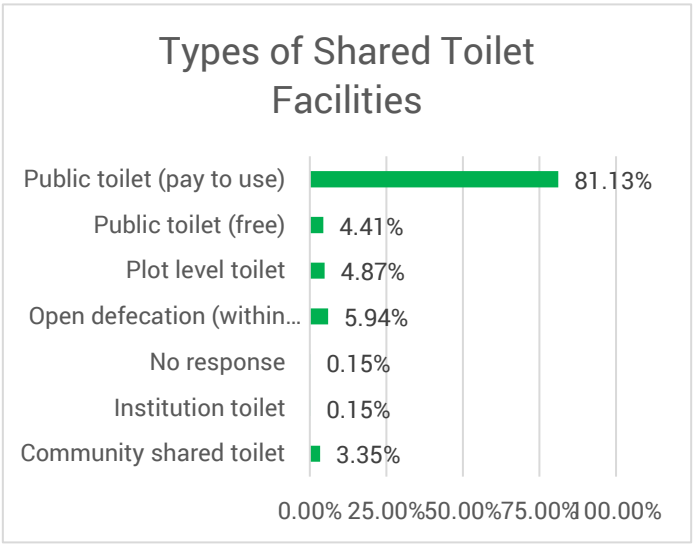


Figure 44 Types of Shared Toilet Facilities

Affordability is another critical issue. Households using pay-to-use toilets face ongoing financial burdens, with 85.63% paying between Ksh 10–19 and 12.89% paying between Ksh 20–39 each time they use a facility. These cumulative costs disproportionately affect low-income households, pushing some residents to resort to unsafe alternatives such as open defecation or direct disposal into the lake.

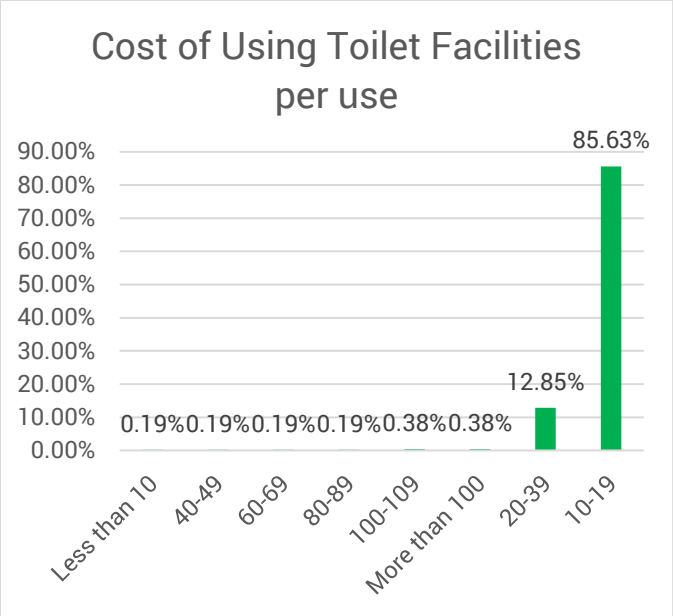


Figure 46 Cost of Using Toilet Facilities Per Use

Figure 45 Sense of Safety Using Toilets

49% of Remba Island residents feel unsafe using toilet facilities, 44% feel safe, and 7% gave no response. This pattern reveals significant safety concerns within sanitation access—issues that disproportionately affect vulnerable groups, especially women, children, and people with disabilities.

In Remba's context, where most sanitation facilities are shared, pay-per-use, Open Defecation and often poorly lit and located in congested areas, fear of harassment and assault is common. Women and girls, in particular, are at risk when facilities are distant, lack privacy, especially at night. The elderly and persons with disabilities also face physical barriers and heightened insecurity due to the absence of inclusive design and supervision.

This widespread sense of unsafety undermines not only personal dignity but also public health, as some residents resort to open defecation or direct disposal into the lake. This underscores the urgent need for gender- and disability-sensitive sanitation planning—including improved lighting, facility design, community policing, and involvement of (BMUs) and women's groups—to ensure that sanitation access is safe, equitable, and inclusive for all

Waste management practices for filled latrines and septic tanks further highlight the fragility of the sanitation system. When facilities reach capacity, 28.93% of households dispose of waste directly into the lake, exacerbating pollution and health hazards. Others rely on local authorities for emptying services (21.99%), though such services are often inconsistent. A small share (5.21%) attempt to empty latrines into soak pits or drains. Alarmingly, 28.64% of households reported not knowing what happens to waste once their facilities fill up, revealing significant gaps in public awareness, sanitation governance, and accountability.

Figure 47 Toilet Waste Management Techniques

These trends underscore the urgent need for investment in sustainable sanitation solutions. Strengthening waste management systems, promoting ecological sanitation models, reducing reliance on shared and unsafe options, and enforcing environmental safeguards are essential to safeguarding public health and the ecological integrity of Lake Victoria.

6.5 Solid Waste Management

According to NEMA, the average Kenyan generates approximately 0.5 kilograms of waste daily. Based on the current population of 2,297, Remba Island produces an estimated 1148.5 kgs (1.15 tons) of waste per day. Based

on projected population growth to 2,786 over the next ten years, daily waste generation is expected to rise to 1,393 kilograms (1,39 tons).

Provisions for solid waste management on Remba Island remain severely constrained, with only 5.21% of households accessing any form of public waste collection. Among these, collection occurs sporadically, with 78.26% receiving the service once a week and 15.22% twice a week. Such limited and irregular coverage leaves the vast majority of residents reliant on unsafe, informal practices for waste disposal.

Photo 7 Solid Waste Management

The 2025 enumeration reveals that most households resort to environmentally hazardous methods. Approximately 28.16% of residents dispose of waste directly into Lake Victoria, significantly undermining water quality, aquatic ecosystems, and human health. Another 32.59% dump waste in designated areas, though these sites are often unmanaged, unlined, and prone to overflowing, creating unsanitary conditions. Additionally, 23.24% of households rely on open burning, which contributes to air pollution, respiratory illness, and greenhouse gas emissions. Very few households—only 0.77%—make use of private or group collection services. However, these services are prohibitively expensive for many: the average cost of private collection stands at Ksh 1,295 per month, consuming nearly 14.87% of the average household income. This cost burden explains the very low uptake despite the obvious need for structured and reliable services.

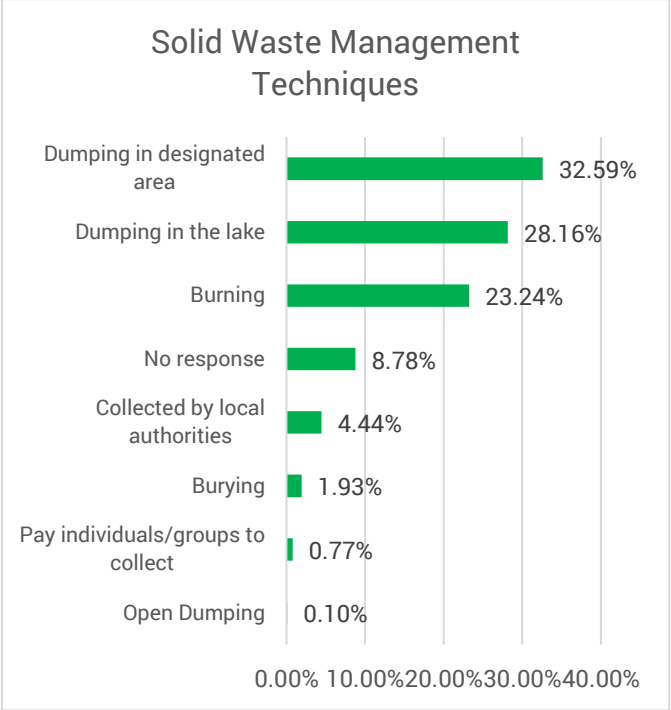


Figure 48 Solid Waste Management Techniques

The dominance of dumping and burning practices underscores not only gaps in infrastructure but also systemic weaknesses in waste governance and enforcement. The environmental consequences are particularly acute, as widespread dumping into the lake accelerates eutrophication, threatens fish stocks, and directly impacts the livelihoods of the island's fishing-dependent population. Blocked drainage channels from uncollected waste further heighten flood risks during heavy rains, while accumulation in settlements fosters breeding grounds for disease vectors such as mosquitoes and rodents.

