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Socioeconomic Factors Affecting Utilization of Ready-to-Use Therapeutic Food in Management of Severe Acute Malnutrition in Kinango Sub-County, Kwale County

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Abstract

The issue of malnutrition, encompassing both overnutrition and undernutrition, remains a significant global challenge with severe consequences, especially for children under the age of five. Severe Acute Malnutrition (SAM) is particularly detrimental, leading to high morbidity and mortality rates among affected children. Despite progress in reducing the global burden of SAM, it continues to affect millions of children worldwide, with Sub-Saharan Africa bearing a significant portion of the burden. This study aimed to investigate the socioeconomic factors affecting utilization of ready-to-use therapeutic food in the management of severe acute malnutrition in Kinango sub-county, Kwale County, Kenya. Adopting a longitudinal cross-sectional study design, the study enrolled 220 severely malnourished children receiving RUTF and followed them for three months. Several external factors can influence the effectiveness of RUTF. These include: co-existing illnesses, such as infections or chronic conditions which hinder recovery and reduce the efficacy of RUTF, inadequate food at home limit the overall nutritional recovery, as RUTF alone cannot address broader food insecurity, prolonged waiting times at the health facility can discourage caregivers from seeking treatment, leading to incomplete recovery, insufficient follow-up by health workers can result in missed opportunities to address complications, monitor progress, and ensure adherence to treatment protocols. Recommendations include multifaceted approaches to improve caregiver practices, comprehensive training for health workers, and ensuring consistent RUTF supply at health facilities.

Keywords: *Socioeconomic Factors, Utilization of Ready to Use Therapeutic Food, Severe Acute Malnutrition*

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1. Introduction

Malnutrition, including both over-nutrition and under-nutrition, has remained a global challenge, with under-nutrition significantly affecting more children under the age of five years in Sub-Saharan Africa (Zachary, 2024). According to the UNICEF/WHO/World Bank Group Joint Child Malnutrition Estimates 2023 report, as of 2022, 148.1 million children under the age of 5 years were stunted – too short for their age - with 59.4 million of these children hailing from Sub-Saharan Africa. Moreover, 45 million children suffered from wasting – too thin for their height- and 13.7 million suffered from severe wasting. Additionally, in Sub-Saharan Africa, 5.9% and 1.3% of all children under five years suffered from wasting and severe wasting, respectively. Nyakundi and Cleophas (2021) define under-nutrition as an insufficient intake of either macronutrients or a deficiency in essential micronutrients, which manifests clinically in various ways, including stunted growth (chronic malnutrition) and wasting (acute malnutrition). While acknowledging the relevance of chronic malnutrition (stunting), my research primarily centered on acute malnutrition, specifically on Severe Acute Malnutrition (SAM), as it aligns more closely with the objectives and scope of the study.

King et al. (2022) define SAM as having a mid-upper arm circumference (MUAC) less than 115mm, a weight-for-height z-score (WHZ) less than −3 SD, and/or the presence of bilateral pitting edema in children aged 6 – 59 months. Despite significant strides in the reduction of the global burden of SAM, with the numbers reducing from 17 million children suffering severe wasting at any given time in 2016 to 13.7 million children in 2023, both the short-term and long-term consequences of SAM are detrimental (WHO, 2023). SAM is associated with high rates of morbidity and mortality. SAM among children results in serious physiological consequences, including reductive adaptation, marked immunosuppression, and concurrent infection, such as diarrhoea and pneumonia (Alflah & Alrashidi, 2023). Severe Acute Malnutrition is one of the main reasons for children's hospital admission and a key driver of child mortality in developing countries. Moreover, children suffering from SAM are up to nine times more likely to die than well-nourished children (UNICEF, 2015). In the long term, SAM during childhood exposes survivors to low human capital as regards education, cognition, and behavior in adulthood (Mwene-Batu et al, 2020). Severe Acute Malnutrition is not only a public health concern, but it's also an impediment to global poverty eradication, productivity, and economic growth (Dukhi, 2020). For example, Gross Domestic Product (GDP) loss from low weight, poor child growth, and micronutrient deficiencies averages 11% in Asia and Africa (Global Nutrition Report, 2016). Generally, malnutrition contributes to the disease burden, and governments spend huge amounts of money on treatment (FAO, IFAD, UNICEF, WFP, and WHO, 2024). For instance, a national government spends between US $50-$200 for the complete treatment of one severely malnourished child (Rebecca et al., 2024). Dukhi (2020) argues that eliminating malnutrition reduces 32% of the global disease burden and consequently increases economic growth and development in a country.

