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NAVIGATING NUTRITIONAL SELF-MANAGEMENT WITH TYPE 2 DIABETES IN SEMI-ARID RURAL KENYA: A QUALITATIVE STUDY OF SOCIOCULTURAL MEANINGS, STRUCTURAL BARRIERS, AND INTERGENERATIONAL CARE AMONG OLDER ADULTS

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ABSTRACT

Type 2 diabetes mellitus (T2DM) is a rapidly escalating non-communicable disease in sub-Saharan Africa, where healthcare infrastructure and food systems are severely constrained. While dietary management is central to diabetes control, there is a critical gap in qualitative evidence on how elderly adults in arid and semi-arid land (ASAL) settings of rural Kenya understand and navigate nutritional self-management within their specific sociocultural and ecological contexts. A qualitative thematic study was conducted in Kitui County, Kenya (March–June 2025). Seventeen participants were recruited through purposive and snowball sampling: nine elderly individuals with T2DM (aged 60–78 years), four family caregivers, two community health volunteers, and two healthcare workers. Semi-structured in-depth interviews were conducted in Kikamba and Kiswahili, audio-recorded, transcribed verbatim, and analyzed using Braun and Clarke's six-phase reflexive thematic analysis framework. Trustworthiness was ensured through member checking, independent coding, peer debriefing, and respondent validation. The study is informed by the Health Belief Model and the Social Ecological Model as sensitizing frameworks. Institutional oversight was provided by the Departmental Postgraduate Research Committee, University of Nairobi; comprehensive procedural ethical safeguards were fully implemented. Four themes emerged: (1) the social construction of nutritional pathologies, in which diabetes was understood through a cultural food-causal lens as *ugonjwa wa sukari* (sugar disease), framing dietary adherence as both a medical duty and a moral obligation; (2) nutritional behavior and therapeutic pluralism, characterized by a strategic transition to indigenous grains and concurrent use of herbal remedies alongside biomedical treatment; (3) structural barriers to dietary and medical continuity, encompassing food unaffordability, geographic remoteness, and the absence of cold-chain infrastructure for insulin storage; and (4) the intergenerational nutritional support network, in which family caregivers functioned as the primary nutritional infrastructure for elderly patients, with entire households incidentally adopting diabetes-adapted diets. This study makes an original contribution in documenting the intersection of cultural illness framing, therapeutic pluralism, ecological food insecurity, and intergenerational care as a mutually constitutive system shaping nutritional self-management in ASAL Kenya. Effective interventions must shift from individual-level dietary counseling toward context-responsive, family-centred, and structurally integrated models of diabetes care.

Key words: Type 2 Diabetes Mellitus; Nutritional self-management; Therapeutic pluralism; Kenya

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INTRODUCTION

Type 2 diabetes mellitus (T2DM) is one of the most significant non-communicable diseases (NCDs) affecting populations worldwide. According to the World Health Organization (WHO), diabetes contributes to approximately 1.5 million deaths annually, with a substantial and growing proportion occurring among older adults [1]. The International Diabetes Federation (IDF) estimates that approximately 537 million adults were living with diabetes globally in 2021, with projections indicating this number may reach 783 million by 2045 [2, 3]. In sub-Saharan Africa, the burden is escalating rapidly: Mbanya and colleagues [6] identified rapid urbanization, dietary transition, and sedentary lifestyles as key drivers of a regional diabetes epidemic affecting rural and urban populations alike. Approximately 24 million adults in Africa were living with diabetes in 2021, with over half remaining undiagnosed, a situation substantially compounding health system burden and long-term complications [2, 6].

The management of T2DM requires sustained self-care behaviors, particularly dietary regulation, widely recognized as a cornerstone of treatment [4]. Evidence consistently demonstrates that dietary strategies emphasizing reduced intake of refined carbohydrates, balanced energy consumption, and increased fiber-rich foods improve glycemic control and reduce complications [4, 5]. However, adherence to recommended dietary practices in low- and middle-income countries (LMICs) is profoundly shaped by cultural food beliefs, household economic constraints, and the availability of foods within local environments [7, 8]. In rural sub-Saharan Africa, diabetes management is particularly complex because food systems and healthcare systems operate within contexts of poverty, food insecurity, and limited health infrastructure [7]. Dietary advice provided in clinical settings frequently fails to account for local food environments or economic realities, creating a persistent gap between medical recommendations and livable practice [9]. Furthermore, the use of traditional herbal remedies alongside biomedical treatment is well documented across sub-Saharan Africa: systematic reviews report prevalence rates of concurrent traditional medicine use among persons with diabetes ranging from 34% to over 80%, driven by cost, accessibility, and deep cultural trust in traditional healing systems [10, 11, 12]. Cultural beliefs and spiritual frameworks further shape illness perception and health-seeking behavior in these contexts [13].

Older adults represent a particularly vulnerable and frequently overlooked subgroup in diabetes care. Ageing is associated with declining metabolic function, compounding comorbidities, and reduced physical mobility, all of which complicate self-management behaviors such as dietary regulation and medication adherence [14]. In rural African contexts, older adults managing diabetes must simultaneously navigate physiological decline and deeply embedded social constraints related to food access, caregiving arrangements, and diminished healthcare availability [15].