Addressing these challenges requires a multi-pronged approach. Expanding the coverage and frequency of public collection services is critical, alongside investment in decentralized waste management infrastructure that can function in the island's dense and informal urban environment. Strengthening regulatory enforcement, introducing community-managed collection points, and incentivizing household-level waste segregation could also reduce reliance on unsafe methods. In parallel, targeted subsidies or cooperative models may be necessary to make private or group services more affordable. Without urgent intervention, waste management will remain a growing public health crisis and a barrier to sustainable urban development on Remba Island.

6.6 Information, Communication, and Telecommunications

Mobile Network and Internet Coverage

There is widespread availability of mobile phones across the island, reflecting national trends toward high mobile penetration rates, even within informal settlements. Mobile phones are predominantly used for communication, mobile money transactions, accessing news, and conducting informal business activities. However, variations exist in the type and quality of mobile phone access, with some households using basic mobile phones while others have smartphones that enable more diverse functions, including internet access.

Facebook remains widely used, especially among the older generation, for sharing community updates and engaging in local discussions. Meanwhile, younger audiences are increasingly turning to platforms like TikTok, Instagram, and X (formerly Twitter) to consume and share news, entertainment, and opinions in real-time. This evolving media ecosystem ensures that residents across age groups remain informed, engaged, and connected to both local and national developments.

Internet accessibility, however, has significantly lower penetration levels compared to mobile phone usage. Internet access is primarily through mobile data subscriptions, with limited availability of broadband or fixed internet connections. Households with internet access generally use it for social media, communication, accessing educational content, and informal business or trade. However, cost barriers, lack of awareness, limited digital literacy, and inconsistent network connectivity constrain broader adoption and usage among residents.

Photo 8 Telecommunication Masts

Mass Media Communication

Remba Island is served by a rich and diverse mass media environment that plays a central role in public awareness, civic engagement, and cultural expression. Radio is the dominant mode of mass communication, with several local and regional stations such as Ramogi FM (97.0 FM), Girwa FM (105.0 FM), Lolwe FM, Mayienga FM, and Victoria Radio broadcasting within the municipality. These are complemented by popular national stations such as Radio Citizen, Radio Maisha, and Radio Jambo, which enjoy strong followings and provide a mix of news, entertainment, and national dialogue in English, Kiswahili, and local languages.

Television access is more limited and largely concentrated in entertainment zones, where residents gather to watch national broadcasters including Ramogi TV, Citizen TV, KTN, NTV, and KBC. These channels regularly feature content relevant to Remba Island residents, from coverage of County affairs to broader national programs. The print media space remains important as well, with widely circulated newspapers such as *The Standard* and *Daily Nation* offering both national and localized reporting.

7 SOCIAL INFRASTRUCTURE

7.1 Education

Access to Educational Institutions

The graph illustrates the distribution of educational access and attendance among residents of Remba Island, highlighting the dominance of primary education and the limited reach of secondary and tertiary institutions. According to the data, the majority of learners—55.7%—attend primary school within the settlement, showing that most children access basic education locally. This aligns with the island's educational landscape, where a single primary school serves as the main centre of learning and community development.

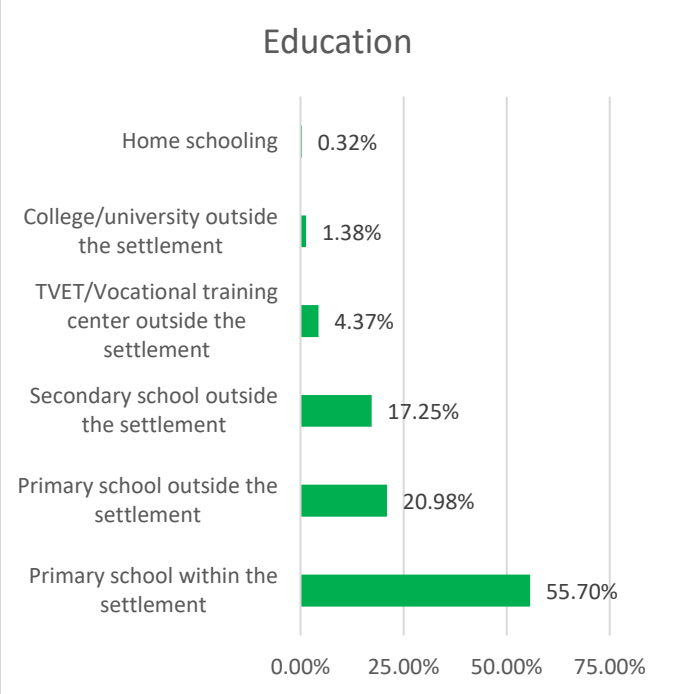


Figure 49 Education

However, 20.98% of respondents indicated that they or their children attend primary schools outside the settlement, reflecting that while local access exists, capacity and quality constraints may push some families to seek better facilities elsewhere. Secondary education is mainly accessed outside Remba, with 17.25% of learners attending schools beyond the settlement—an indicator of limited local infrastructure for higher levels of learning. This dependence on off-island institutions poses challenges, especially during adverse weather when transport across the lake becomes difficult.

Access to TVET (Technical and Vocational Education and Training) and college or university education is notably low, at 4.37% and 1.38% respectively, underscoring a lack of advanced educational opportunities on the island. This gap limits youth access to technical and professional skill development, which are vital for local economic diversification beyond fishing. Home schooling, at just 0.32%, is almost non-existent, reflecting reliance on formal education systems despite infrastructural and economic constraints.

Overall, the graph reveals that Remba Island's education system is heavily skewed toward basic education, with limited pathways for higher and technical learning. The concentration of primary education within the settlement demonstrates some progress in accessibility, but the sharp decline in attendance beyond that level signals ongoing challenges in affordability, infrastructure, and institutional availability. Strengthening secondary, vocational, and tertiary options—along with improving transport and school resources—would be essential to promoting educational equity and sustainable human development on the island.

Photo 9 Remba Comprehensive Primary School

Barriers to Education

Education on Remba Island is hindered by a complex set of social, economic, and infrastructural barriers that

particularly affect children from low-income households. Financial hardship is the most prominent challenge—many families rely on small-scale fishing as their primary source of income, an occupation marked by irregular earnings and high daily costs of living. This financial instability makes it difficult for parents to consistently afford school fees, uniforms, and learning materials. As a result, school attendance often fluctuates with fishing seasons, as children are either withdrawn from school to help with fishing activities or kept home when families cannot meet school-related expenses. Gender disparities further compound the issue, with girls disproportionately affected by early dropouts due to domestic responsibilities, cultural expectations, or teenage pregnancies. These realities create a cycle where immediate economic needs take precedence over long-term educational goals.

Accessibility also presents a major constraint. Most secondary and tertiary institutions are located outside Remba Island, forcing students to travel across Lake Victoria or relocate to the mainland to pursue higher education. This dependency on off-island facilities exposes students to high transportation costs and safety risks, especially during the rainy season when lake conditions are rough. Inadequate transport infrastructure and the lack of reliable communication systems exacerbate these challenges, often resulting in absenteeism and eventual school dropout. Additionally, some families lack awareness of the long-term value of education, leading to low enrolment in secondary and vocational institutions. Together, these economic, geographic, and cultural barriers have created an uneven educational landscape where access is determined more by circumstance than by aspiration.