In Africa, 2.5 million children under the age of 5 years at any given time suffer from SAM (WHO, 2023). In Kenya, the prevalence of wasting among children under five years is estimated at 5%, whereas in Kwale County it's estimated at 6.2% (KDHS, 2023). Other studies have documented even higher Global Acute Malnutrition (GAM) prevalence in Kwale County. For example, Kralova et al. (2021) reported an 18.9% GAM rate among children less than 24

months, whereas a Ministry of Health-led Nutrition survey among children 6 – 59 months in 2012 reported a 9.1% GAM rate, with 2.7% of children under five years suffering from severe wasting.

Ready-to-Use Therapeutic Feed (RUTF) is an energy-dense, micronutrient paste made using peanuts, sugar, milk powder, oil, vitamins, and minerals, and used to treat children with uncomplicated SAM. According to the Kenya IMAM guidelines, a 100g sachet of RUTF provides approximately 530Kcal. The ration given to a SAM child is based on the intake requirement of between 150-200 kcal/kg/day. The amount of RUTF consumed per day is based on the weight of the child. When used with proper management and medical protocol, RUTF is considered the most effective treatment for uncomplicated SAM (WHO, 2007). Moreover, empirical data support the notion that despite limited resources leading to the use of a reduced amount of RUTF instead of the recommended dosage of 200 kcal/kg/day, there are observable improvements in the performance rates of Outpatient Therapeutic Programs. These improvements are significant enough to satisfy the minimum recovery, death, and defaulting rates stipulated by the Sphere Minimum Standards (James, 2020). Numerous scholars have documented studies on the challenges facing Outpatient Therapeutic Programs, more so on the program coverage (Heymsfield et.al., 2023; Takele et al., 2022; Anato, 2022; Ezezika et al., 2021). These studies have cited various obstacles hindering the success of Outpatient Therapeutic Programs, such as household food insecurity, limited access to health facilities, poor compliance and treatment adherence, and inadequate supplies of RUTF. However, there needs to be more knowledge on how the cited factors influence the utilization of RUTF among SAM children. Moreover, there is scant evidence on how nutrition performance outcomes, such as defaulter rates, impact RUTF utilization and effectiveness. It's on this premise that the current study aimed at investigating factors affecting utilization of ready-to-use therapeutic food in the management of severe acute malnutrition in Kinango sub-county, Kwale County.

1.1 Problem Statement

RUTF, which contains nutrients like peanut, oil, sugar, and milk powder, is recommended by the WHO to treat severe acute malnutrition. It is a home-based therapy to reduce costs to the families with malnourished children, avoid infections which can be fueled by admission at the hospital, and allow caregivers to care for all other children at home (Schoones et al., 2019). Since RUFT is home-based therapy, it renders the close monitoring by the health workers very minimal, which may compromise the effectiveness of the therapy. Governments, donors, and non-governmental organizations spend $100 per child for a full treatment (UNICEF, 2013), hence the importance of ensuring that the treatment is used to save the lives of the children.

Even though follow-up for severe acute malnutrition is every week, the levels of non-response, long stay in the program, defaulters, and relapse cases have been reported in Kwale (CGoK, 2016). Cases of stockouts at the health facility level are very low since UNICEF, in collaboration with the ministry of health and other development partners' work towards continuous supply. Despite the continuous supply, the health facilities continue to report default cases who are likely to worsen at home without appropriate treatment. Comparing routine data at health facilities and data collected during surveys, the level of severe acute malnutrition is high, but only a few visit health facilities (KDHS, 2014). Therefore, the study

will be looking at some of the factors that encourage caregivers to visit health facilities when they suspect their children have severe acute malnutrition.