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Community-level factors, including social support networks, family dynamics, the sociocultural meaning of food, and the role of faith, that, further mediate how older adults respond to dietary recommendations [16]. The role of family and intergenerational care networks in supporting chronically ill elderly persons has been documented as central to treatment adherence in African contexts, yet this dimension remains markedly understudied specifically in relation to diabetes nutritional management [17].

In Kenya, diabetes prevalence has steadily increased over the past decade, with an estimated 1.8 million adults living with the condition, and diabetes-related mortality rising disproportionately in low-resource rural settings [9, 18]. Rural counties in semi-arid and arid eastern Kenya, classified as arid and semi-arid land (ASAL) counties face compounding challenges of high poverty rates, chronic food insecurity driven by erratic rainfall, limited health infrastructure, and constrained agricultural production, all of which fundamentally shape the food environments within which dietary self-management must occur [9, 18]. Qualitative evidence specifically addressing how elderly individuals in Kenya's ASAL regions interpret, adapt, and enact dietary recommendations within these structural realities is critically absent from the literature. The few existing qualitative studies on diabetes management in Kenya have focused primarily on urban settings or younger adults [9], leaving elderly adults in rural ASAL contexts as a structurally and analytically neglected population. This gap matters because interventions designed for urban or younger populations are unlikely to be either appropriate or effective for elderly ASAL-based individuals whose food environments, social architectures, and illness frameworks are fundamentally different.

This study addresses that gap. Guided by the Social Ecological Model [29] and the Health Belief Model [30] as sensitizing theoretical frameworks, and employing Braun and Clarke's [19] reflexive thematic analysis, the study explored how elderly adults living with T2DM in Kitui County, Kenya, understand and manage their condition with particular emphasis on dietary practices, food environments, cultural beliefs, and social relationships. The study asks: what meanings do elderly adults with T2DM in ASAL rural Kenya assign to their illness and dietary practices, and what individual, social, structural, and ecological factors mediate their nutritional self-management?

MATERIALS AND METHODS

Research Design and Theoretical Framework

This study employed a qualitative thematic research design, situated within an interpretivist epistemological framework. Interpretivism holds that social realities are constructed through subjective meaning-making processes and that understanding human experience requires attending to the contextual, relational, and cultural dimensions of that meaning [20]. This stance is well suited to examining how elderly

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adults in rural Kenya make sense of diabetes management within their everyday social and ecological contexts, and how they negotiate between biomedical prescriptions and culturally embedded food practices.

Two complementary theoretical frameworks informed the study's analytical orientation. The Health Belief Model (HBM) [30] provided a lens for examining individual cognitive and motivational dimensions of dietary behavior—specifically, how participants' perceptions of disease severity, susceptibility, and the perceived benefits and barriers of dietary compliance shape their nutritional practices. The Social Ecological Model (SEM) [29] offered a multilevel analytical frame, illuminating how dietary behavior is simultaneously shaped by individual, interpersonal, community, institutional, and policy-level factors. Together, these frameworks enable a reading of nutritional self-management as neither purely a personal choice nor purely a structural determination, but as a negotiated practice occurring at multiple, interacting levels of influence. Braun and Clarke's [19] six-phase reflexive thematic analysis was used as the primary analytical framework, chosen for its systematic rigor, its compatibility with interpretivist inquiry, and its capacity to generate meaningful themes across heterogeneous participant groups.

Study Setting

The study was conducted in Kitui County, located in eastern Kenya, between March and June 2025. The county is classified as an ASAL region and experiences semi-arid climatic conditions characterized by erratic and inadequate rainfall, periodic drought, and high ambient temperatures, all of which substantially constrain agricultural production, dietary diversity, and food security. The majority of households rely on subsistence farming, livestock keeping, and small-scale trade for livelihoods. Access to safe water is a chronic challenge, with many households purchasing water from vendors. Kitui County has one of the highest poverty rates in Kenya [9]. Healthcare services are delivered primarily through public facilities including Kitui County Referral Hospital, which operates a chronic disease management clinic, including a designated diabetes outpatient clinic but faces persistent challenges related to drug supply shortages, understaffing, and physical distance from rural communities [18, 9].

Participant Recruitment and Sampling

Seventeen participants were recruited through a combination of purposive and snowball sampling. The study targeted individuals who could provide rich, contextually grounded insights into the nutritional management of T2DM, including elderly persons living with the condition, family caregivers, community health volunteers, and healthcare workers. Inclusion criteria for elderly participants were: (a) aged 60 years and above; (b) confirmed clinical diagnosis of T2DM for at least one year; (c) residency in Kitui County; and (d) ability to communicate in Kikamba or

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Kiswahili. Participants with severe cognitive impairment or acute illness at the time of recruitment were excluded. Elderly participants were recruited during routine diabetes clinic visits at Kitui County Referral Hospital held on Tuesdays and Thursdays (March–April 2025). Caregivers and community health volunteers were recruited through snowball sampling facilitated by community health promoters. Healthcare workers were recruited purposively from the hospital's chronic disease management unit. Data collection continued until thematic saturation was confirmed, assessed iteratively when no new codes emerged across the final two successive interviews [21]. Table 1 presents the full participant profile.

