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Exploring Lived Realities and Information Needs at the Intersection of Maternal Nutrition Intervention and Social Assistance in Kenyan Under-Resourced Settings: A Qualitative Multi-Case Study

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Abstract

Background

Providing nutritional advice to a pregnant mother is ineffective if she lacks money to buy food or social support to access it. Under-resourced settings present a complex intersection of physiological requirements and socioeconomic constraints where clinical guidelines often fail to account for the lived realities of food insecurity, cultural influence and systemic fragmentation. While biomedical protocols focus on nutrient density and dietary diversity, these recommendations become practically void when expectant mothers lack the capability to secure the recommended regimen. Despite commitments to integrate social protection with healthcare in Kenya, these systems often operate in silos. This fragmentation creates 'data poverty', where specific vulnerabilities of expectant mothers remain invisible to the systems designed to support them. This study seeks to answer the question: *What are the lived realities and information needs of stakeholders at the intersection of maternal health nutrition, and social assistance implementation in under-resourced settings in Kenya?*

Methods

A qualitative multiple-case study was conducted in four Kenyan counties: Nairobi, Kitui, Wajir and Kajiado, which experience different manifestations of intersecting vulnerabilities. Purposive sampling was used to recruit participants from six stakeholder groups. Data was collected through semi-structured interviews and 24-hour dietary recalls. Thematic analysis was performed using the Braun and Clarke framework using ATLAS.ti software.

Results

Maternal malnutrition was found to be primarily driven by severe economic and sociocultural determinants rather than knowledge deficits. In high-prevalence Female Genital Mutilation regions, a fear-driven paradox was identified where mothers intentionally practice nutritional nonadherence to prevent foetal overgrowth and subsequent obstetric complications. Systemically, a lack of integration between health facilities and social registries results in 'institutional data poverty', preventing the delivery of timely Safety Nets. Consequently, frontline workers acted as human bridges, absorbing the burden of systemic failure by providing informal, support to marginalised women.

Conclusion

Maternal nutrition non-adherence is a structural failure caused by fragmented digital infrastructures and disregard for local information needs. Integrated, person-centered data-driven models have the potential to eliminate institutional data poverty and ethically integrate the grassroots workforce. This will help improve social assistance and maternal health outcomes, hence enhancing achievement of SDGs Target 1.3 and 3.1, respectively.

Background

Pregnant mothers are expected to eat well for the sake of their health and that of the developing child. However, due to various socioeconomic factors and compounded vulnerabilities, they are not able to maintain the recommended nutrition regimen, and this has profound intergenerational nutrition challenges. These maternal nutrition challenges, such as limited access to nutritious food, cultural taboos, especially in under-resourced settings, are rarely just a health problem. They are driven by intersecting socioeconomic vulnerabilities. Systemic siloing of maternal healthcare and social assistance programs in Kenya creates an information and resource vacuum that prevents under-resourced expectant mothers from meeting essential nutritional requirements (1–3).

Even with national efforts to provide social support to vulnerable pregnant women, many still face severe poverty and hunger, leading to high rates of malnutrition challenges in these resource- constrained settings (4–7). As a result, these intersecting vulnerabilities dictate that clinical nutrition guidelines and recommendations are not sufficient, because when an expectant mother lacks basic financial capabilities to secure the recommended nutrition regimen, the biomedical advice regarding dietary requirements and diversity becomes practically void (8–10). Consequently, addressing maternal malnutrition requires interventions that not only provide feeding recommendations but also deliver targeted socioeconomic support to mitigate the intersecting and structural poverty driving poor maternal nutrition outcomes (11, 12).

In Kenya, standard nutritional package includes clinical interventions like Iron-Folic Acid Supplementation (IFAS), currently transitioning to Multiple Micronutrient Supplementation (MMS), routine monitoring of weight and haemoglobin, malaria prophylaxis deworming and dietary counselling, aimed at preventing anaemia, stunting and low birth weight. While social protection programs, such as social assistance offer a theoretical lifeline to bridge socioeconomic gaps (13), their delivery in Kenya is hampered by systemic fragmentation. Currently, maternal health services and social protection information services are not fully harmonised, with key programs operating in parallel silos (14, 15). Consequently, a vulnerable pregnant woman navigating the Kenyan healthcare system for antenatal nutrition support is rarely visible to the social protection services. The systemic disconnect is characterised by data poverty, where the lack of integration of the information systems prevents frontline workers from making dynamic, holistic, data-driven intervention decisions. As a result, vulnerable mothers with malnutrition challenges, fall through the cracks of these disjointed systems and interventions. This leads to high exclusion errors in social assistance targeting and failure of well-intentioned maternal nutrition interventions (14, 16).

In the Kenyan public health context, maternal nutrition interventions are targeted at pregnant women during antenatal visits and Community health promoters visits. The clinical markers define who needs intervention but are often disconnected from socioeconomic indicators of vulnerability used by social protection services. Subsequently, interventions suffer from contextual misalignment, in addition to the exclusion errors. Furthermore, because the

design is top-down and expert-led; by leaders and specialists then passed down to everyone, they fail to account for the lived realities and service realities of the affected communities, mothers and low-level workers in this maternal nutrition space. Existing interventions and policies overlook the invisible burden and invisible indigenous knowledge of the mothers and local front-line workers who navigate these systemic failures daily. Invisible burden on CHPs include hidden work and personal costs they have to take up to care of the mothers, where the system fails to provide aid. Furthermore, intervention ignore invisible indigenous knowledge like local traditions and cultural fears that dictate what a mother eats. By ignoring these localised social and cultural contexts together with individual economic realities, health and social protection systems then perpetuate interventions that are contextually misaligned and fundamentally unsustainable (17).

This paper aims to expose the lived realities, structural silos and data gaps that prevent integrated care, laying the groundwork for more equitable, cross-sectoral intervention, grounded in the voices of the underrepresented, championing their voice to value. Consequently, this study seeks to answer the question: What are the lived realities and information needs of stakeholders involved in maternal health nutrition and social assistance implementation in under-resourced settings in Kenya?