Quality of Education and Infrastructure

The quality of education on Remba Island is constrained by the limited availability of well-equipped learning facilities and trained teachers. With more than half of students enrolled in primary schools, overcrowding is a recurring problem that undermines effective teaching and learning. Most schools operate with minimal teaching resources—few textbooks, inadequate classroom space, and insufficient furniture. The shortage of trained teachers compounds this, leading to high student–teacher ratios that reduce individualized attention and learning outcomes. These constraints are particularly concerning in the context of Kenya's Competency-Based Curriculum (CBC), which demands a more interactive and resource-intensive learning approach. The absence of libraries, laboratories, and recreational facilities further restricts opportunities for holistic education, making it difficult for students to develop both academic and practical skills.

The island's educational infrastructure also lags behind national standards, limiting the overall quality of schooling. Many institutions lack access to clean water, reliable electricity, and proper sanitation facilities—conditions that directly affect student health and attendance. The absence of digital equipment and internet connectivity restricts exposure to modern learning tools, leaving students disadvantaged compared to their mainland counterparts. Furthermore, there are no TVET or tertiary institutions on Remba, forcing young people to migrate for further studies or abandon education altogether. This limits access to technical and professional training that could diversify livelihoods beyond fishing. Improving the island's educational infrastructure, investing in teacher training, and integrating renewable energy and ICT tools would significantly enhance learning outcomes and prepare the island's youth for broader economic opportunities within and beyond the Lake Victoria region.

7.2 Health

Access to Healthcare Facilities

Photo 10 Remba Hospital

The household survey and mapping exercise revealed that Remba Island is served by only one public health institution, a facility that faces enormous pressure given the population size and the breadth of healthcare needs. Despite this limitation, 69.25% of households still rely on public health facilities, demonstrating both trust in and dependence on state-provided services. However, the facility is chronically under-resourced, and its ability to handle complex cases is restricted. As a result, residents often turn to alternatives such as private hospitals (11.37%) and community clinics (10.12%), though these options are either too costly or inadequately staffed. This fragmented care ecosystem mirrors the broader

infrastructural gaps seen in water and sanitation, where formal systems exist but remain insufficient, forcing residents to depend heavily on informal and often unreliable alternatives.

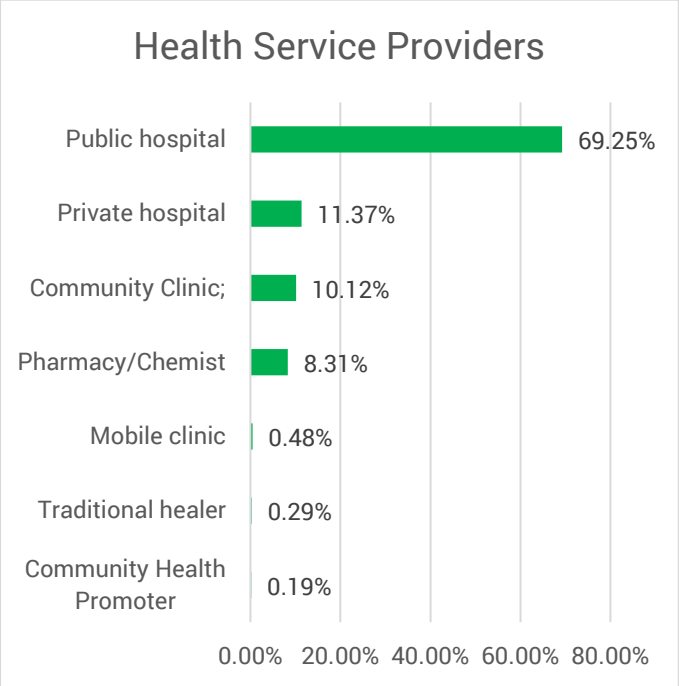


Figure 50 Health Service Providers

Distance to Nearest Health Facility

Physical access appears, at least on paper, to be relatively favorable, with 88.14% of households within one kilometer of a health facility and nearly half (44.84%) within 500 meters. However, proximity does not guarantee adequate care. Greater distances—particularly for the minority who live more than a kilometer away—correlate with delays in treatment-seeking behavior, sometimes leading households to resort to self-treatment, traditional medicine, or delayed diagnosis of preventable conditions. This mirrors patterns seen in access to water, where short walking distances to communal taps often mask the deeper problem of quality, affordability, and reliability. The health sector thus demonstrates the same paradox observed in water and energy systems: residents may be physically close to services, but the reliability, quality, and affordability of those services remain a barrier to effective use.

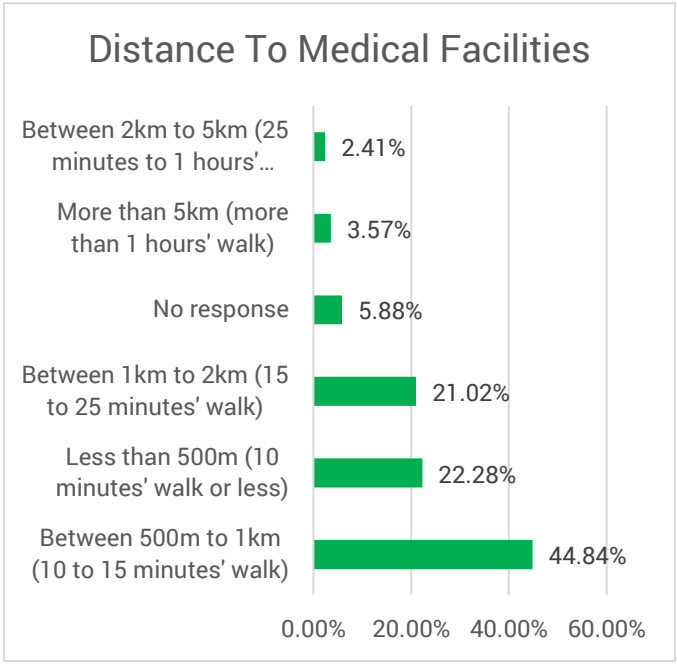


Figure 51 Distance to Health Facilities

Common Health Issues and Disease Burden

The disease profile of Remba Island is a reflection of its fragile environmental conditions and inadequate infrastructure. Vector-borne diseases, primarily malaria, are by far the most significant burden, reported by 54.57% of households. Malaria's persistence (affecting 54.43% of residents) is not only linked to the island's geographical position on Lake Victoria but also to stagnant water bodies created by poor drainage, uncollected solid waste, and open sanitation systems such as pit latrines and lake defecation. This directly connects the health burden to earlier sections of this report on sanitation (Section 5.4) and waste management, where dumping into Lake Victoria was highlighted as a major practice (28.16% of households). These conditions create breeding grounds for mosquitoes, sustaining a cycle of disease.

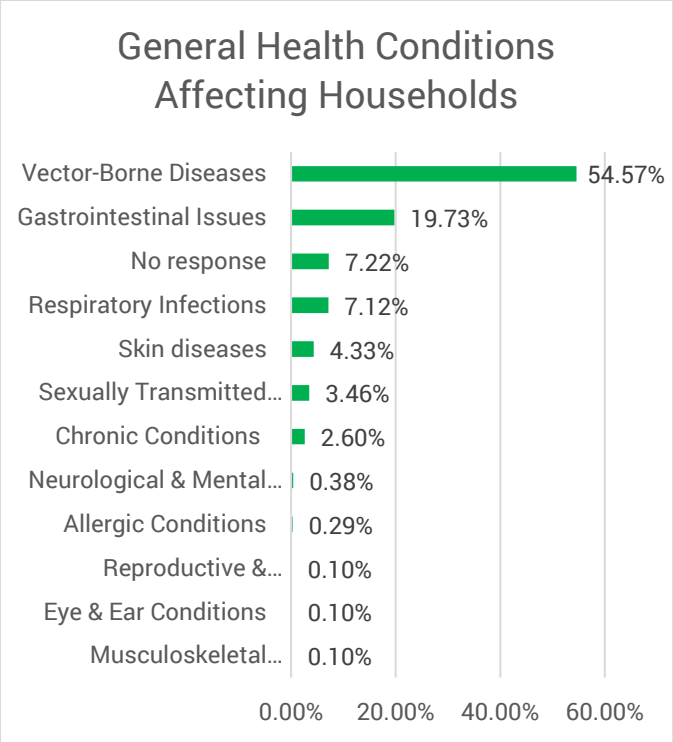


Figure 52 General Health Conditions Affecting Households

Gastrointestinal illnesses are also widespread, affecting 19.73% of households. Diarrhea, reported by 18.88%, is strongly associated with contaminated water sources, especially the heavy reliance on Lake Victoria for domestic water (75.22%) and drinking water (13.11%). Even though 63.07% of households perceive their drinking water as safe, only 44.30% actively treat it, leaving a large portion of the population at risk of waterborne diseases. The link between water quality and gastrointestinal health outcomes is therefore direct and critical.