Capacity in the management of acute malnutrition is also low (Jackson & Ashworth, 2023) in terms of human resources and training. The employment of nutritionists has not been a key priority for the government, hence high workloads in the health facilities. The demand for nutrition services is also low, and some caregivers don't understand the importance of adhering to the schedule. This affects the recovery rate for the children being managed for acute malnutrition. This study sought to determine the socioeconomic factors affecting utilization of ready-to-use therapeutic food in the management of severe acute malnutrition in Kinango sub-county, Kwale County.

2. Literature Review

2.1 Factors affecting RUTF utilization

RUTF is considered the most effective treatment for uncomplicated SAM when used with proper management and medical protocol (WHO, 2007; Alflah & Alrashidi, 2023). Outpatient therapeutic programs implemented with fidelity often perform exemplary – performance indicators satisfy the Sphere Minimum Standards. However, CMAM programs are often faced with an array of challenges (Anato, 2022; Takele et al., 2022). RUTF is administered according to the child's weight, and since it contains no water, caregivers are advised to give clean drinking water. In some areas, children stay in the program for more than three months, leading to discharge as non-respondents. In such situations, further medical investigation or follow-up (Uddin et al., 2022) is recommended to identify if there are any underlying medical conditions contributing to non-respondence.

There are barriers and boosters towards utilization of RUTF, which mostly depend on the level of awareness and community sensitization. RUTF is also used for children with HIV (Ashenafi et al., 2024) suffering from SAM, hence some caregivers have associated it with HIV. Caregivers are afraid of stigmatization once their children are seen taking RUTF, as they will be perceived to have HIV, hence resulting in poor health-seeking behaviours with SAM children being denied access to treatment.

RUTF is largely viewed as food rather than medication, which leads to intrahousehold sharing compromising recovery from SAM. This is common in households with food insecurity and large family sizes. This perception also contributes to the sale of the RUTF to buy other food items (Nikièma et al., 2022).

In contrast, RUTF is also viewed by some caregivers as an effective treatment for children with SAM, as the improvements are demonstrated through weight gain within one week of administration. Since RUTF is free of charge, caregivers adhere to the weekly review schedules to replenish the supply (Nor & Mohamed, 2016). The taste, texture, and colour of the RUTF make it acceptable among the children (Hossain et al., 2020). For children who pass the appetite test, the caregivers find it easier to administer to the child. SAM is highly prevalent in poor rural areas where mothers are likely to have other young children at home to care for. Therefore, mothers find it difficult to agree to lengthy hospital stays while treatment is administered for their sick, malnourished child. This may encourage adherence to the RUTF schedule to avoid

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further deterioration in the child's health that may warrant admission (Ayana et al., 2015; Jibat et al., 2022).

Due to the cost of RUTF, many governments depend on donors and other non-governmental organizations to supply the commodities (UNICEF, 2013). This may contribute to stockouts at the health facilities; hence the children miss their weekly supply. When a caregiver visits the health facility for two consecutive weeks and doesn't get the ration, they are likely to default from the program, leading to deterioration of the child.

3. Methodology

This study, conducted in Kwale County, Kinango Sub-County, Kenya, aimed to investigate the socioeconomic factors affecting utilization of ready-to-use therapeutic food in the management of severe acute malnutrition in Kinango Sub-County, Kwale County. Adopting a longitudinal cross-sectional study design, the study enrolled 220 severely malnourished children receiving RUTF and followed them for three months. Data on socioeconomic factors influencing RUTF utilization were collected using structured questionnaires and anthropometric measurements. Data was analysed using descriptive (frequencies, mean, percentages, and confidence intervals) & inferential statistics. The results were presented in charts, graphs, and customized tables.

4. Results and Discussion

4.1 Factors affecting utilization of RUTF

4.1.1 RUTF Dosage & Adherence Practices

Majority of the caregivers (83.0%) adhered to the health worker's instructions on the use and the dosage of RUTF at home. According to the health worker's instructions, most children were supposed to be given either 2.5 RUTF sachets per day (38.3%) or 3 RUTF sachets per day (35.8%). The other children were supposed to be given 1.5 RUTF Sachets per day (4.0%), 2 RUTF Sachets per day (16.4%), 3.5 RUTF Sachets per day (4.0%), & 4 RUTF Sachets per day (1.5%). Figure 1 below illustrates the caregiver practices in RUTF administration.