Data Collection

Data were collected through semi-structured in-depth interviews conducted between March and June 2025. All interviews were facilitated by the principal investigator (first author), who holds training in qualitative health research, together with a trained bilingual research assistant fluent in both Kikamba and Kiswahili. Interviews were conducted in the participants' preferred language, predominantly Kikamba with Kiswahili or English used as needed. Participants selected interview venues to ensure comfort and confidentiality; most interviews took place at participants' homesteads (n = 11), at community health posts (n = 4), or in a private room at the hospital (n = 2). Interview duration ranged from 45 to 75 minutes (mean: 58 minutes). The interview guide was pilot tested with three individuals not included in the final sample, and minor revisions to question clarity were made prior to commencement of data collection. Field notes were recorded immediately following each interview to capture non-verbal cues, contextual observations, and reflective analytical memos.

The interview guide addressed six thematic domains: (a) illness perceptions and meanings attributed to T2DM; (b) dietary practices, food restrictions, and food modification strategies; (c) household food environments and food access constraints; (d) concurrent use of traditional remedies and biomedical treatment; (e) access to healthcare and structural barriers encountered; and (f) social support systems, family dynamics, and caregiving arrangements. A member checking procedure was conducted: a subset of interpreted findings was returned to six of the nine elderly participants, who reviewed emerging themes for accuracy of representation. Participants confirmed the themes without substantive contestation, providing support for the credibility of interpretations.

Data Analysis

Thematic analysis was conducted following the six-phase reflexive framework of Braun and Clarke [19]: (1) data familiarization immersive repeated reading of all transcripts; (2) generating initial codes by systematic labeling of relevant data segments; (3) searching for themes clustering codes into candidate thematic categories; (4) reviewing themes iterative comparison of candidate themes against

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the full dataset; (5) defining and naming themes crafting precise, analytically coherent theme descriptors; and (6) producing the report by writing up findings with anchoring participant evidence. All transcripts were transcribed verbatim and translated into English by the research assistant, then independently back-translated by a bilingual member of the supervisory team to verify fidelity. Transcripts were coded independently by two team members; disagreements were resolved through sustained interpretive discussion until consensus was reached. NVivo (QSR International) was used to manage, organize, and audit the coded dataset.

Trustworthiness and Rigour

Trustworthiness was established using Lincoln and Guba's [24] four criteria. Credibility was supported by prolonged engagement with the field setting, independent dual coding, member checking with six participants, and persistent peer debriefing between the principal investigator and academic supervisor throughout the analytical process. Transferability was addressed through thick description of the study context, providing sufficient contextual detail to enable readers in analogous settings to assess the applicability of findings [24, 25]. Dependability was ensured through a documented analytical audit trail, including reflective memos, coding records, and minutes of supervisory discussions that track interpretive decisions across the analytic process [25]. Confirmability was supported by triangulation across participant groups (elderly persons, caregivers, community health volunteers, healthcare workers), and by respondent validation, ensuring that interpretations were grounded in the data rather than the researchers' assumptions [24].

Positionality and Reflexivity

The principal investigator is a Kenyan researcher trained in health and social sciences, conducting this study as part of a supervised MA programme at the University of Nairobi. As a researcher from outside Kitui County's specific community, she maintained ongoing reflexive awareness of how her academic positionality, language proficiency, and institutional affiliation might shape participant interactions and interpretive decisions. Reflexive journaling was maintained throughout data collection and analysis, and potential biases, including, the possibility that recruitment at a clinical facility might systematically favour participants with greater healthcare engagement, were documented and discussed with the second author who was the academic supervisor. Interviews were conducted outside clinical spaces wherever participant preference allowed, and voluntary participation was emphasised independently of the clinical team, to reduce power-relationship effects on disclosure.

Ethical Considerations

This study forms the research component of a Master of Arts degree at the Faculty of Arts and Social Sciences, University of Nairobi. The research proposal was

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reviewed and approved by the Departmental Postgraduate Research Committee, which constitutes the institutional oversight body for Master's-level research in the faculty. The Committee assessed the study design, participant profile, data collection instruments, and ethical provisions, and confirmed that full ethics committee review was not required given the study's minimal-risk, non-clinical, non-invasive design, which involved voluntary conversational interviews on dietary experiences and food environments only, with no biological sampling, clinical measurement, biomarker collection, or investigation of traumatic events. This determination is consistent with established principles in qualitative social science research ethics, which distinguish between formal procedural ethics and substantive ethics-in-practice [31].