Respiratory infections (7.12%) represent another significant concern. These are likely exacerbated by the dominance of charcoal (84.47%) as the primary cooking fuel, as documented in the energy section (5.2). Indoor air pollution, especially in poorly ventilated housing structures, directly contributes to respiratory disease. The use of candles and kerosene for lighting (20.15% and 25.27% of households respectively) further compounds exposure to smoke and toxic emissions. The intersection of energy poverty and health outcomes is therefore clear and points to the need for integrated planning approaches that tackle energy, housing, and health simultaneously.

Skin diseases (4.33%) and other conditions, such as asthma (4.91%), hypertension, diabetes, and HIV/AIDS (3.47%), illustrate the "double burden of disease" that residents face. On one hand, they contend with communicable diseases linked to poor sanitation, unsafe water, and inadequate waste management; on the other, they are increasingly exposed to non-communicable diseases associated with lifestyle and long-term health risks.

Health Insurance and Affordability of Healthcare

Financial vulnerability is one of the greatest barriers to adequate healthcare on Remba Island. Only 4.72% of households are insured, with nearly all of these covered under the Social Health Insurance Fund. A staggering 89.87% remain uninsured, leaving them reliant on out-of-pocket expenses, which they fund primarily through personal savings (86.35%) or income set aside for health (7.25%). In times of medical crisis, households turn to informal mechanisms such as chamas, harambees, or loans, exposing them to cycles of debt and instability.

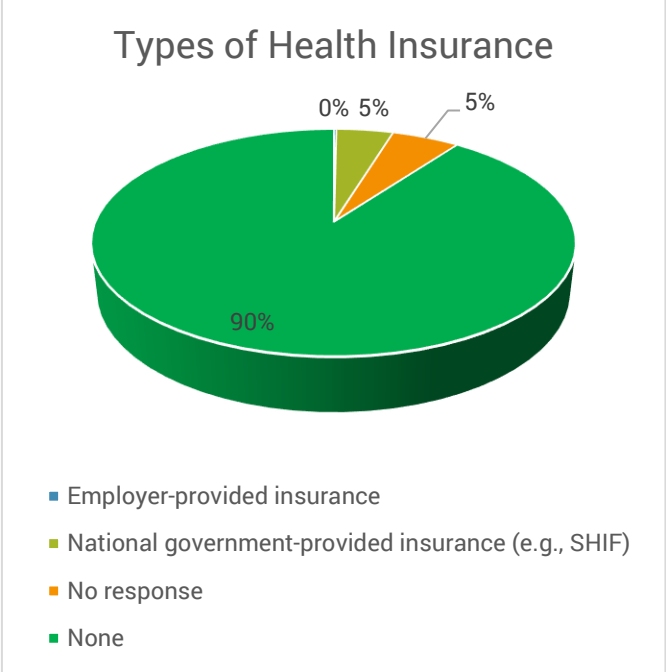


Figure 53 Types of Health Insurance

This financial strain mirrors the inequities identified in the water section (5.3), where households in informal settlements pay up to 500% more for water compared to official HOMAWASCO rates, illustrating a broader "poverty penalty." Just as water costs absorb a disproportionate share of household income, healthcare expenses similarly destabilize families, diverting resources from education, food security, and housing. The overlap of high healthcare costs, low insurance coverage, and precarious incomes amplifies household vulnerability across multiple dimensions.

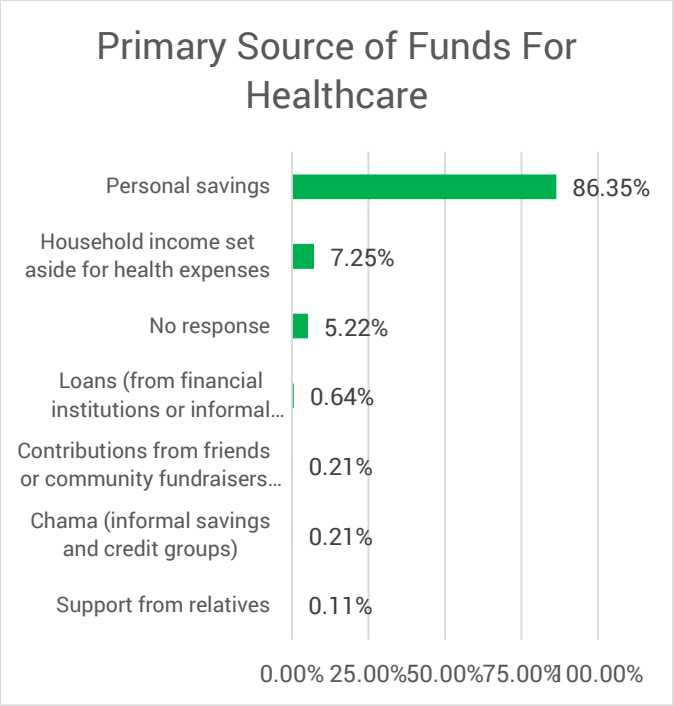


Figure 54 Primary Sources of Healthcare Funds

When asked about barriers to health access, nearly half of respondents (48.79%) cited a lack of essential drugs and equipment as their most pressing concern. This aligns with broader infrastructural deficiencies, where service delivery is undermined not just by demand but by the absence of necessary supplies. High treatment costs were noted by 27.21%, reinforcing the issue of affordability, while 17.58% expressed dissatisfaction with poor service delivery. These challenges are intensified in remote areas of the island, where evacuating patients during emergencies is difficult due to the unreliable water transport system. The health system is therefore both geographically and institutionally constrained, amplifying residents' exposure to preventable health risks.

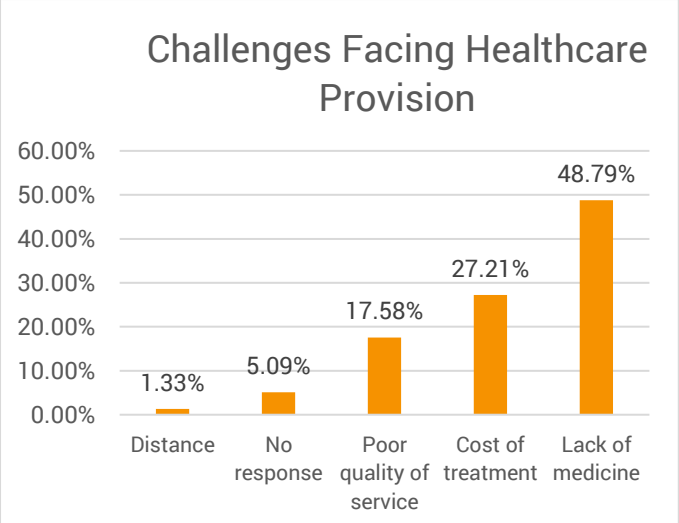


Figure 55 Challenges Facing Healthcare

The health profile of Remba Island cannot be understood in isolation; it is a direct outcome of the interlinked challenges of land tenure insecurity, inadequate housing, energy poverty, unsafe water, poor sanitation, and weak waste management. Malaria thrives where waste and stagnant water accumulate. Gastrointestinal diseases flourish in a context of unsafe water and inadequate treatment. Respiratory illnesses are fed by charcoal smoke and kerosene lamps, while financial insecurity forces households to delay or forego treatment. The combination of these factors creates a cycle of vulnerability that undermines both household wellbeing and broader development prospects.