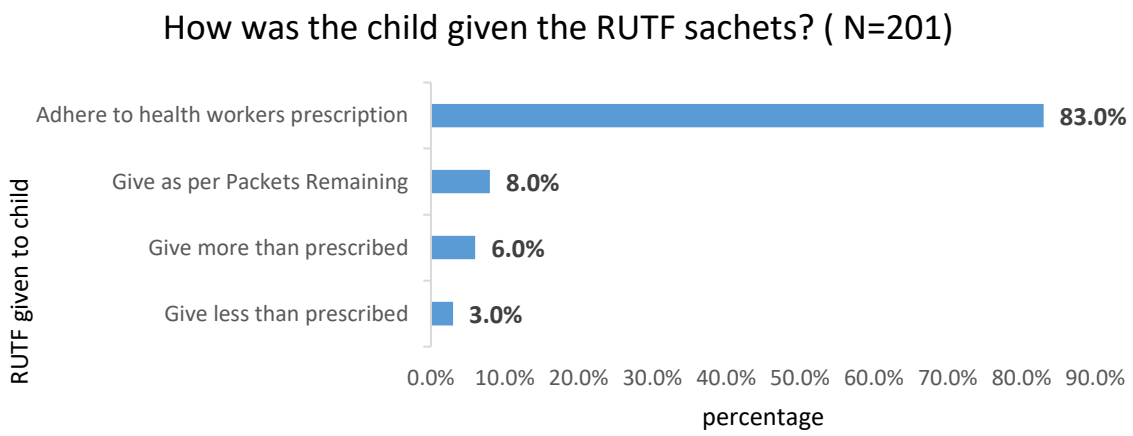

Figure 1: The caregivers' practices on issuing children with RUTF at home

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The primary factor that motivated the caregivers to adhere to the health worker's prescriptions on RUTF dosage & administration was their baby gaining weight (96.5%). Other factors identified by the caregivers included RUTF's good taste (50.7%) and the baby eating well (38.8%).

There was a significant relationship (at 95% confidence interval) between the caregiver's education level and RUTF administration practices. Caregivers with higher education levels were more likely to adhere to health workers' prescriptions on the use and dosage of RUTF sachets at home, X^2 (12, N = 145) = 23.45, p = .024.

4.1.2 Health Seeking Behaviour and Caregiver Practices

According to the 20 health workers who were interviewed, it takes approximately two (30%) to 3 months (70%) months for a SAM child adhering to RUTF dosage to fully recover from malnutrition. However, the health workers reported a set of factors that may hinder a child's recovery; all health workers agreed that household food insecurity, poor health status of the child, and non-adherence to RUTF prescription were the primary factors. Other contributing factors reported were sharing of RUTF (85%), non-adherence to clinic schedule (90%), and inconsistent RUTF supplies at the hospital (95%).

Most caregivers were motivated to adhere to the clinic schedule when they observed that their children gained weight during the treatment (97%) or were becoming healthier (95.5%). Other factors, such as short waiting time (43.3%), good reception by health workers (33.3%), and distance to the health facility (18.9%), were not major contributors, as shown in Figure 2.