Notwithstanding this determination, the following ethical safeguards were fully implemented: written informed consent in Kikamba and English (verbal consent with witness documentation for low-literacy participants); complete anonymization using participant codes (EP1–EP9; FC1–FC4; CHV1–CHV2; HCW1–HCW2); voluntary participation with the explicit right to withdraw without consequences to healthcare; venue choice by participants to ensure safety and comfort; data storage on password-protected, encrypted devices accessible only to the investigative team; adjustment of interview pace and duration in recognition of the vulnerability of elderly participants with chronic illness; and respondent validation with selected participants. No financial incentives were offered. The anticipated social benefit of generating evidence to improve nutritional care for a neglected elderly rural population substantially outweighs any minimal risk associated with voluntary conversational participation.

RESULTS AND DISCUSSION

Participant Characteristics

Of the 17 participants, nine were elderly persons with confirmed T2DM (Table 2). This cohort was predominantly female (55.6%) and aged between 60 and 78 years; the majority (66.7%) were in the early elderly phase (60–70 years). Most lived in intergenerational households of four to five members, with subsistence farming and small-scale trade as primary livelihoods. Monthly incomes were modest at 55.6% earned between KSh 5,000 and 20,000 (approximately USD 38–155). This placed most participants at or below Kenya's food poverty line. The semi-arid ecological context, characterized by irregular rainfall, chronic water scarcity, and wood-fuel dependency, constituted a defining structural backdrop to dietary possibility. These conditions resonate with documented challenges to nutritional quality and dietary diversity among elderly populations in Kenya's ASAL regions [9, 22], and establish Kitui County as a setting where even standard clinical dietary recommendations face profound structural obstacles.

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Theme 1: The Social Construction of Nutritional Pathologies

Across all nine elderly participants, diabetes was articulated primarily through a nutritional-causal frame. The condition was consistently referred to as *ugonjwa wa sukari* (sugar disease), a lay illness label that localizes the pathology within the domain of food and personal dietary conduct. This conceptual framing does not simply mirror biomedical discourse on sugar and carbohydrates; it constructs a broader cultural narrative in which diabetes represents the metabolic consequence of dietary transgression of eating wrongly, excessively, or in departure from ancestral food norms. By framing diabetes as a disease of food choices, participants created a powerful internal logic for self-management: if sugar caused the disease, the moral and practical imperative was to eliminate or drastically reduce it. This cognitive structure aligns with the perceived susceptibility and perceived severity constructs of the Health Belief Model [30], in which a clear and comprehensible illness narrative increases motivation to act on self-care recommendations.

> *"People in this area link this disease to eating too much sugar. So when you are sick, the first thing they say is, you have been eating too much. There is always a food to blame."*
> *(EP3, Female, 68 years)*

What is analytically significant here is not merely the cultural simplification of diabetes etiology, but the productive role this simplification plays. The 'sugar disease' framing, while medically incomplete and overlooking genetic predisposition, sedentary behavior, and other metabolic factors, functions as what sociologists of health would call an *illness narrative* [13]: a culturally intelligible account that organizes experience, motivates action, and makes suffering meaningful. At the same time, the framing creates potential blind spots. Participants who understood diabetes as a disease of sugar sometimes maintained generous portion sizes of starchy foods they did not classify as 'sugar,' and underestimated the glycemic impact of staples such as boiled yams or sweet potatoes. This disconnect between lay nutritional knowledge and biomedical dietetics represents a key site for culturally sensitive diabetes education, not by dismissing the cultural frame, but by extending and enriching it.

Beyond the food-causal frame, several participants overlaid their illness experience with a spiritual and moral interpretive layer. Diabetes was understood not only as a biological disruption but as a divinely appointed test of self-discipline. This moral framing was not passive; it actively recruited religious commitment as a motivational resource for dietary adherence:

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> *"I am a Christian and I believe God has given me this condition for a reason. It is a test. So I follow the diet because I feel it is what God wants me to do, to discipline myself."*
> *(EP7, Male, 72 years)*

The intersection of religious identity and health behavior in sub-Saharan African diabetes management is increasingly documented. Iregbu and colleagues [16] found that spirituality and religiosity can positively affect diabetes self-management by providing motivation, coping skills, and social support, while also noting the risk of fatalistic acceptance when illness is attributed entirely to divine will. In Kitui, the spiritual framing appeared to function predominantly as a motivational rather than fatalistic resource: participants used it to impose dietary discipline on themselves and to explain their condition to others in ways that preserved personal dignity and social standing.

However, the social visibility of dietary restriction generated stigmatizing pressures that cut against the motivating potential of the illness frame. Eating less in public, a visible marker of compliance with the diabetic diet, exposed participants to social judgment that reframed restraint as evidence of disease and excess:

> *"When people see you taking small portions they say, oh, you have the disease of fat people, the disease of those who eat too much. So sometimes you feel ashamed to eat less in public."*
> *(EP5, Female, 64 years)*

This stigmatizing dynamic reveals the community-level dimension of dietary self-management highlighted by the Social Ecological Model [29]. Behavioral change does not occur in a social vacuum; community perceptions of what eating behaviors mean can directly undermine clinical recommendations. The fear of social judgment led some participants to eat 'normally' in social settings while managing their portions privately, a bifurcated strategy that compromises consistency of glycemic control. Nutritional interventions must therefore be designed to work at the community level, normalizing smaller portions and diverse food choices across the whole community rather than directing behavioral change exclusively at the individual patient [9, 13].