Addressing these issues requires integrated interventions that bridge sectors: improving drainage and solid waste collection to reduce mosquito breeding, expanding access to clean energy to combat respiratory illnesses, strengthening water treatment to prevent gastrointestinal diseases, and extending health insurance coverage to protect households from financial shocks. Without these coordinated approaches, healthcare interventions on their own will be insufficient, as the root causes of ill health lie beyond the health sector and within the island's socio-environmental fabric.

7.3 Markets and Economic Hubs

Remba Island's economy is closely tied to its informal market systems, which form a vital part of residents' livelihoods. The 2025 enumeration identified a combination of formal and informal market setups, ranging from small street vendors to semi-permanent stalls. Informal markets support approximately 6.4% of the working population, while casual labor—often associated with fishing, transport, and market operations—accounts for another 9.43%. The concentration of economic activity within residential areas allows residents convenient access to goods and services, yet this proximity also exacerbates pressure on limited public infrastructure, particularly water, sanitation, and waste management systems.

Storage and sanitation facilities within market areas are minimal, leading to significant public health risks. The informal handling of goods, combined with high pedestrian and cargo traffic, increases exposure to contamination, contributing to conditions that intersect with the broader health and sanitation challenges. Overcrowding, congestion, poor hygiene, insecurity, and eviction threats due to informal or unregulated operations further compound these risks. These conditions illustrate the duality of informal markets: while critical for economic resilience and local trade, their unregulated nature exposes residents to financial, health, and legal vulnerabilities.

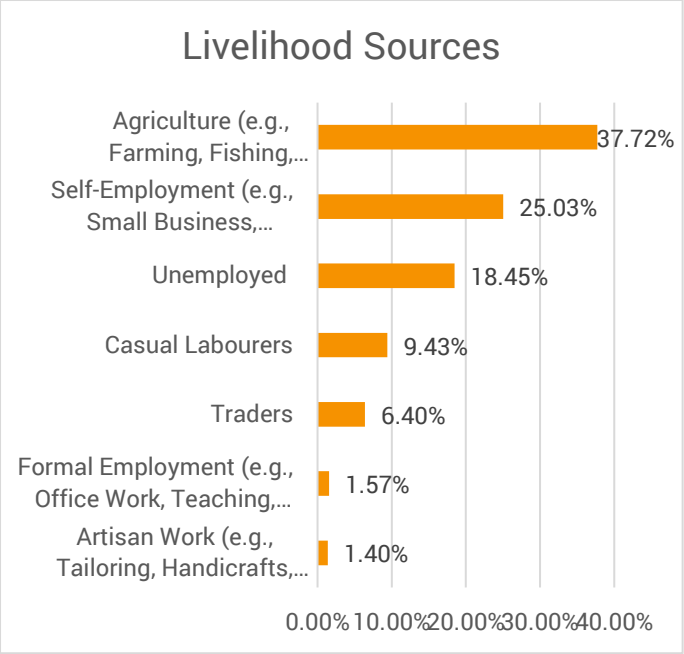


Figure 56 Livelihood Sources

Investments in structured market infrastructure, such as proper storage, waste disposal, and sanitation facilities, as well as regulatory frameworks that formalize vendors' operations, could improve both economic productivity and public health outcomes. Market improvements should also consider connectivity with transport networks), particularly pedestrian and water-based access routes, to enhance the efficiency of goods movement and accessibility for island residents.

7.4 Security

Remba Island hosts a single police station responsible for maintaining law and order across the entire settlement. While the presence of formal law enforcement is a positive factor, resource allocation constraints and operational limitations reduce the station's capacity to respond rapidly to incidents, especially in remote or densely populated informal settlement zones. These gaps in formal security provision are partially addressed through community policing initiatives, which rely on local participation and neighborhood vigilance to maintain safety.

Security concerns intersect with other issues on the island, including land tenure insecurity, eviction threats, and informal economic activities. The high proportion of households occupying public or undocumented land especially children and youth—have limited opportunities for physical exercise and structured leisure activities. Introducing small parks, sports fields, and community centers could contribute to social cohesion, promote healthy lifestyles, and reduce vulnerability to social risks (65.09%) and the prevalence of informal market operations increase the risk of disputes, property conflicts, and vulnerability to crime. Similarly, limited street lighting, narrow unpaved roads, and high population density—described in Section 5.1—reduce natural surveillance, creating additional challenges for safety and law enforcement.

Strengthening security on Remba Island will require a multi-layered approach, including capacity building for the police station, improved community policing, investment in street lighting and infrastructure, and formalization of land and economic activities to reduce disputes and foster stability.

Photo 11 Remba Police Post

7.5 Recreational areas

Recreational and leisure spaces on Remba Island are critically limited. The enumeration identified only two entertainment halls and the grounds of the primary school, including its Early Childhood Development Education (ECDE) center, as spaces occasionally available for public recreational use. The scarcity of open and accessible recreational areas reflects the broader land use constraints discussed in Section 3.1, where high residential densities (78.01% of building use) and limited allocation for recreation (1.20% of compound use) constrain opportunities for social interaction, physical activity, and community cohesion.

The lack of formal recreational spaces affects not only quality of life but also public health, as residents—

such as crime or antisocial behavior. Such interventions should be planned alongside infrastructure upgrades and tenure regularization programs to ensure long-term sustainability.

7.6 Other Social Facilities

Social and religious institutions play a central role in the community life of Remba Island. The enumeration indicates that 82.35% of residents identify as Christian, 12.25% as Muslim, and 0.96% as adherents of traditional beliefs. These institutions often provide not only spiritual services but also educational support, social gathering spaces, and informal safety nets.

However, their distribution across the island is uneven, and many are constructed using temporary or semi-permanent materials. In some cases, they are co-located within residential areas or dual-purposed with other functions, such as schools being used for religious gatherings or the Beach Management Unit (BMU) doubling as a social hall.

This arrangement reflects both the resourcefulness of the community and the scarcity of dedicated social infrastructure. However, the reliance on multipurpose facilities and temporary structures limits the effectiveness and safety of these spaces, particularly during public events or emergencies. Integrating social infrastructure planning with broader land use and housing strategies (Sections 3 and 4.5) could provide residents with better access to culturally and socially significant spaces while ensuring structural safety, accessibility, and inclusivity.

Photo 12 Religious Institutions

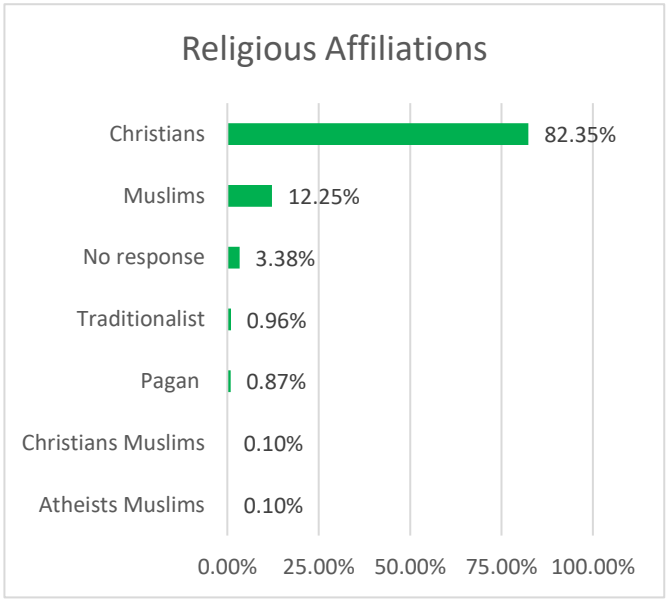


Figure 57 Religious Affiliations

8 SOCIO-ECONOMIC CHARACTERISTICS

8.1 Livelihoods and Income Patterns

Employment Dynamics

The economic landscape of Remba Island is dominated by informal and small-scale income-generating activities. According to the 2025 enumeration, a significant portion of the working population—37.72% or 1,718 individuals—engage in agricultural activities, which include fishing, vegetable farming, and small-scale livestock rearing, such as pigs.