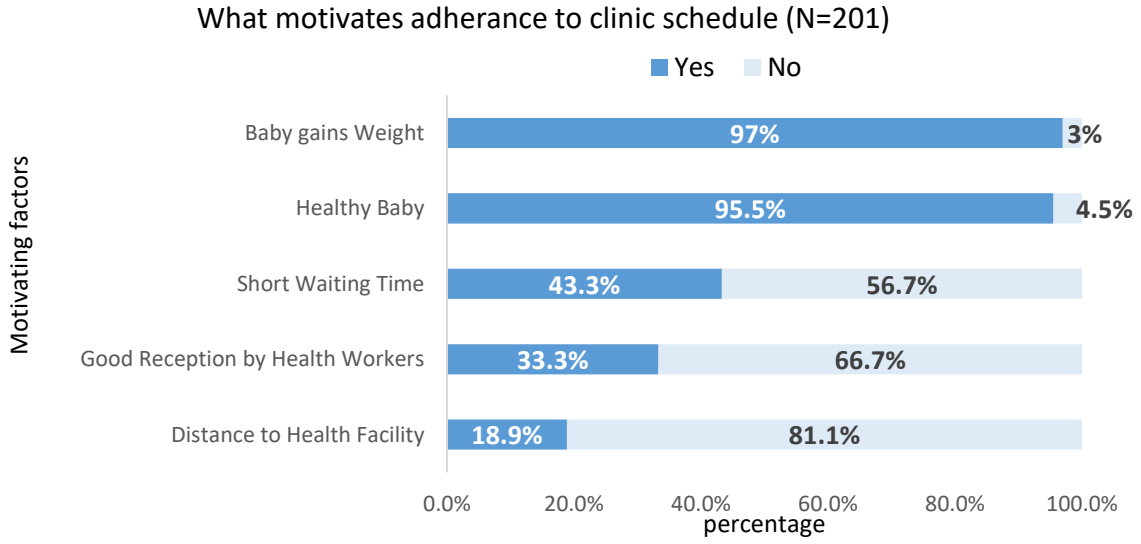

Figure 2: Factors motivating caregivers' adherence to clinic schedules

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On average, most caregivers (83.1%) received treatment services in less than 30 minutes upon arriving at the clinic. Only 12.4% waited for at least 1 hour, and the remaining 5.5% waited for more than 1 hour - 2.5% (5 caregivers) waited for one and a half hours, 1.5% (3 caregivers) waited for 2 hours, and only 1 caregiver (0.5%) who reported waiting for more than 2 hours.

During the clinic visits, most caregivers reported positive aspects portrayed by health workers, such as being attentive to details (94.5%), respectful (84.1%), and confidential (70.1%). Only 7.5% of the caregivers cited negative aspects portrayed by health workers, such as not being careful.

4.1.3 Relapses

6 in every 10 caregivers (59.7%) reported that their children developed SAM within three months after being discharged as recovered. Most of the children (69.2%) developed SAM within 2 months, with other children relapsing after 1 month (16.7%) or even in less than a month (5.0%), as shown in Figures 3 and 4.