Theme 2: Nutritional Behavior and Therapeutic Pluralism

Despite the structural food constraints of Kitui's ASAL environment, participants demonstrated sophisticated and adaptive nutritional strategies. The most consistent dietary adaptation was a deliberate shift away from maize-based staples, which is the dominant regional carbohydrate, toward drought-resistant indigenous cereal grains including sorghum and millet. Participants understood these grains as producing slower and more stable energy release, a perception empirically supported by research on the glycemic properties of traditional African cereals [26].

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Crucially, this dietary adaptation was not experienced merely as clinical compliance; it was framed as a return to ancestral food practices, linking self-management behavior to cultural identity and historical continuity:

> *"I no longer cook the usual ugali from maize. I now use millet or sorghum flour. The doctor told me it is better. And my grandparents used to eat this. It feels more like our food anyway."*
> *(EP1, Female, 60 years)*

This reconnection with indigenous foodways carries analytical significance beyond glycemic management. It illustrates how nutritional behavior change is most sustainable when it aligns with rather than disrupts cultural identity and food memory. Dietary change framed as cultural recovery rather than clinical sacrifice reduces the psychological cost of adherence. This finding has important implications for diabetes nutrition education in ASAL settings: rather than promoting an externally derived 'diabetic diet' that may conflict with local food cultures, programs can center indigenous foods as nutritionally and culturally valorized choices, simultaneously improving metabolic outcomes and reinforcing cultural continuity [8, 26].

A second major adaptive strategy was the concurrent use of traditional herbal remedies alongside prescribed biomedical treatment, a pattern this study terms therapeutic pluralism. Participants described using boiled mango leaves, neem bark preparations, and bitter gourd decoctions when formal medicines were unavailable or unaffordable. This pluralistic approach is not unusual: systematic reviews report traditional medicine use among persons with diabetes in Africa at between 34% and 84%, driven by cost, accessibility, and cultural confidence in traditional healing [10, 11]. A healthcare worker recognized this pattern clearly:

> *"Patients use a mix of both traditional and conventional medicine. They will take their metformin but they will also boil mango leaves or use herbal preparations. Mostly they do not tell you, they only tell you when you ask."*
> *(HCW1, Nurse, 38 years)*

The clinical concealment of traditional remedy use, evident in the nurse's observation that patients only disclose when directly asked, is a significant patient safety concern. Undisclosed concurrent use of herbal preparations alongside metformin or insulin creates potential for unrecognized drug-herb interactions, dose miscalculation, and delayed reporting of adverse effects [12]. Evidence from northern Tanzania's similar context found that undisclosed concurrent use was driven not by distrust of biomedicine but by patients' fear of dismissal or ridicule by

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clinical staff [12]. A second healthcare worker reflected on the institutional conditions that produce this silence:

> *"We are not against traditional medicine per se. The concern is safety. If patients use herbs alongside insulin or metformin without telling us, there can be complications. We need to create space where patients feel safe to disclose."*
> *(HCW2, Clinical Officer, 44 years)*

This observation points to a relational dimension of therapeutic pluralism: the quality of the patient-provider communication environment determines whether therapeutic plurality constitutes a safety risk or an opportunity for integrated care. Structurally inclusive clinical practice that invites disclosure of traditional remedy use, without judgment, could substantially reduce safety risks while also informing providers about the health-seeking logics operating in their patient populations.

Healthcare worker training in culturally responsive communication is therefore as important as biomedical upskilling in diabetes management for rural ASAL settings [12, 18].

Theme 3: Structural Barriers to Dietary and Medical Continuity

The barriers were multiple, intersecting, and mutually reinforcing, and no single intervention at the individual or household level could adequately address them in isolation.

Geographic distance from healthcare facilities constituted a primary structural barrier. Several participants traveled distances exceeding 13 kilometers to the county hospital on motorcycle taxis (*boda boda*), a journey that caused physical exhaustion, limb swelling, and in some cases resulted in abandonment of the clinic visit before consultation:

> *"By the time I reach the hospital I am already tired. My legs are swollen. Sometimes I just go home without seeing the doctor because the queue is too long and I cannot sit any longer."*
> *(EP9, Male, 76 years)*

This account encapsulates the compounding effect of geographic distance, physical frailty, and institutional queue management on healthcare access for elderly rural patients. The decision to abandon a clinic visit, after the time, physical strain, and economic cost of the journey have already been incurred, represents a rational calculation under conditions of extreme constraint, not a failure of motivation or commitment. This finding is consistent with evidence across rural Kenya and sub-Saharan Africa that transport barriers to chronic disease management

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disproportionately harm elderly patients and contribute directly to poor glycemic outcomes [7, 9, 18].