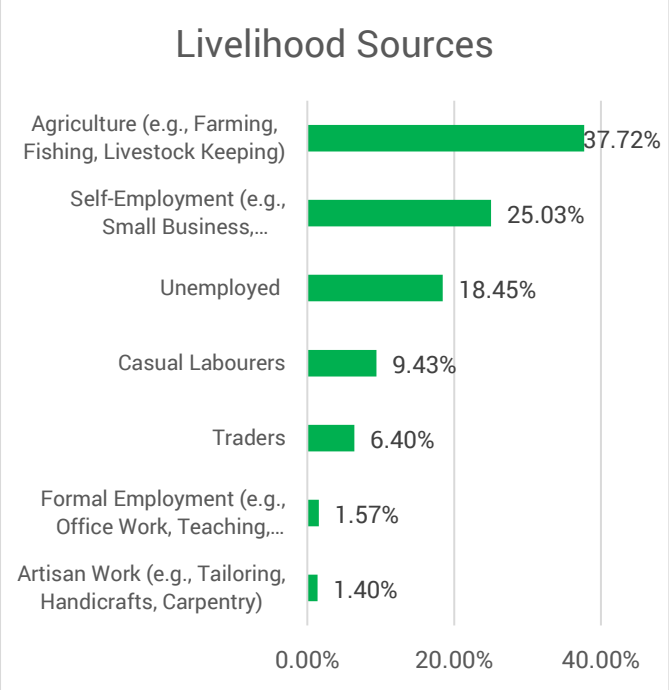


Figure 58 Livelihood Sources

Self-employment accounts for 25.03% of the working population, reflecting a vibrant microenterprise sector that includes tailoring, food vending, transport services, and other small-scale trades. Casual labor contributes another 9.43%, while trading engages 6.4% of residents. Formal employment remains extremely limited at 1.57%, highlighting the island's inability to integrate labor into structured sectors such as education, administration, or healthcare. This economic informality intersects with the challenges noted in Sections 5.1–5.3, including irregular transport access, limited water supply, and energy insecurity, which collectively affect residents' capacity to sustain stable livelihoods.

High unemployment, recorded at 18.45%, disproportionately affects young adults aged 18–34, who constitute over half (53.48%) of the unemployed population. While overall gender disparities in unemployment rates are minimal, men disproportionately occupy the few available formal jobs, with 1.34% formally employed compared to 0.29% of women. Women, however, dominate informal microenterprise, with 69.9% engaged in self-employment, reflecting resilience and adaptive strategies in the face of structural barriers such as limited access to credit, unpaid care responsibilities, mobility restrictions, and exclusion from formal decision-making or procurement systems.

Photo 13 Livelihoods

Household Income Levels

Household incomes on Remba Island reflect pronounced disparities and precarity. Approximately 8.29% of households report no regular income, while 9.16% survive on less than Ksh 2,000 per month. Only 11.57% of households earn above Ksh 10,000 monthly, limiting the capacity to invest in housing, education, or improved livelihoods (linked to Section 4.6 on housing costs and Section 5.3 on water affordability). Most households rely on small-scale trade, casual labor, or low-yield fishing. Pension and retirement benefits are rare, affecting just 0.13% and 0.39% of households, respectively, leaving older adults financially vulnerable.

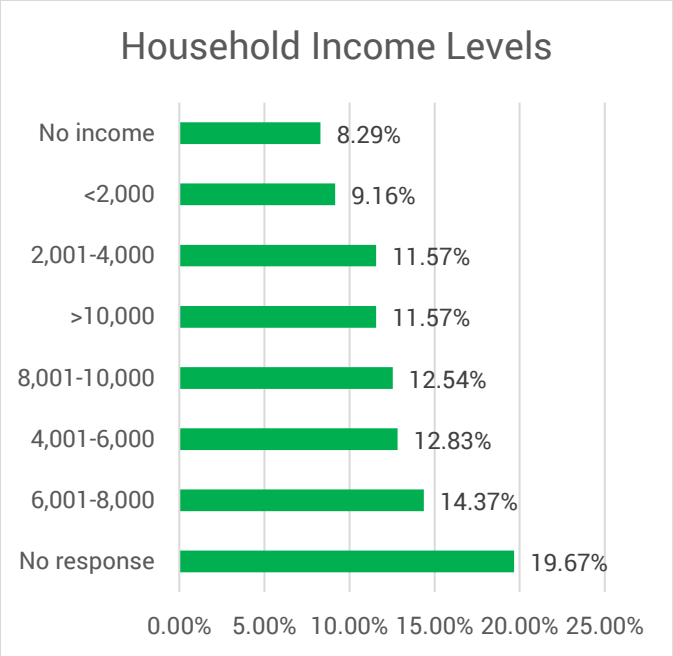


Figure 59 Household Income Levels

Education and Employment Link

The education-employment nexus reveals additional constraints. The highest unemployment proportion is among secondary school graduates (29.65%), followed by primary school leavers (27.13%). Those with no formal education represent 13.56% of unemployed individuals, while university graduates and vocational/TVET-trained residents have marginally better employment outcomes (0.63%). This underscores a mismatch between local labor demand and available skills, further complicated by limited access to formal credit and training.

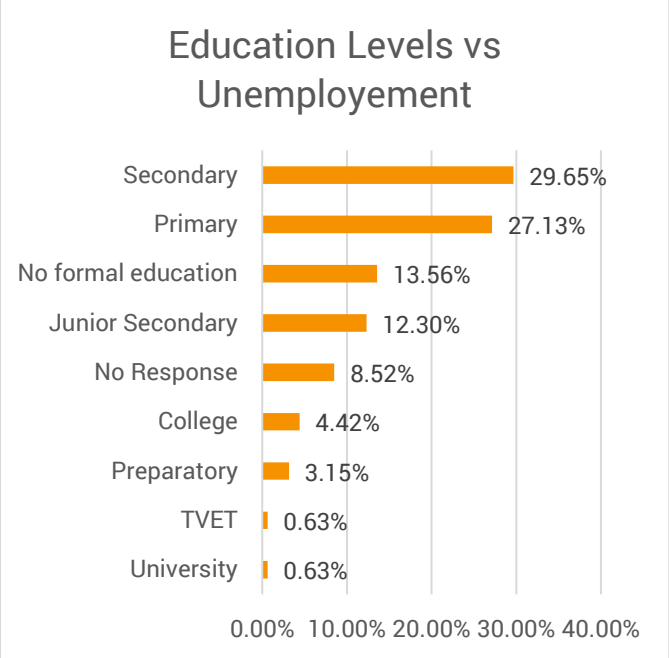


Figure 60 Education Level Vs Unemployment

8.2 Food Security and Economic Resilience

Food Access and Vulnerability

The socioeconomic data does not directly capture household food acquisition methods; however, insights drawn from employment trends indicate that most households depend on market purchases rather than homegrown food.

Food security on Remba Island is intimately linked to income instability, agricultural productivity, and market access. Households with no regular income (8.29%) or earning below Ksh 2,000 per month (9.16%) are acutely vulnerable to price shocks, health emergencies, and seasonal work fluctuations. Market dependency is high, as the majority of residents purchase staple foods from local markets rather than producing them, although 37.72% engage in agriculture or fisheries for subsistence and income.

Agriculture and Livelihoods

Despite its high density, Remba Island still retains pockets of agricultural activity that are vital to both food access and household income. According to the study, staple food crops grown on the island include vegetables such as kales and spinach. A few households also undertake pig rearing while a large number engage in fishing activities on the lake.

These patterns reveal a dual challenge: low value capture from food production, and under-utilization of agro-processing potential. Agricultural activities remain heavily affected by climate unpredictability, pest outbreaks, and limited access to extension services. Furthermore, irrigation infrastructure is poorly developed, leaving farmers at the mercy of erratic rainfall. The low adoption of modern technologies—due to cost, training gaps, and labor shortages— limits both yield and food availability during lean periods.