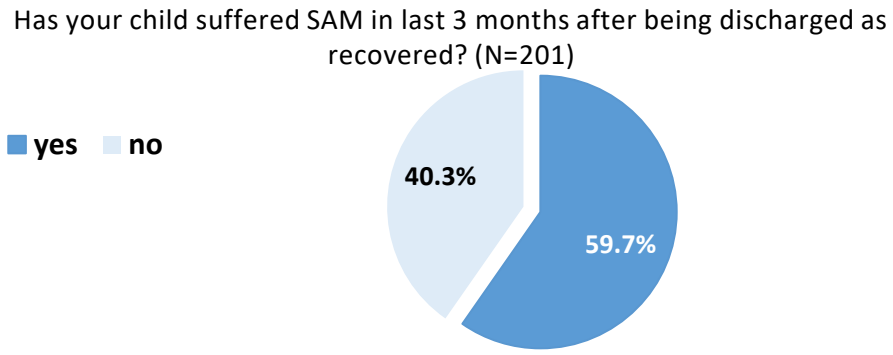

Figure 3: Percentage of caregivers reporting relapse cases

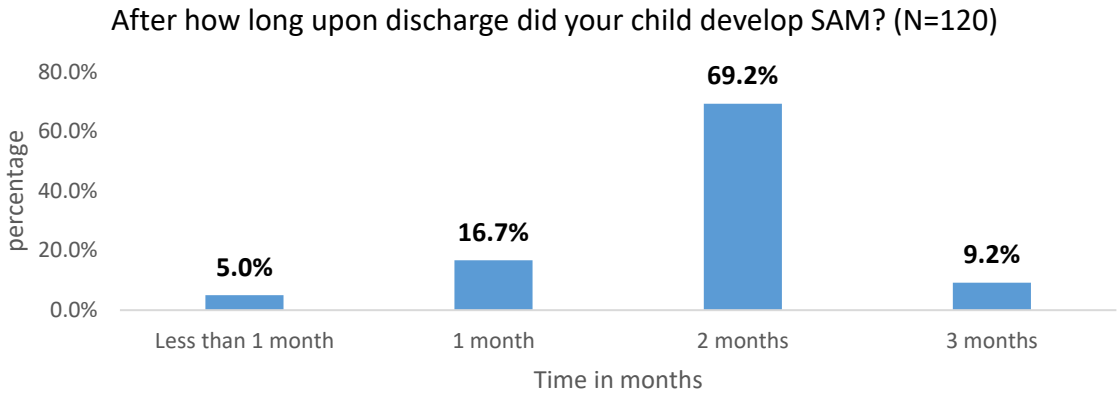

Figure 4: Duration (in months) for a child to relapse to malnutrition

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Health workers affirmed that there were high incidences of relapses, with 65% (13 Health Workers) of the respondents reporting having admitted 3 or more cases of relapse. Only 15% (3 health workers) reported having admitted 2 cases, and 20% (4 health workers) reported only 1 case. To better understand the issue of relapses, the health workers and caregivers were requested to provide information on what could be the contributing factors and ways to minimize or curb relapses. Eight in every ten caregivers (84.2%) reported that household food insecurity was the major driver for relapsing to malnutrition among children, as shown in Figure 5.

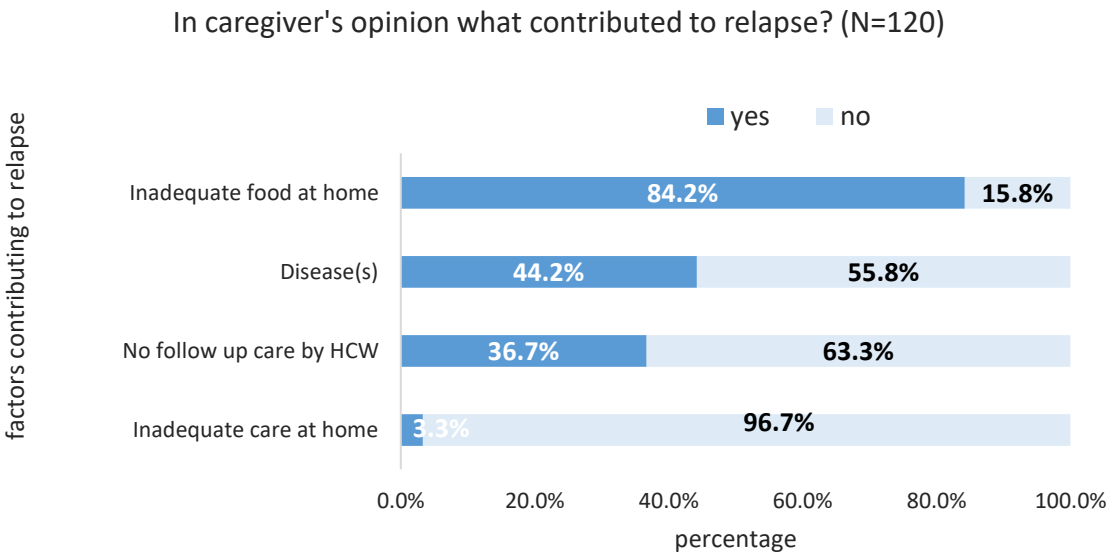

Figure 5: Caregivers' opinion on factors contributing to relapses

The caregivers felt that adequate nutrition, following information shared during health education sessions, and adherence to scheduled follow-up clinics for growth monitoring were some of the solutions that could significantly help them prevent relapses. Additionally, the caregivers felt that the government could play an essential role in the reduction of relapse rates by having follow-up schedules after discharge (95.8%), cushioning all food-insecure households (84.2%), especially those households with malnourished children (88.3%).

On the other hand, health workers' responses to factors contributing to relapses resonated with those reported by caregivers. Specifically, almost all health workers (95%) cited food insecurity as the primary contributor. Other factors reported include intrahousehold sharing of RUTF (90%), inconsistencies in RUTF supply (80%), among other factors, as illustrated in Figure 6.