Methods

Study Design

The study employed a qualitative multi-case study approach to explore the lived realities of stakeholders navigating maternal nutrition and social assistance programs in Kenyan Under resourced contexts, focusing on Wajir, Kitui, Nairobi(Kibera) and Kajiado counties. The approach involves studying distinct locations that are geographically and socioeconomically diverse to understand a broader phenomenon. It allowed for in-depth examination of how different individuals, those who gave and received service at different levels, make sense of their complex intersecting health and social realities in the four unique counties. The approach also allowed for triangulation of vulnerabilities, seeing how the same systemic failures manifest differently in diverse contexts (18–20).

LLM Declaration

Large Language Models (Gemini and Grammarly) were utilised during the manuscript preparation for structural refinement and linguistic improvement. However, this did not alter the originality of the content, and all primary data analysis and conceptual conclusions were generated by the authors.

Study Setting and Context

The study was conducted across four Kenyan counties: Nairobi (Kibera), Kitui, Wajir and Kajiado, with diverse contexts characterised by a convergence of high poverty indices, climate-related food crises and ingrained socio-cultural barriers to healthcare. Kibera informal settlement in Kenya is the largest urban slum in Africa, representing an environment of multidimensional poverty. There is high unemployment with poor sanitation infrastructure, driving the burden of communicable diseases (21). Kitui and Wajir are semi-arid counties with environmental shocks, from floods to extreme droughts, precipitating severe food insecurity. Kitui has recorded a stunting rate of 46%, the second highest in Kenya and has currently dropped to 25%, though still higher than the national average of 18% for children under five (22). Wajir's landscape is a semi-arid area uniquely compounded by gender-based cultural practices especially Female Genital Mutilation and early marriages, which have a negative intergenerational cycle of malnutrition and obstetric complications. These issues as malnutrition determinants are consistent with the UNICEF Conceptual Framework on Maternal and Child Nutrition (23). Finally, Kajiado presents how sociocultural determinants such as nomadic pastoralism, early marriages and preference for traditional care practices mediate health outcomes (24, 25).

Participant Selection

A purposive sampling strategy was used to recruit participants from six key stakeholder groups from the four study counties, who included the expectant mothers, Community Health Promoters (CHPs), Social Assistance Officers, Healthcare Frontline Workers, Local Administrators, ICT and Academia, Health and Social Protection officers and decision makers, at local and national levels. The judgemental or selective, non-probabilistic technique aimed for information-rich cases that ensured a comprehensive representation of the health and social protection ecosystems in this digital age. The recruitment was done at the national and county levels. The local level recruitment focussed on the lived realities and the local programs implementation, while the national level targeted policy and technical expertise.

At the county level, participants included expectant mothers, healthcare providers, CHPs and administrative leaders. Expectant women were eligible if they were residents of the counties and provided informed consent. Individuals who were below 18 years without guardian consent, non-residents and those with severe health conditions were excluded. To capture service delivery perspectives, Community Health workers, Nutritionists, nurses and Local administrators were recruited based on their involvement in providing Antenatal Care and maternal nutrition support services in the target counties. Healthcare practitioners without a direct role in maternal care were excluded. Local administrators provided administrative and residential oversight.

At the national level, the study engaged technical and policy stakeholders to evaluate programming and systemic integration. Health and Social Protection policy makers were recruited from senior government positions with direct oversight of the relevant programs. Technical staff without policy and programming oversight responsibilities were excluded. ICT Experts with professional experience in digital health, health information systems or Information and Communication for Development (ICT4D) in health and social protection projects were eligible. However, students and interns without prior experience were excluded. Finally, a Nutrition Improvement through cash and Health Education (NICHE) facilitator was included to provide specialised program insights.

The table below illustrates how the different participants were coded.

Table 1
Participant Identity Coding

Stakeholder Group	County	Mother Identity per Location	Participant Code	Stakeholder Group	County	Service Provider Identity per Location	Participant Code
Expectant Mother	Nairobi Kibera	Kibera Nairobi Mother	KBM	**Community Health**	Nairobi Kibera	Community Health Worker	KBCHW
	Kitui	Kitui Mother	KM		Kajiado	Community Health Worker	KJCHW
	Kajiado	Kajiado Mother	KJM		Wajir	Community Health Worker	WCHW
	Wajir	Wajir Mother	WM		Nairobi Kibera	Community Health Worker	KJCHW
Service Provider Code Identity Location					Kajiado	Traditional Birth Attendant	KJTBA
Healthcare Provider	Nairobi Kibera	County Head of Nutrition	NCNH	**Social Protection**	Nairobi Kibera	Social Protection Officer	KBSP
	Kajiado	County Head of Nutrition	KJCNH		Kitui	Social Protection Officer	KSP
	Wajir	County Head of Nutrition	WCNH		Kajiado	Social Protection Officer	KJSP
	Kitui	County Head of Nutrition	KCNH		Wajir	Social Protection Officer	WSP
	Nairobi Kibera	Nutritionist	KBNt		National Level	Cash Transfer Officer/ NICHE	SP
	Kajiado	Nutritionist	KJNs		National Level	Health Programs Expert	HE1
	Wajir	Nutritionist	WNt		National Level	Cash Transfer Officer/ NICHE	SP
	Nairobi Kibera	Nurse	KBNs	**ICT &Academia**	National Level	ICT, Digital Health Experts, Academia	ICTA
	Kajiado	Nurse	KJNs	**Local Administrator**	Wajir	Chief	WC
	Wajir	Nurse	WNs				

Data Collection

Data was collected through semi-structured interviews and 24-hour dietary recall to explore the intersection of maternal nutrition and social assistance. Interview guides were developed to elicit narratives regarding the daily realities of malnutrition and experience with social protection schemes. Additionally, expose the current information flow between health and social services or other social assistance programs and the flow of information between health and social services. To ensure participant anonymity and maintain relational trust and maintain ethical rapport, especially in remote areas where recording was met with hesitation, a note-taking data capture approach was adopted. Other sessions were audio recorded and transcribed verbatim. All data was translated into English where necessary and transcribed, while field notes were verified through the interview process to ensure accuracy. Physical field notes were securely stored and the digitised data stored in password-protected storage accessible to the research team. According to the ethical requirements and Kenya's Data Protection Act (2019) all personal identifiers were replaced with alphanumeric codes as illustrated in Table 1 above.