Blue Economy and Irrigation

On Remba Island, the Blue Economy forms the cornerstone of both food security and economic resilience, reflecting the community's deep dependence on the waters of Lake Victoria. Fishing is not only the main source of food and income but also the organizing principle of settlement life, trade, and migration. Nearly every household participates directly or indirectly in the fishing value chain—through catching, processing, transporting, or selling fish. This concentration of livelihoods around the lake places Remba at the heart of Kenya's blue economy vision, as outlined in the Fisheries Management and Development Act (2016) and the Blue Economy Strategy (2022–2032), which promote

sustainable use of aquatic resources for economic growth and community well-being.

While irrigation in the conventional agricultural sense is nearly absent due to Remba's rocky terrain and limited land area, the principle of water-based food production still applies. Small-scale aquaculture systems—such as floating cages or tanks fed with collected rainwater—represent potential "irrigation equivalents" for the island context. Such innovations could help supplement nutrition, reduce dependence on imports from the mainland, and enhance resilience to fishing downturns.

However, the same dependence creates vulnerability. Declining fish stocks, fluctuating water levels, and changing weather patterns threaten household incomes and food availability. Many families face periods of scarcity when catches drop or when fishing is restricted due to safety or conservation measures. Expanding blue economy initiatives—such as cage aquaculture, improved cold chain systems, and fish value addition—offers a way to stabilize food supply and reduce economic shocks. These opportunities align with national strategies promoting sustainable fisheries management, women's inclusion in post-harvest trade, and community-led co-management under the BMU framework.

Together, the Blue Economy and adaptive water use practices form the backbone of Remba's pathway to food security and economic resilience. Strengthening these sectors through training, climate-smart technologies, and partnership with county and national agencies can transform Remba from a vulnerable fishing enclave into a model of sustainable island livelihoods within Lake Victoria's evolving blue economy landscape.

8.3 Trade, Commerce, and Financial Inclusion

The study reveals that 25.03% of the working population is self-employed, a significant majority of whom operate in the informal sector—offering services like tailoring, boda-boda transport, and food vending. An additional 6.40% are involved in retail trade, and 1.40% in artisanal work. These small-scale enterprises thrive in open-air markets, forming the dominant livelihood strategy for low- and mid-income households. However, the growth of these informal businesses is constrained by spatial pressure, competition, and lack of access to formal infrastructure.

For instance, most vendors operate without licenses or permanent structures, exposing them to evictions and seasonal sales drops due to weather. The enumeration also highlights how consumer spending patterns remain limited—with 29.03% of households are earning below Ksh 4,000, making it difficult to prioritize essentials like food and water, limiting market vibrancy and stunting commercial expansion.

Financial Access and Savings

Despite vibrant microenterprise activity, financial inclusion in Remba Island remains low. The report notes that over 65.89% of residents depend on informal income sources (self-employment, causal labor, trade), often without pay slips, asset records, or collateral requirements traditionally demanded by banks and formal lenders.

This structural exclusion prevents many from accessing credit, saving securely, or building long-term financial resilience. Although the enumeration does not provide direct data on savings rates or financial account ownership, it strongly suggests that most low-income residents lack access to mainstream banking. In such an environment, mobile money platforms like M-Pesa are likely the most accessible and widely used financial tools, enabling day-to-day transactions, remittances, and basic savings. Demand for savings and credit cooperatives and microfinance services is implied by the entrepreneurial base, particularly among traders and home-based businesses.

Gendered Economic Participation

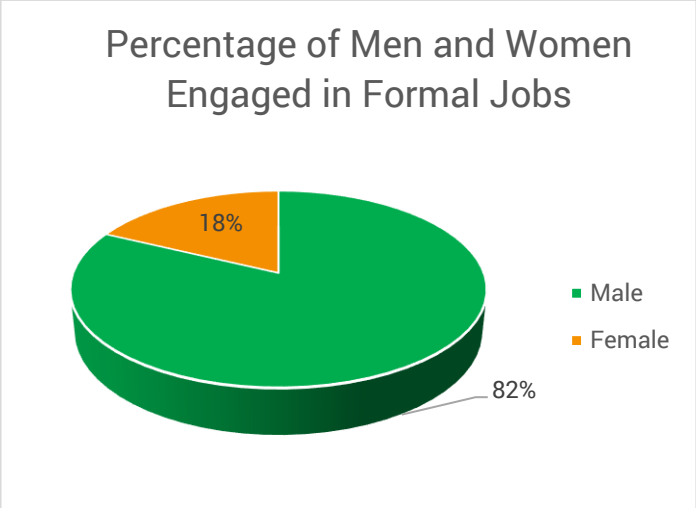


Figure 61 Percentage of Men and Women Engaged in Formal Jobs

The gender divide in Remba Island's economic life is generally equal. Women are underrepresented in formal employment—with only 1 formally employed women compared to 5 men—and face a significantly higher unemployment rate (82.14% vs. 17.86% for men).

Women (69.9%) are highly active in self-employment, often managing micro-businesses that are crucial to household survival. These include fish vending, grocery stalls, tailoring, and child-care services.

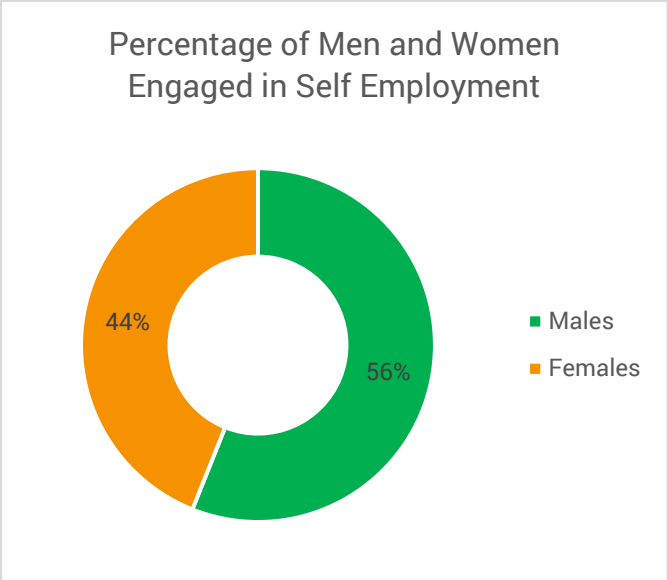


Figure 62 Percentage of Men & Women Engaged in Self-employment

Barriers to women's full economic participation include limited access to credit (due to lack of land titles or collateral), mobility restrictions, unpaid care burdens, and exclusion from decision-making spaces. These constraints not only undermine women's income-earning potential but also reduce household and municipal economic growth. Unleashing women's economic potential could yield significant benefits for food security, education, and the resilience of communities.