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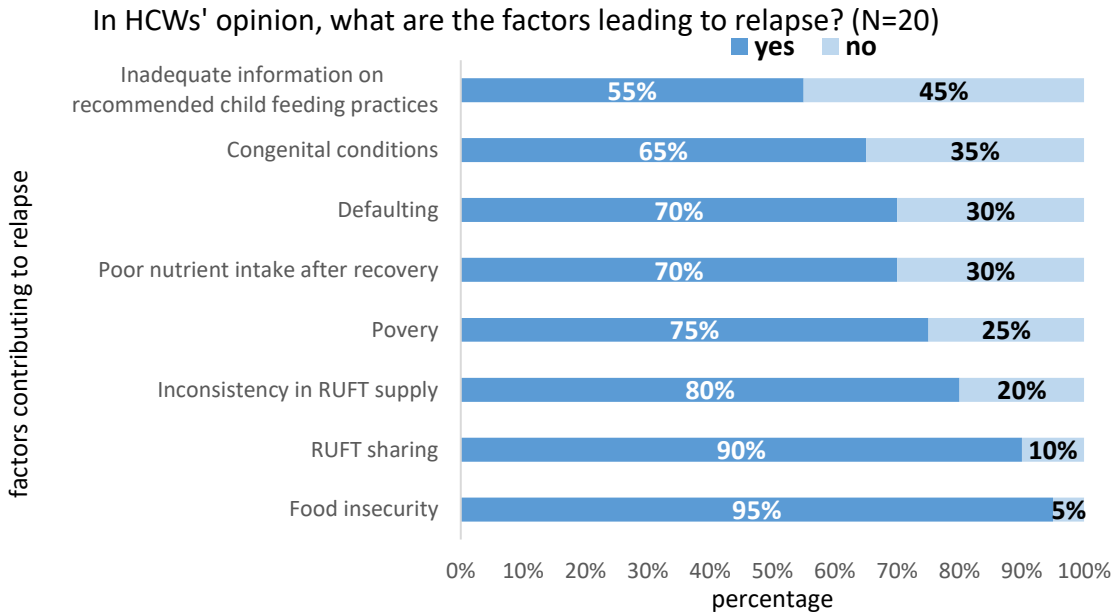

Figure 6: Health workers' opinion on factors contributing to relapses

According to the health workers, several measures could be considered to curb relapse among recovered children. These measures included giving support on household food production for consumption (95%), providing health education at the household level (90%), post-discharge follow-up (90%), tracing the defaulters (85%), and lastly, continuous RUTF supply at facilities (80%).

4.1.4 Regression Analyses

A multinomial logistic regression analysis was conducted to examine the relationship between the caregivers' factors affecting RUTF utilization – motivating factors to clinic adherence, factors contributing to relapses, factors contributing to defaulters – and the child treatment outcomes. Missing values were imputed – using multiple imputation methods in SPSS (v.23). The overall model was statistically significant, $X^2(68, N=145) = 97.264$, Nagelkerke $R^2 = .590$, $P = .011$, indicating that the caregiver factors (predictors) reliably distinguished the categories of child treatment outcomes (dependent variable). For the child treatment outcome categories, only the defaulters compared to the recovered had significant predictors. The presence of disease, RUTF stockouts, inadequate food at home, long waiting times at the clinic, and lack of follow-up care by the health workers were associated with an increase in the likelihood of a child defaulting on recovering as shown in Table 1 below. All the other caregiver factors did not significantly predict defaulting over recovering.

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Table 1: Multinomial logistic regression parameter estimates comparing defaulters and recovered (reference category)

Caregiver Factors	B	Sig *(P-value)*	Exp(B)	95% C.I Lower Bound	95% C.I Upper Bound
Diseases	1.993	.002	7.335	2.016	26.685
Availability of RUTF stock	-2.496	.005	.082	.015	.463
Inadequate food at home	1.517	.036	4.558	1.107	18.768
Long waiting times at the clinic	.983	.032	2.674	1.089	6.563
Lack of follow-up care by the health workers	1.798	.002	6.036	1.906	19.114

A child suffering from a disease was 7.3 times more likely to default on SAM treatment than recover (*B=1.993, p = .002, 95% C.I [2.02, 26.69]*). The odds of being a defaulter (vs. recovered) increased by a factor of 4.6 in food-insecure households (*B=1.517, p = .036, 95% C.I [1.11, 18.77]*). At the health facilities, long waiting times (*B=.983, p = .032, 95% C.I [1.10, 6.56]*) and lack of follow-ups by health workers (*B=1.798, p = .002, 95% C.I [1.91, 19.11]*) increased the likelihood of children defaulting treatment by 2.7 and 6.0 times, respectively. Conversely, the availability of RUTF stocks in health facilities decreased the odds of children defaulting by a factor of 0.08.