Data Analysis

Qualitative data; both the verbatim transcripts and the field notes were analysed following the Braun and Clarke thematic analysis framework (26), using ATLAS.ti (V25) software. This process involved an iterative cycle of data familiarisation, generation of initial code and refinement of themes that captured the lived realities of the participants and the barriers within health and social protection systems. To ensure trustworthiness of the findings, inductive and deductive coding were employed, allowing the emergence of unexpected insights while addressing the research question. The codebooks were cross-checked by the research team to ensure consistency and minimise researcher bias (26–28). From the initial coding process, 119 codes were created through manual coding and through the use of the '*suggested code*' functionality on Atlas. Ti. The codes were grouped into experiential, leadership and system-level themes in alignment with the study's research questions and objectives. These codes captured the stakeholders' expressions, capturing nutrition practices and related misconceptions, experiences and knowledge of social protection, their own interpretation of their beliefs, challenges and desire for a change in how things work in context. The initial codes were later merged, with some discarded, ending up with 55 codes.

Results

Participant Characteristics

A total of 75 stakeholders from the 4 counties; at local and national level participated in the study to reach data saturation (29, 30).This comprised of 37 expectant mothers and 38 service providers across the social protection, health and ICT and Academia domains. For the expectant mothers; Kitui (n = 16), Wajir (n = 11), Kajiado (n = 5) and Nairobi-Kibera (n = 5). 75% of these women were aged between 20–24 years (n = 16) and at the time of the interview and 53% were in their third trimester specifically between 7 and 8 months of gestation. The table below summarises the expectant mother demographics (n = 37).

Variable	Category	Frequency (n)	Percentage (%)
Location	Kitui	16	43.2%
	Wajir	11	29.7%
	Kajiado	5	13.5%
	Nairobi-Kibera	5	13.5%
Age Bracket	15–19 Years	2	5.4%
	20–24 Years	16	43.2%
	25–29 Years	12	32.4%
	30–34 Years	4	10.8%
	35–39 Year	2	5.4%
	Above 40 Years	1	2.7%
Gestation Status	4–6 Months	9	24.3%
	7–9 Months	25	67.6%
	Not revealed	3	11.1%

The service provider and policy-level participants (n = 38) included 27 health service providers, 5 social protection implementors, 2 local administrators (chiefs) and 4 ICT& Academic/Digital health experts. This multisector sample ensured a comprehensive view of systematic disconnects between health and social assistance in the age of technology.

County-Level Analysis

The heatmap below illustrates how the codes were distributed in the four locations, illustrating county-level findings, which are later discussed under the discussion section.

The analysis confirms that maternal malnutrition is not a uniform challenge, rendering a ‘one-size -fit-all’ intervention ineffective. The heatmap above illustrates the varying reflections of the situation across the four counties. Compounded vulnerabilities was among the significant codes across the locations, indicating that the intersecting complexities are primary drivers of nutritional outcomes in both the urban informal and remote settings. This suggests that malnutrition is rarely a standalone clinical issue but rather a result of intertwined challenges. Furthermore, the occurrence of service delivery barriers and intervention design challenges highlighted systemic fragmentations and the silo effect in service delivery. It highlighted how policies may be blind to infrastructure and systems failures that impede impact. The fragmentations and blind spots, therefore, contribute to data poverty and information asymmetry with high information gaps and systemic disconnects. Ultimately, the heatmap uncovers invisible knowledge and burden that make up for the fragile systems. Frontline workers and CHPs act as human buffers absorbing systemic shocks of the invisible needs and compensating for the lack of cohesive infrastructure.

Narrowing down to county level analysis, data illustrated that Wajir is dominated by food access barriers and deeply rooted dietary beliefs. The vast physical distances aggravate the social protection awareness gaps. Kajiado illustrated severe information gaps and unmet needs with poor representation of social protection awareness, indicating massive systemic outreach failure. Notably, the heatmap displays Kajiado with comparatively lower frequencies for ‘Food Access and Availability’ and ‘Dietary Practices and Beliefs’ than other counties. However, qualitative context reveals that this is not an indicator of localised food security, but rather an artificial suppression driven by extreme clinical workarounds. Because marginalised mothers in Kajiado face geographical barriers and related food and environmental challenges, health workers resort to admitting them to supervised feeding, avoiding later admission in more critical situations. As a result, the better feeding is actually a proxy for outpatient intervention, resulting in hospital admission and monitoring as a reliable nutritional safety net.

NICHE; Nutrition Improvement through Cash and Health Education, is an innovative social protection intervention targeting vulnerable households, and Kitui County is a beneficiary, as it is a high- malnutrition county. However, compounded vulnerabilities and information gaps remain prevalent in the county. Kibera, an informal settlement, despite its location in the country’s capital, exhibited high frequencies of compounded health vulnerabilities and social protection information gaps, parallel to remote counties, proving that urban proximity does not equal system integration.

Thematic analysis generated four major findings regarding the lived realities and systemic realities of maternal nutrition and social assistance. These include the challenge of intersecting vulnerabilities that affect maternal nutrition, systemic fragmentations and the silo effect in service provision, data poverty and

information asymmetry hindering integrated decision making, and the invisible knowledge, labour and burden on frontline workers and community health workers as they navigate service provision.