9 SYNTHESIS

9.1 Swot Analysis

Table 8 SWOT Analysis

Strengths	Weaknesses
1. **Compact island size supports effective non-motorized transport (walking, cycling).** 2. **Regular waterbus ferry service enhances regional connectivity.** 3. **Informal water transport (canoes, motorboats) underpins trade and fishing livelihoods.** 4. **High adoption of solar energy (40.69%) shows willingness for off-grid innovation.** 5. **Lake Victoria provides a consistent water source for domestic and economic use.** 6. **Vibrant informal markets and seven fish landing sites anchor the local economy.** 7. **Strong community reliance on microenterprise (25.03% self-employed) ensures adaptive resilience.** 8. **Active religious and social institutions provide informal safety nets and cohesion.** 9. **Youthful labor force offers potential for skills development and economic growth.**	1. Roads are narrow, earthen, flood-prone, limiting access to services. 2. Limited frequency of public waterbus transport; heavy reliance on costly private boats. 3. Only 8.87% connected to the national grid; widespread reliance on polluting fuels (charcoal 84.47%). 4. Poor sanitation: 28.16% of households dump waste into the lake, fueling disease risks. 5. Only one under-resourced health facility for a large population; 89.87% uninsured. 6. High prevalence of preventable diseases (malaria 54.57%, diarrhea 18.88%). 7. Housing insecurity: 65.09% occupy undocumented/public land, prone to eviction. 8. Congested informal markets lack sanitation, storage, and regulation. 9. Very limited recreational facilities (only two entertainment halls and a school ground). 10. Financial exclusion: majority lack collateral for loans; rely on informal savings and credit. 11. Youth unemployment (18.45%) disproportionately affects ages 18–34.
Opportunities	**Threats**
1. Upgrading NMT paths, drainage, and street lighting can improve safety and mobility. 2. Modernizing jetties, regulating fares, and expanding ferry frequency can improve transport equity. 3. Expanding solar mini-grids, LPG access, and clean cooking tech can cut health risks. 4. Enhancing water storage, rainwater harvesting, and treatment can address scarcity and disease. 5. Building structured markets with sanitation and storage will boost trade and health outcomes. 6. Expanding health insurance coverage and improving medical supply chains can ease household vulnerability.	1. Seasonal flooding and rising lake levels threaten infrastructure, housing, and fishing. 2. Poor drainage, waste dumping, and stagnant water sustain malaria transmission. 3. Water contamination and low treatment rates drive gastrointestinal disease outbreaks. 4. Energy poverty and reliance on charcoal/kerosene worsen respiratory illness and fire risks. 5. Limited emergency transport options restrict urgent healthcare access. 6. Land tenure insecurity and informal markets increase risk of evictions and disputes. 7. High youth unemployment fuels economic vulnerability, crime, and migration pressures. 8. Climate variability undermines fishing and small-scale agriculture.

7. Developing marine spatial plans and aquaculture can protect fisheries and grow the blue economy.
8. Leveraging women's high participation in self-employment (69.9%) can drive inclusive economic growth.
9. Introducing community recreational and sports facilities can strengthen youth engagement and cohesion.
10. Cooperative savings groups and microfinance can expand financial inclusion and resilience.

9. Gender barriers in finance, land, and decision-making limit household and community resilience.

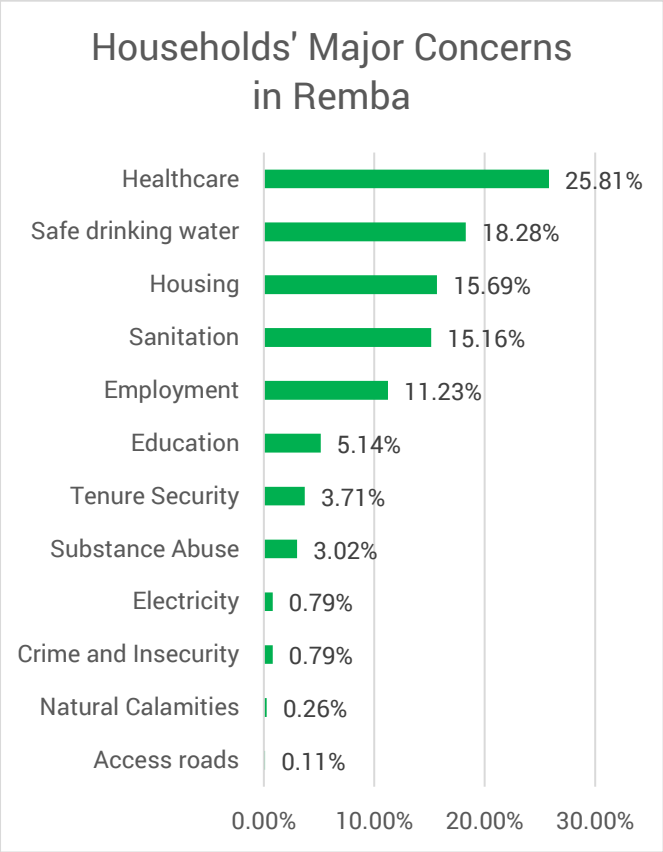


Figure 63 Households' Major Concerns in Remba

9.2 Cross cutting issues

The situational analysis show that the challenges facing Remba Island are deeply interconnected, cutting across sectors in ways that make them mutually reinforcing. Poverty and financial vulnerability remain at the core of most household struggles. With limited formal employment opportunities, a large share of the population—especially the youth—depends on informal income sources and precarious microenterprises. The lack of adequate financial inclusion and health insurance leaves families exposed to shocks that often erode their savings and undermine investments in housing, education, or food security.

Housing and land tenure insecurity is another thread that runs across sectors. The majority of residents live on public or undocumented land, which not only exposes them to the threat of eviction but also discourages long-term investment in safer and more durable housing. Informal settlements that emerge under these conditions are marked by congestion, poor sanitation, and heightened vulnerability to hazards such as flooding, fire, and disease outbreaks.

Environmental degradation is closely tied to these living conditions. The widespread practice of waste disposal into Lake Victoria, combined with inadequate sanitation facilities and poor drainage, creates direct health risks by contaminating water sources and providing fertile ground for malaria and diarrheal diseases. Similarly, reliance on polluting fuels such as charcoal and kerosene links energy poverty with respiratory illnesses and household fire hazards. These environmental stresses are further compounded by the effects of climate change, with rising lake levels and erratic rainfall cycles destabilizing fishing livelihoods, damaging infrastructure, and intensifying the risk of waterborne and vector-borne diseases.

The island's youthful population adds both potential and urgency to development planning. Youth unemployment is disproportionately high, and the lack of adequate skills training, recreational opportunities, and formal labor market pathways heightens their vulnerability to poverty, substance abuse, and social unrest. At the same time, the demographic profile offers opportunities for innovation, entrepreneurship, and community-driven development, if harnessed effectively.

Gender inequalities cut across almost every sector examined in this report. Women play a dominant role in informal trade and microenterprise, yet they remain largely excluded from formal employment, secure land tenure, and access to credit. This imbalance constrains not only women's empowerment but also the resilience of entire households, where women often bear the brunt of

caregiving responsibilities while managing livelihoods under insecure and under-resourced conditions.

Underlying these interlinked challenges are governance and institutional gaps. Weak formal service delivery in areas such as electricity supply, water supply, waste management, and health care has left residents heavily dependent on informal systems. These may provide immediate coping mechanisms but are often costly, unreliable, or unsafe. A lack of coordination among sectors also undermines efficiency, as problems like sanitation, health, and environmental degradation are treated in isolation despite their clear overlaps.

Taken together, these cross-cutting issues highlight that Remba Island's development challenges cannot be addressed through sectoral interventions alone. They call for integrated and multi-sectoral responses that tackle poverty, environmental health, tenure insecurity, infrastructure development, and governance deficits simultaneously, while paying particular attention to the needs of youth and women who are central to the island's social and economic resilience.

10 CONCLUSION

Remba Island embodies both the promise and the peril of Kenya's lake-based urbanization. Its dense, enterprising community sustains livelihoods across Homa Bay and the broader Lake Victoria basin, yet faces existential threats from environmental decline, service deficits, and tenure insecurity. The evidence from mapping, enumeration, and community engagement underscores that fragmented, sector-specific responses will not suffice.

Integrated planning is essential—linking land use, housing, health, energy, water, and waste systems within a unified resilience framework. Strengthening governance through collaboration between county departments, Beach Management Units, NGOs, and residents can transform informal coping mechanisms into durable institutions. Upgrading infrastructure—particularly drainage, sanitation, clean water, and renewable energy—will yield immediate public-health gains, while structured markets, education facilities, and affordable housing can stabilize the island's social fabric.

Environmental stewardship must be at the core of future action. Reforestation, shoreline protection, and sustainable fishing practices will not only restore ecological balance but also safeguard livelihoods central to the blue economy. Empowering women and youth through access to credit, training, and decision-making will multiply the social benefits of development.

Ultimately, Remba's resilience depends on turning its vulnerabilities into opportunities for innovation. By anchoring all interventions in participatory, data-driven planning and aligning them with the Homa Bay County Climate Change Act (2022), the island can evolve from an informal fishing enclave into a model of inclusive, climate-responsive small-island urbanism—proof that even the most constrained environments can chart a sustainable future when community, knowledge, and governance act in concert.

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