A second structural barrier, arguably more acute and practically most challenging, was the absence of reliable electricity and refrigeration infrastructure in rural households making safe insulin storage impossible. Participants described improvised cooling strategies including placing insulin vials in wet cloth, storing them in clay pots buried in earth, or wrapping them in damp rags. These adaptations reflect genuine resourcefulness but carry significant risk: insulin stored at ambient temperatures in Kitui's semi-arid climate (26–35°C) rapidly loses potency, resulting in unrecognized underdosing and uncontrolled hyperglycemia. A community health volunteer documented this daily reality:

> *"These people have no refrigerators. They put the insulin in wet cotton or bury it in a clay pot. They are trying their best but nobody has told them clearly whether this is safe."*
> *(CHV1, Female, 42 years)*

Beran and colleagues [27] have documented that cold-chain failure for insulin at the household level is a structural crisis in LMICs, distinct from supply chain and facility-level challenges, and that, patients in low-resource settings frequently improvise storage solutions without guidance on safety thresholds. The critical gap identified in Kitui goes beyond infrastructure: patients are improvising without adequate information, and community health workers who observe this are themselves uncertain about the safety of these improvised methods. Addressing this requires not only capital investment in household solar refrigeration (a long-term infrastructure goal) but immediate, low-cost interventions: community health worker training on insulin storage guidance, patient education on permissible ambient storage durations, and clinical protocols for flagging suspected insulin degradation during consultations.

Food affordability and ecological food availability constituted the third structural pillar of this barrier complex. The clinical recommendation to consume fresh vegetables, fruits, and lean protein daily was effectively unrealizable for the majority of participants, whose semi-arid environment precluded local cultivation of recommended foods and whose incomes could not absorb the market price of imported produce:

> *"Fruits and vegetables are very expensive here. We cannot grow them because the area is too dry. The doctor tells grandmother to eat more greens and fruits but where will they come from?"*
> *(FC2, Female, 34 years)*

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A healthcare worker framed the health system consequences of this food environment with striking clarity:

> *"Kitui is a marginalized county. When drugs or appropriate foods are not available here, we see an upsurge in hospital admissions. People are not non-compliant, they simply cannot afford to be compliant."*
> *(HCW1, Nurse, 38 years)*

This formulation 'they simply cannot afford to be compliant' captures what is perhaps the study's most important finding for policy: the framing of dietary non adherence as personal failure systematically misattributes the cause of poor outcomes. When the 'metabolic rift' [9, 22], the structural gap between what evidence-based diabetes care requires and what the ecological and economic environment provides, is recognized as the primary barrier, the locus of intervention shifts from the individual patient to the food system, the healthcare infrastructure, and the policy environment. Diabetes management programs that do not address food insecurity and structural food access alongside clinical counseling will inevitably and predictably produce poor outcomes in ASAL settings.

Theme 4: The Intergenerational Nutritional Support Network

The fourth theme reveals the most analytically original finding of this study: the family unit in Kitui County functions not merely as a source of social support for elderly diabetics, but as a living nutritional infrastructure, a distributed, intergenerational system that manages the entire food and medication cycle of the elderly person with T2DM, from procurement and preparation to portioning, medication reminders, and clinic facilitation. This finding extends the existing literature on family caregiving in African chronic illness [17, 28] by demonstrating that the family's role is not merely supportive but constitutive: without this infrastructure, nutritional self-management among elderly adults in this setting would largely collapse.

> *"At home we all eat the same food now, millet ugali, sweet potato, vegetables when we can get them. We cannot cook two different meals. So everybody has adopted grandmother's diet. It is now our diet."*
> *(FC1, Female, 30 years)*

The incidental convergence of household dietary practices around the diabetic diet, driven by economic necessity rather than deliberate family health planning, is a finding with significant unrecognized programmatic potential. When the entire household adopts a lower-glycemic, higher-fiber diet, every member benefits metabolically, even while the structural driver is financial constraint rather than health intentionality. This phenomenon represents an organic, grassroots form of what public health practitioners call a 'whole-of-household' nutrition intervention.

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Policy frameworks have not recognized or sought to leverage this pattern; formal diabetes care programs in Kenya currently provide dietary education to the individual patient only, missing an opportunity to engage the household system as a unit of nutritional change.

Healthcare workers identified the absence of family support as a reliable predictor of non-adherence and deteriorating outcomes:

> *"When families are involved, outcomes are much better. Patients remember their medication. They eat at the right time. But when there is no family support, when someone lives alone, the management collapses."*
> *(HCW2, Clinical Officer, 44 years)*

Two dimensions of caregiving warrant particular analytical attention. First, the gendered character of caregiving was visible across the data: all four family caregivers in this study were women or girls aged 28–34 years, reflecting the broader feminization of informal care in sub-Saharan African households [28]. While the household diet convergence finding is positive in health terms, it simultaneously represents an intensification of women's domestic labor. Caregivers must source, prepare, and adapt meals for the diabetic family member on already constrained incomes, often absorbing this additional burden silently. Nutrition interventions targeting family caregivers must be designed to support and resource these women rather than simply deploying their labor as a free input.