Intersecting Vulnerabilities

Data shows that maternal malnutrition in these under-resourced settings is rarely a result of mere Information deficit, but it is compounded by severe socioeconomic and disease-related constraints, and cultural practices. While standard clinical interventions prioritise supplementation, dietary counselling and behavioural education, data reveals that knowledge alone is not insufficient. Cultural practices on women's reproductive health, feeding habits, food insecurity, poverty, mental health challenges, disease burdens like anaemia, HIV, TB, unstable living and gendered labour are compounding vulnerabilities, causing or facilitating nutrition risks. The findings also demonstrate a disconnect between the clinical nutrition guidelines and the lived capacity of mothers to adhere to them. The mothers described the difference between critical dietary advice and clinical nutritional guidelines provided during antenatal care, and their actual capacity to adhere to them.

Findings from the 24-hour dietary recall show that poverty dictates what mothers eat, leaving them with very little variety in their daily meals. Across the four study sites, maternal diets functioned more as hunger management adaptations rather than nutritional care. Diets were dominated by low-cost, high carbohydrates while intake of essential proteins and vitamin-rich foods remained sparse. The dietary poverty manifested differently across the geographies but yielded similar malnutrition outcomes.

Protein deficiency was severely displayed in Kibera, a Nairobi urban informal settlement. Despite urban proximity, the cost of living restricts diets to basic staples. In Kajiado and Wajir, despite widespread livestock ownership, animal proteins were rarely consumed, and livestock were preserved as a form of wealth rather than food. Furthermore, cultural taboos explicitly exclude alternative proteins like poultry and fish. Kitui displayed slightly better dietary diversity, with more frequent bean consumption, yet prolonged droughts continuously threaten agricultural variability.

In Wajir and Kajiado, data illustrated hunger management tactics and fear-driven avoidance of proteins to prevent c-section in Female Genital Mutilation (FGM) -affected communities. Severe dietary restrictions are actively self-imposed due to the cultural prevalence of FGM. The data revealed a profound, fear-driven paradox; because FGM causes severe vaginal scaring, expectant mothers are terrified of obstructed labour, perineal tearing or requiring a caesarean section. Consequently, they intentionally starve, avoiding proteins like eggs and milk to prevent baby growth. As one community health worker (**WCHW1**) translated from a mother,

Mimi naogopa kukatwa na pia niliambiwa nisikule mayai, atatoka mate na pia atakua polepole

"*I fear going through caesarean section for childbirth, and I was also told my kid will be drooling and have slow growth issues if I eat eggs*".

This fear is pervasive, and clinical advice is often ignored or hidden. Healthcare workers reported that praising a mother for healthy gestational weight gain often triggers her to go home and skip meals.

"*When a mother shows up for a routine check, and you mention you are happy with her weight gain and general pregnancy health, they go home and starve themselves. Some skip meals or avoid other meals, especially proteins, to avoid further growth. You actually wonder if the information you provide should be concealed for her well-being*." **WNs1**

"*The mothers have misconceptions about feeding- to avoid 'difficulty in delivery', they sometimes choose to stave or avoid certain foods because they do not want their children to grow big or get in situations where one would want to go through caesarean section for birth.* **-KJN**

"*You understand that women in our community undergo FGM, and this means the virginal scars after the procedure. Most mothers think about the pain of childbirth and know that if they feed well, their child will be big, and they may tear up during childbirth or go through a C-Section. With this fear, they underfeed and avoid proteins. Sometimes you tell a mother what to eat during the household visit, and you see them say 'wachaa aongee tu ama alete nitakula (Let her talk, or she can as well bring that food I will eat*"- **WCHW1**

*"In Kajiado, the FGM narrative is championed with different connotations. it is believed that children born to uncircumcised mothers are said to never be successful. No mother wants that and being circumcised makes you a woman, so why not "***– KJCHW1**

The intersection of food security, unyielding cultural expectations and geographical specific challenges places a toll on maternal mental health. Frontline workers have reported heightened levels of maternal stress, extreme coping mechanisms like selling nutritional supplements for cash and tragic instances of violence resulting from psychological strain.

"Some sell their supplementations. Some use devious ways to keep benefiting from supplementation programs, and those deep down in the rural areas are not reached for any intervention"- **Nt**

The failure of formal social safety nets has pushed the healthcare workforce to adopt unconventional systemic compensations. In Kajiado, for instance, a nurse reported cases of malnourished mothers being admitted not for acute medical crises but simply as a strategic measure to guarantee consistent food intake. This clinical improvisation serves to prevent severe anaemia an premature births, which are otherwise inevitable due to long distances from facilities, harsh environments and chronic food insecurity.

"Poorly feeding mothers have Low HB (Haemoglobin), some have Urinary Tract Infections, and Most give birth prematurely" – **KNt**

"We sometimes have to make the hard decision to admit the expectant women because they stay so far, we are not sure if they will keep the food regimen, and that means they are highly likely to come back in more critical situations. We have had to admit a 6-month expectant mother to and also have a number of blood transfusions"-**KJN**

The compounding challenges get overwhelming, and maternal mental health becomes an issue to look out for.

"These mothers experience many challenges that affect their nutrition and general health. So, supporting care solutions should be considered and connected. Here, Mental health is a big issue with mothers going through stressful moments, going as far as hurting themselves. Last week, a mother stabbed her child to death as she could not take care of her. Hence the need to cater for mental care intervention as well."- **WCNH**

"Lack of food was seen to cause so much stress among the mothers, and they handle it differently. In Wajir, a heightened level of maternal mental issues had been raised with a report of a mother who stabbed her child for crying too much out of hunger. When you ask the mothers why they still have many children despite the burden, you notice socio-culturally embedded rationales. One mother is reported to have 'discarded' a crying child and gotten pregnant with another. Taking birth control is seen as a taboo, against the rules of life." - **WCHW1**

Systemic Fragmentations and the Silo Effect

Data also revealed various forms of system fragmentation and the systemic cracks between health and social protection services, highlighting how operational bottlenecks and siloed governance undermine nutrition intervention. Participants reported that interventions run in parallel tracks, describing a fragmented ecosystem characterised by disjointed operations, top down targeting mechanisms, and rigid programmatic boundaries that exclude under resourced populations.

Key informants in the technology sector highlighted disparate technology stacks, a lack of standardised Application Programming Interfaces and misaligned data dictionaries that affect integration. In addition, the multiplicity of stakeholders creates significant data governance and ownership conflicts. Additionally, the involvement of diverse actors, ranging from policy makers and technology vendors to foreign donors, created a complex data landscape.

"*Complexities are a huge challenge associated with the integration of previously independent systems. The people who need the system, provide data, fund programs, run the programs and create the tools are all different. This comes with conflicting needs and ownership challenges. Giving a scenario of the ECHIS System in Kenya. The Community Health Strategy is by the Ministry of Health, ECHIS is run at the policy level. The group or team that provides the tool is Medic Mobile. The Community Health support program where the CHWs use ECHIS, is run by AMREF, funded by the USA Government. Considering all these players, who owns the data?*"**- ICTA2**

"*The actual integration of a Social Protection-enabled Maternal Nutrition Intervention Framework may be challenged by fragmented health and social welfare systems, limited funding, weak data-sharing mechanisms, and policy misalignment, but it presents strong opportunities through existing maternal health programs, cash transfer schemes, digital health platforms, and supportive national nutrition and social protection policies, provided regulatory clarity, inter-ministerial coordination, and data protection compliance are ensured. Major challenges include data fragmentation, poor integration, privacy and consent concerns, weak governance, and limited digital capacity.*" **– ICTA1**

The study also found a major gap between central leadership and local staff. Frontline workers and CHPs expressed frustration that decisions 'at the top' without their input. Even though these workers have the best understanding of which families are struggling based on their day to day interactions, they are left out of the process when identifying aid beneficiaries.

"As a community health promoter, I visit homes during my routine household checks, and I know those who are badly off, but I am not involved in selecting beneficiaries. Sometimes you learn about enrolments as a by the way and wonder who they choose to support **" -KBCHW1**

The sentiment was echoed by local social protection officers who noted unpredictable, top-down enrolment schedules that leave them unable to respond to urgent community needs.

"*We are the ones on the ground and know these poor people. They camp at my office for help, though not directly for nutrition, but for normal support, but the government schedules are unpredictable, and we never know when the next vulnerable people enrolment will take place. It would be better if we, at the low and local office, gave recommendations.*" - **WSP**

Fixed rules and administrative delays slow down the system. This fragmentation is worsened by inflexible program designs and cycles that are inconsistent or influenced by political timings. For example, the Nutrition Improvement through Cash and Health Education (NICHE) relies on legacy social protection registries. Consequently, vulnerable mothers are only eligible for nutrition support; a top-up, an extra financial supplement intended for maternal health if their household is already enrolled in a social protection program under another category, such as the elderly, persons with disability, or orphans.

"*NICHE was rolled out in some counties, including Kitui, but the mothers were only supported if they belonged to the other beneficiary group households i.e. if they belonged to an old person household/ orphan/ disabled then they got a top-up of Ksh 500.*"- **SDSP**

Additionally, there is poor data synchronisation between civil registries(births and deaths) and social protection databases (14, 31). In some remote settings like Wajir, cultural constraints such as immediate burial rites mandated by religious and traditional customs often lead to delayed official death reporting. No-fully automated updates of the registries make deceased individuals remain on the payroll, creating ghost beneficiaries.

"*The government funds are limited and not every beneficiary is recruited. It is limited to specific numbers hence the need for prioritization. The amount given to the beneficiaries is KES 2000 per month, which is not enough, and the selection criteria leaves out some people. The vastness of the county does not make it*

easy to reach out to all people as desired. Enrolment is done through chief and sometimes tracing people is a problem. We have had some abled people in families like grandchildren stealing money sent via MPESA as they know the beneficiaries' credentials, i.e. a grandchild getting money from his/her grandparents' phone and deleting the transaction details. Later the old person shows up complaining only to learn money was sent to them.

There are no specific support programs for poor expectant mothers"- **WSP**

"*Sending the money through MPESA has its challenges- for example, old people's phones are often accessed by family members and there have been cases where the old people come to claim they have not received the money, yet it was sent- so people access their phones and steal from them, unlike when they would present themselves, with their IDs and pick the money from the bank.*

We also have questions; how do you stop the tap when the person dies? Receiving money via MPESA would make this hard to know- unlike the times when one needed to show up and validate themselves as they pick cash form the banks.".- **SP**

Information Asymmetry and Data Poverty

Data also revealed crisis of asymmetric information and data poverty at institutional and community levels. This was characterised by the absence of shared information architecture between Antenatal Care (ANC) health facilities and social assistance programs. The participants expressed that the data used to select beneficiaries is often static and unrepresentative of the highly dynamic economic vulnerabilities experienced by the households. Additionally, at the community level, a fundamental lack of understanding of the normal pregnancy physiological changes was noted.

"*Other challenges experienced in the community, touching on nutrition, include cultural beliefs and nutritional misconceptions. I.e., the women avoid feeding well, some do not eat eggs or take milk to avoid having the kids being too big. Some do not know how to preserve food nutrients, boil food and pour the water leaving them with food with no nutrients.*"- **WCNH**

"Some do not eat Omena (silver cyprinid or Lake Victoria sardine) as they believe it will hurt the baby. They also do not eat eggs, as it will affect the baby, make them drool and also make them grow very big. They also have cultural influences on food choices, so someone eats what their grandmother says is good, based on their culture. They avoid legumes and pulses. Most do not understand the concept of bloating, so when it happens, they completely avoid the food" – **KNt**

Participants detailed pervasive food taboos rooted in intergenerational cultural beliefs, i.e., highly nutritious and locally available Omena (Sardines) and eggs are actively avoided. due to misconceptions that they will harm the foetus, cause the baby to drool, delay speech or result to foetal macrosomia. Similarly, essential fruits like pawpaws and pineapples are shunned with fears of inducing miscarriage, while legumes and leafy vegetables are eliminated from diets because they believe they cause bloating and heartburn.