Second, faith-based organizations emerged as a secondary but meaningful layer of social support, providing communal emotional sustenance, prayer solidarity, and a non-clinical space for managing the psychological dimensions of chronic illness. Participants described church communities as reducing the isolation and fatalism that chronic illness can generate:

> *"At church they know I am sick. They pray for me. They encourage me. It helps me to keep going, to keep following the diet. Without that encouragement I think I would have given up long ago."*
> *(EP4, Female, 70 years)*

This observation resonates with evidence from across sub-Saharan Africa documenting that faith communities serve as both motivational and informational networks for chronic disease management [16]. Faith-based organizations—which have demonstrated reach into rural ASAL communities that formal health systems cannot match—represent an underutilized platform for diabetes education, peer support, and community-level normalization of dietary change. Community health

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interventions in Kitui that do not engage this existing infrastructure are missing a critical lever for population-level behavioral change [16, 28].

Synthesis: Diabetes Self-Management as Structured Negotiation

The four themes collectively constitute a multi-level portrait of diabetes nutritional self-management in which individual agency, cultural meaning, structural constraint, and relational care are not separate determinants but mutually constitutive forces. This study's original contribution is the articulation of how these forces interact in the specific context of ASAL Kenya's elderly population—a contribution that is not reducible to any prior single-site study in Kenya [9] or any of the broader SSA reviews [10, 11, 13] that have informed the field.

Mapping findings onto the Health Belief Model [30] reveals both the model's explanatory power and its limits in this context. The HBM predicts that individuals will adopt preventive health behaviors when they perceive the illness as severe, when they believe themselves susceptible, when they perceive the benefits of action as outweighing the barriers, and when they have sufficient self-efficacy to act. In Kitui, perceived severity and susceptibility were high and culturally encoded through the ugonjwa wa sukari frame. Participants understood their condition as serious and themselves as causally implicated. Perceived benefits of dietary modification were also recognized. However, perceived barriers, including food unaffordability, geographic distance, inadequate infrastructure, were of such structural magnitude as to render self-efficacy effectively moot for many participants. The HBM's conceptualization of 'perceived barriers' as primarily psychological phenomena cannot adequately capture the material, ecological, and infrastructural barriers documented here. This finding is consistent with critiques of HBM in low-income settings, where structural determinants of health behavior are frequently more powerful than cognitive ones [13, 23].

The Social Ecological Model [29] more fully accommodates the multi-level reality documented in this study. At the *individual level*, participants demonstrated genuine motivation, cultural illness narratives, and strategic dietary adaptation. At the *interpersonal level*, family caregiving networks were the primary mechanism sustaining nutritional management, while simultaneously exposing the disproportionate burden placed on female carers. At the *community level*, stigma, social judgment about eating behavior, and faith-based solidarity operated in complex tension, simultaneously impeding public dietary adherence and sustaining private motivation through religious framing. At the *institutional level*, healthcare facilities provided diabetes clinic services but were geographically remote, episodically undersupplied, and poorly positioned to address the food environment or household infrastructure realities of their patients. At the *policy level*, the absence of food subsidies for diabetes-appropriate foods, the absence of rural cold-chain

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infrastructure investment, and the non-recognition of family caregivers as formal actors in diabetes management protocols constitute systemic omissions that no amount of individual behavioral change can compensate for.

A third theoretical lens, not fully deployed in prior work in this setting, is the concept of the metabolic rift [9, 22]: the structural disconnect between what clinical evidence-based diabetes nutrition requires and what the ecological and economic environment of ASAL Kenya provides. This rift is not a metaphor; it is a measurable, concrete gap between the dietary prescription and the dietarily possible. The healthcare worker's formulation that, 'they simply cannot afford to be compliant', is not a statement about individual failure but a diagnostic of structural violence: the systematic exposure of a marginalized population to preventable illness and deteriorating health because the conditions for their health are not provided. Addressing this rift requires both clinical innovation (adapting dietary recommendations to locally available and culturally appropriate foods) and structural investment (food security programs, rural infrastructure, community health worker support).

The household diet convergence finding, all family members incidentally adopting the diabetic diet due to economic necessity, is this study's most empirically original and practically significant observation. It documents an organic, bottom-up process of dietary alignment that public health programs have neither recognized nor sought to replicate intentionally. A family-centred, household-level model of diabetes nutrition intervention in ASAL Kenya, one that supports, resources, and formalizes this naturally occurring pattern could achieve population-level dietary improvement at low cost while simultaneously reducing caregiver burden by providing explicit guidance and support. This represents a concrete programmatic innovation opportunity that emerges directly from ethnographically grounded qualitative evidence.

Limitations

Several important limitations must be acknowledged. The small sample size (n = 17) and single-county setting constrain the transferability of findings to other regions of Kenya or sub-Saharan Africa; results should be understood as contextually specific and analytically generative rather than statistically representative. Recruitment through a county referral hospital may introduce selection bias toward participants with relatively greater healthcare engagement, potentially underrepresenting those with the most severe access barriers. Combining results and discussion, while a recognized and widely used approach in qualitative health research, may limit the visible separation between descriptive data presentation and interpretive analysis; readers are encouraged to attend to the analytical commentary accompanying each participant quotation.