As a nutritionist (**Nt**) observed, '*Someone eats what their grandmother says is good, based on their culture*', underscoring the profound behavioural impact of localized information gap.

At the time of the interview, mother **KBM1** struggled with eating and vomited a Lot. She had been given blood-boosting medication. But the mother mentioned that,

She was told she experiences heartburn because he child is growing hair and should not eat pawpaws and pineapples because they cause miscarriage.

This mother is visited by her CHW, who advised her on how to eat and supplement, but still holds on to the wrong understanding of nutrition and challenges around it.

"Some say the supplements are not good for the baby." **-KBCHWI**

"Many dont eggs because it affects their baby, so their baby will not talk" **-KBCHW5**

"Most avoid greens and beans because of heartburn" **- KNs1**

Invisible Knowledge, Labour and burden on Frontline Workers, and Community Health Workers and Local Leaders

Data poverty, data shows that frontline workers and community health workers utilise uncompensated, invisible labour and informal workarounds for vulnerable mothers. They step in as a human bridge for fragmented systems, where top-down interventions fail. Because targeting algorithms are opaque and enrolment cycles unpredictable, they encounter severely malnourished women who are excluded from the formal systems. To bridge this systemic failure, they absorb the financial costs, routinely paying medical bills and purchasing basic commodities out of pocket to simply establish rapport or provide emergency relief.

In addition, the extreme rigidity of the formal institutional protocols further frustrates. i.e., centralised policies mandate that mothers travel to receive nutritional support. This inflexibility forces the community health workers into ethically compromising situations as they attempt to advocate for their clients. In an illustration of this stark situation, a CHP recounted covertly taking food from the hospital to feed an immobile, starving ng mother.

"*Poverty is a big issue here in the slum, and mothers eat the little they have. Some as single parents struggle when they get tired and can't work- they cannot provide, and sometimes we are forced to chip in when a mother is in a bad situation*."**- KBCHWI**

KJCHW1 agreed with **KBCHWI**'s sentiments, saying,

When I visit a household, even my colleagues need to carry something for them to even have a place to start my conversation- some food, sugar, etc. to encourage them, and this is at our own cost. I have many times gotten frustrated when I see the state of the mothers- I once visited a mother, and I just cried and even came to seek mental help here at the hospital. It is too bad to see.

She went further to explain how mentally draining it gets as a CHW explaining that,

When we meet mothers who are badly off and ask for support from the hospital, they say the mothers need to come to be seen. These mothers stay far off, and it costs Ksh. 1000 to get to the hospital and back, on a motorbike, so it is not even financially feasible. One day, I had to steal some food from the hospital and take it to a mother who could not make it to hospital, and I was frustrated. I stole some food for her- I just told God I am sorry.

KJCHW2 also mentioned that

Some households are too hard to reach; we walk long distances to reach them.

The study revealed hidden knowledge as well as hidden information needs. **Nt** mentioned that

"*As much as people in the local area don't have a lot of information, there's that mother, there's that grandmother. There's that culture of making food.* He goes further on to explain that '*The problems that are faced in the local communities are because of food security'*.

Peer Support Networks and Informal Knowledge Exchange

In Kitui, a post-ANC, group ANC session was observed where around 30 expectant mothers voluntarily remained behind at the facility with nurses and midwives to engage in peer to peer and nurse-led pregnancy related discussions. These sessions provided a critical platform for addressing common pregnancy concerns, clarifying nutritional needs in a resonant manner. Unlike the clinical session, the group allowed for day to day knowledge and indigenous knowledge to be shared and validated.

Discussion

Intersecting Vulnerabilities

By examining the lived realities of the key stakeholders, the study reframes maternal nutritional non-adherence in under resourced Kenyan settings, not as a failure of an individual but as a profound structural failure, as illustrated in the Heatmap (Fig. 1). The study found that nutritional nonadherence was strongly associated with socioeconomic constraints and limited social support among expectant women. While global health and social protection literature emphasises cross-sectoral action, the study demonstrates how fragmented infrastructures, contextual differences and cultural realties actively undermine maternal equity at critical the intersection of maternal nutrition and social assistance (13, 17, 23, 32–34).The failure of formal social safety nets has pushed the healthcare workforce to adopt unconventional systemic compensations and when the compounding challenges get overwhelming, and maternal mental health becomes an issue to look out for.

System Fragmentation and the Silo Effect

Technical and governance silos translate into impediments towards an integrated social protection-enabled maternal nutrition framework; a system designed to synchronise clinical health data with social protection registries, because of fragmentation, privacy concerns and limited digital capacity. Apart from technical problems with data systems, the central leadership and local staff and workers gap translates to a lack of representation of their information and views in decision making, even though these workers have the best understanding of which families are struggling based on their day to day interactions. When they are left out of the process of identifying aid beneficiaries, they unable to respond to urgent community needs, effectively rendering social protection systems unresponsive in real-time nutritional crises.

The NICHE program piggyback design also illustrates how static eligibility criteria effectively locks out new vulnerable demographics; individuals who have fallen into poverty due to pregnancy-related costs or environmental shocks but do not live in a household that meets the traditional, static criteria for aid.

Poor data synchronisation between civil registries facilitates existence of ghost beneficiaries which leads to misallocation of funds. This relates directly to maternal nutrition crisis, as, the financial resources 'leaking' to non-existent beneficiaries are the same funds that could be used to fill the funding gap for the vulnerable mothers. Ultimately, these disconnected silos prevent social protection from operating as an equitable, right-based safety net.

Information Asymmetry and Data Poverty

An institutional lack of data sharing hinders service delivery, and at a communal level, information asymmetry fuels nutritional misconceptions and harmful dietary practices. The lack of integration between Antenatal Care (ANC) and social protection registries creates information asymmetry. This moves beyond the digital divide to information marginalisation, where an expectant mother's nutritional and socioeconomic deficits remain invisible to targeting algorithms. Furthermore, the data revealed community mistrust in the social protection system driven by opaque targeting algorithms. This makes social protection become inherently reactive, failing to provide timely SafetyNet during the gestational window. Our findings extend the work of (13), who suggest a framework to synergise social protection and health systems. Other studies have also looked into the impact of social assistance on health, including offsetting healthcare access, nutritional enhancement and encouraging individuals to engage in prevention and health awareness education (13, 35). Furthermore, a review of 51 studies by (36) linked cash transfers to improved maternal and child health service utilisation and (37) found improved maternal and child health indicators with conditional cash transfer and a reduction of low-birth-weight incidences. Additionally, (38) reviewed 200 cash transfer studies and concluded

that most of the studies showed improved health utilisation and growth rates. While the studies demonstrate the efficacy of cash transfers, our findings suggest the gains are unstable in arid and semi- arid areas where cultural diet restrictions can override the economic intervention.

This study further demonstrates that even when economic barriers are mitigated, other challenges, such as invisible barriers and sociocultural gatekeepers, remain prevalent, suggesting that digital interventions must also provide a platform to address the invisible knowledge and labour. This information asymmetry places a burden on an expectant mother who must repeatedly prove their socioeconomic vulnerability to disparate agencies to access support.

At the community level, a fundamental lack of understanding of the normal pregnancy physiological changes creates an information vacuum that is filled with cultural misinformation. This asymmetry directly compromises maternal dietary diversity, health-seeking behaviours and adherence to micronutrient supplementation. Even when Community Health Promoters provide evidence-based nutritional behavior, clinical advise is often surpassed by deeply rooted traditional knowledge.

Invisible Knowledge, Labour and burden on Frontline Workers, and Community Health Workers and Local Leaders

Through the technical-integration challenges and data poverty, frontline workers and community health workers have to patch the broken system. Their coming out as human bridges illuminates the human consequences of the disconnects identified in the preceding themes. When formal health and social protection systems operate in silos, the resulting delivery gaps do not simply disappear but are absorbed by the stained frontline workers, community health workers and local administrators.

When inflexible protocols ignore geographical, financial and physiological barriers of the marginalised populations, informal and rule-breaking workarounds are taken up, highlights how deeply the formal system relies on the invisible labour and moral burden of local support systems to function.

Mothers do not bear the non-adherence burden entirely. Lived realities reveal that localised dietary restrictions are heavily dictated by poverty and cultural determinants, notably FGM. The intentional avoidance of vital foods driven by fear at childbirth demonstrates how clinical guidelines fail when sociocultural realities and local information are ignored. The current health and social aid structure shows a lack of understanding of local needs and a failure to listen to local experts; failing to align with local knowledge and realities. The locals' ground-level service providers possess a wealth of hidden, localised information regarding community dynamics, such as influential roles of family and community, specific cultural mechanisms that lead to food avoidance, but this knowledge is not put to use. This is because interventions are typically designed by external experts without mechanisms to capture and integrate grassroots knowledge. With the top-down intervention and excluding local information, interventions fail not only due to technical fragmentation but also because systems ignore localised knowledge systems necessary to implement contextual, responsive maternal care.

Furthermore, extreme clinical workarounds and invisible burden on frontline workers and CHPs serve as a glaring proxy for systemic failure. Ultimately, the survival of these fragmented systems relies unethically on invisible labour, absorbing the burden of distress, which patches up systemic gaps. Top-down interventions designed without contextualized grassroot knowledge fail to address the genuine information needs and drain ground level workers. Sustainable strategies at this intersection cannot rely on static, one-size-fits-all digital registries. This calls for a dynamically integrated person-centered data model, responsive to real-time realities of those delivering and receiving care.

This aligns with other studies which reiterate that we remain vulnerable and miss opportunities to alleviate poverty, beat diseases and relieve the health sector with fragmented services, where health and social assistance initiatives do not reinforce each other (9, 39, 40), It is therefore recommended that these programs run in collaboration as vouched by (39) who argues that our world is rapidly unfolding a systems mindset plays a critical role in shaping the direction of productivity which is occasioned by technological advances (39, 41). (42) support the need for strong integrated health and social protection systems as social protection measures can help access health services, urging governments to scale up support for social protection schemes for primary care delivery, avoiding duplication and ensuring the best targeting, from the children's perspective, in the best interest of a child.

Based on these findings, a co-designed a digital, social protection- enabled maternal nutrition framework is proposed, that targets data poverty identified in the study to practically bridge the highlighted divides towards a responsive, equitable safety net. This is by using real-time clinical data and socioeconomic profiles input to trigger aid for expectant mother. Additionally, the framework and tool must move beyond simple data sharing to address the ownership conflict highlighted by **ICTA 2** and standardisation of APIs and data dictionaries to ensure the systems are interoperable and legally distinct. It should also address the identified leakage and verification issues as noted by **SP** and **WSP.**

Implications for Policy and Practise

Moving beyond the walls of the antenatal clinic to address maternal malnutrition requires integrated interventions that are highly localised, legally recognising the different drivers of the compounded vulnerabilities. A 'one-size-fits-all' intervention and policy will fail. Aligned with WHO's recommendation for resilient health systems, this study explored the lived realities and information needs to understand how digital techniques could be incorporated to support social assistance-enabled nutrition, exploring people-centred healthcare and decision-making (43). This reiterates the promotion of a mother-centred, context-driven nutrition approach, towards improving health-seeking behaviour, reducing errors and supporting caregivers in the health ecosystem to enhance nutrition surveillance (44) as guided by the 2024 WHO Digital Transformation Handbook (45, 46). The study, at a point of donor transition, repositions maternal nutrition not only as a service delivery problem but also as a leadership and systems coherence challenge that needs to be addressed through ecosystems integration, trusted synthesis and adaptive governance.