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Social desirability bias may have influenced responses, particularly regarding dietary adherence and traditional medicine use: participants may have reported more compliant dietary behavior in an interview setting than they practiced in daily life, and may have underreported herbal remedy use, despite the interviewer's explicit non-judgmental framing, due to the clinical setting of initial recruitment. Dietary information relies on retrospective participant recall rather than validated dietary assessment tools; the study does not generate quantitative data on actual dietary intake. The study's cross-sectional design captures a single temporal point in participants' illness trajectories and cannot illuminate how self-management practices, family support systems, or structural barriers change over time. Finally, the supervisor-lead author relationship in this study, where the academic supervisor appears as a co-author, while common in postgraduate research contexts, may constitute a perceived power dynamic that influenced the principal investigator's choices during data collection and analysis, and that warrants transparent acknowledgement.

CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

This study makes an original and substantively important contribution to the qualitative diabetes literature by documenting, for the first time in an ASAL Kenyan context, how nutritional self-management among elderly adults with T2DM is shaped by the intersection of cultural illness framing, therapeutic pluralism, ecological food insecurity, and intergenerational care. Specifically, three findings merit emphasis as contributions that extend, rather than merely replicate, what is known from prior Kenya and sub-Saharan African research. First, the social construction of diabetes through the *ugonjwa wa sukari* frame is not simply a cultural oversimplification but a functional illness narrative that organizes self-management motivation, while simultaneously creating glycemic blind spots around non-sugar carbohydrates that nutrition education must address. Second, the metabolic rift between evidence-based dietary prescriptions and ASAL ecological food realities is of such magnitude that individual-level dietary counseling without structural food access intervention is demonstrably insufficient, and the systematic labeling of structurally constrained non-adherence as 'patient failure' is both empirically incorrect and ethically problematic. Third, and most originally, the incidental convergence of entire households onto diabetes-adapted diets, driven by economic necessity, reveals an unrecognized mechanism of organic dietary change that family-centred public health programming could leverage intentionally and at scale.

The following recommendations arise from these findings.

At the clinical level: healthcare providers should create explicit, non-judgmental spaces for disclosure of traditional remedy use; dietary counseling should be grounded in locally available, culturally appropriate foods rather than externally

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derived dietary templates; and elderly patients traveling long distances to clinics should be prioritized for community outreach and mobile health services.

At the community and programmatic level: family caregivers, particularly women, should be recognized and formally supported as primary nutritional agents; faith-based organizations should be engaged as diabetes education and peer support platforms; and diabetes nutrition programs should be designed at the household rather than individual level, leveraging and supporting the organic diet-convergence pattern documented in this study.

At the policy and structural level: investment in rural cold-chain infrastructure (including solar refrigeration and home-storage guidance), subsidization of diabetes-appropriate foods in food-insecure counties, and the formal integration of community health workers into chronic disease management systems are essential preconditions for equitable diabetes outcomes in ASAL Kenya. Without structural transformation alongside individual and community-level interventions, diabetes self-management will remain an exercise in navigating constraints rather than achieving health.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest that influenced the research, authorship, or publication of this study.

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Table 1: Participant recruitment profile by category (N = 17)

Participant category	n	Sex (F/M)	Age range	Recruitment setting
Elderly persons with T2DM	9	5F / 4M	60–78 yrs	Diabetes clinic, Kitui County Referral Hospital
Family caregivers	4	3F / 1M	28–55 yrs	Snowball via community health promoters
Community health volunteers	2	2F / 0M	35–50 yrs	Snowball via community health promoters
Healthcare workers	2	1F / 1M	32–45 yrs	Purposive, chronic disease management unit
Total	**17**	9F / 8M	28–78 yrs	

F = Female; M = Male; T2DM = Type 2 Diabetes Mellitus

Table 2: Sociodemographic characteristics of elderly participants with T2DM (n = 9)

Variable	Category	n (%)
Sex	Female Male	5 (55.6%) 4 (44.4%)
Age group	60–70 years 71–80 years	6 (66.7%) 3 (33.3%)
Marital status	Married (intergenerational household) Widowed Single	7 (77.8%) 1 (11.1%) 1 (11.1%)
Education level	No formal education Primary level Post-primary level	2 (22.2%) 3 (33.3%) 4 (44.4%)
Primary occupation	Subsistence farming Small-scale trade Retired / pension income	3 (33.3%) 3 (33.3%) 3 (33.3%)
Monthly income (KSh)	< 5,000 5,000–20,000 > 20,000	2 (22.2%) 5 (55.6%) 2 (22.2%)
Duration of T2DM diagnosis	1–5 years > 5 years	4 (44.4%) 5 (55.6%)

KSh = Kenyan Shillings; HH = Household; T2DM = Type 2 Diabetes Mellitus

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