Strengths and Limitations

The study takes a cross-sectoral lens in the multi-case study across different contexts (arid and informal settlements), bridging the voices from both the health and social protection domains, ICT and administration, across multiple levels of the ecosystem. The approach exposes the systemic silos and data poverty (informational marginalisations) that single sector studies may overlook. The use of a 24-Hour dietary recall to triangulate the qualitative narratives provided a consumption reality check, bridging the gap between clinical expectations and lived socioeconomic constraints.

The purposive selection of the four unique counties provides in-depth contextual insights and the findings represent specific localised realities, that should not be broadly generalised to the entire national context without further mixed-methods validation. Further empirical studies are required in other contexts. The study also takes a cross-sectional design, which restricts causal inference.

The data on system fragmentation is based on the current Kenyan decentralised system model, and its applicability to more centralised health systems requires further comparative study. Finally, the 24-hour recall serves as a consumption reality check for qualitative depth and not as a longitudinal nutritional assessment.

Qualitative studies are highly subjective, with possibility of bias in opinion and views. Further research should consider the use of mixed methods to guarantee the validity and accuracy of the findings.

Consequently, future research must employ mixed methods or large scale quantitative approaches to determine how these lived realities and systemic barriers manifest at the national level or diverse sub-Saharan contexts.

Conclusion

The prevailing harmonisation challenges between health and social protection do not only reflect administrative inefficiencies. It systemically penalises the most under-resourced populations. Failing to share data, integrate targeting criteria and acknowledge localised social and cultural realities, these institutions restrict the reach and efficacy of critical maternal interventions. Overcoming these systemic impediments demands a paradigm shift away from reactive, top-down programs towards integrated, person-centered and data-driven responsive models of care. Achieving this requires both policy alignment and eradication of institutional data poverty, as well as ethical integration of the grassroots workforce currently bearing the systems burden.

List of abbreviations

ANC Antenatal Care

CHP Community Health Promoter, also called Community Health Worker (CHW)

FGM Female Genital Mutilation

ICT4D Information and Communication Technology for Development

IFAS Iron-Foloc Acid Supplementation

MMS Multiple Micronutrient Supplementation

SDG Sustainable Development Goal

Declarations

Ethics approval and consent to participate

The study was conducted following the Declaration of Helsinki. Ethical clearance was obtained from the University of South Africa IRB (Ref: 2025_SBL_DBL_036_FA_7345) and The Strathmore University Institutional Scientific Ethics Review Committee (SU-ISERC) (Ref: SU-ISERC3058/25). Subsequently, a formal research permit was issued by the National Commission for Science, Technology, and Innovation (NACOSTI) in Kenya, License No: NACOSTI-P-25-4181418. All participants provided informed consent prior to data collection, with the consents presented in both English and Swahili language for the non-English speaking participants. Participation was voluntary, and data was anonymised to ensure stakeholder confidentiality.

Consent for Publication

Not Applicable

Competing Interests

The authors declare they have no competing interests.

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Author Contribution

FS designed the study, collected data, analysed and prepared the manuscript. RH and DN reviewed and approved the final manuscript, providing senior oversight. All authors have read and approved the final version.

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Data Availability

The datasets generated and/or analysed during the current study are not publicly available due to the sensitive nature of the interviews, but are available from the corresponding author on reasonable request

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Figures

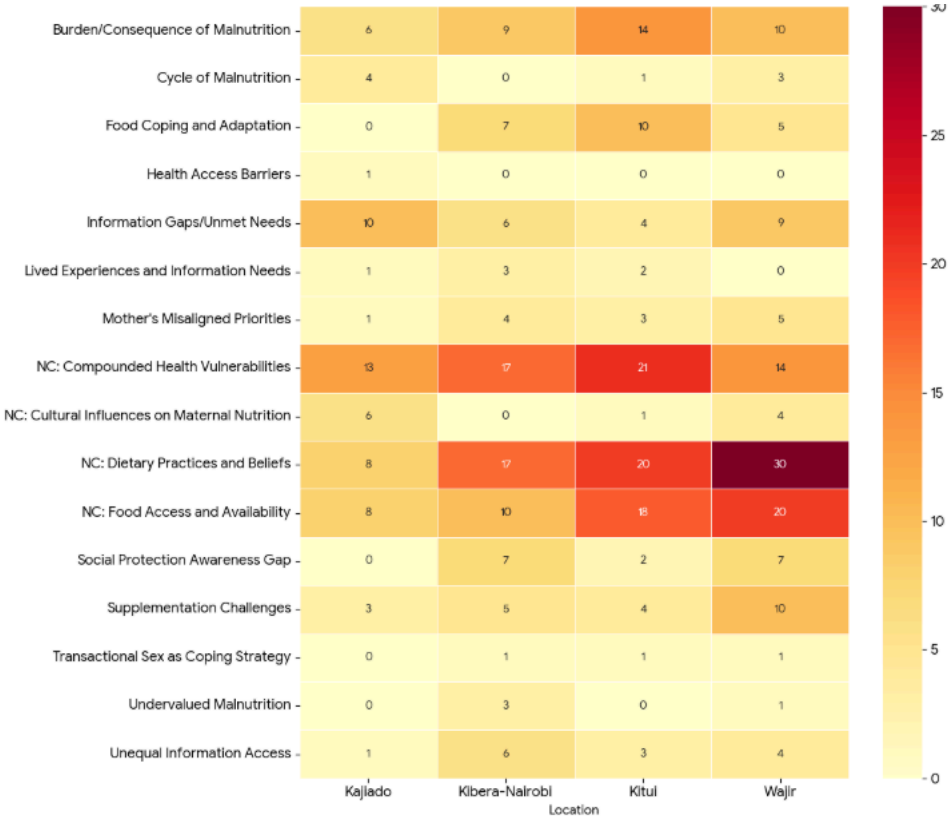


Figure 1

County Level Analysis Heatmap