4.2 Discussion

The present study findings highlight adherence to RUTF prescription, caregiver practices, and health-seeking behaviour, relapsing, and defaulting as the main factors influencing RUTF effectiveness. RUTF is effective in treating uncomplicated SAM but only when the dosage and treatment protocol are adhered to (Alflah & Alrashidi, 2023). Since RUFT is home-based therapy, it renders the close monitoring by the health workers very minimal, hence non-adherence by caregivers may compromise the effectiveness of the treatment. The current study reports that some of the caregivers issued RUTF to the SAM children according to the sachets remaining, hence either underdosing or overdosing. Similar findings have been reported in other studies. For example, Potani (2024) documented a study that conducted unplanned household spot checks and found an average surplus of RUTF sachets compared with the number expected based on the date of distribution and recommended dosing in at least 22% of the households, thus implying under-dosing of the SAM children. RUTF purchase and health-care staff salaries are major cost drivers of CMAM programmes such as OTP (Selvaraj et al.,

2022); hence, there is a need to maximize RUTF use or even adopt strategies that use less RUTF per child.

Caregivers' practices such as poor health-seeking behaviour, sharing and/or selling of RUTF, and non-adherence to clinic schedules contribute to the inefficacy of RUTF in SAM treatment. Other related factors include long distance to the health facility, waiting time at the facility, and the caregiver's perceived attitude of the health care workers. Consistent with these findings, Nikièma et al. (2022) reported that caregivers in Southern Ethiopia viewed RUTF as food to be shared and, when necessary, a commodity to be sold for collective benefits for the household, thus endangering its effectiveness in SAM treatment. Additionally, Saida (2024) indicated that travel distance to the nearest facility greatly influences caregivers' health-seeking behaviour and consequently the effectiveness of treatment for those who manage to seek OTP services.

High incidences of relapses and defaulters in OTP influence evidence on the effectiveness of RUTF in SAM treatment. Both relapses and defaulters significantly increase the malnutrition burden – increasing the number of SAM children in need of treatment – consequently elevating the cost of malnutrition treatment due to costs of procuring additional quantities of RUTF and associated labour costs for the health workers involved in the treatment. Both relapse and default cases are influenced by other underlying causes. For example, in the current study, household food insecurity and the presence of diseases are the primary drivers for the observed high relapse cases, whereas RUTF stockouts primarily influenced the reported defaulter rates. According to a systematic review finding, on average, the reported relapse in most OTP programs ranges from 0% to 37% of children following SAM treatment, with the highest proportions occurring within 6 months post-discharge (King et al, 2022). These cases of relapses are associated with lower anthropometric measurements during admission and frequent illnesses. To curb the high incidences of relapses, scholars have suggested different strategies such as post-discharge provision of RUTF to at-risk cases (Cichon et al., 2023), unconditional cash transfers for households with children receiving SAM treatment (Dah et al., 2022), and better integration between facility-based care and community care to enhance adequate follow-up at home (Verma et al., 2022). Overall, health education on the importance of RUTF, early diagnosis and treatment of SAM, treatment of underlying illnesses, household food security, consistent supply of RUTF, and adherence to RUTF prescription and clinic schedule are important factors to consider in curbing relapses and defaulters (Roy, Biswas & Jenny, 2021; Nikièma et al., 2022).

5. Conclusion

Several external factors can influence the effectiveness of RUTF. These include: co-existing illnesses, such as infections or chronic conditions which hinder recovery and reduce the efficacy of RUTF, inadequate food at home limit the overall nutritional recovery, as RUTF alone cannot address broader food insecurity, prolonged waiting times can discourage caregivers from seeking treatment, leading to incomplete recovery, insufficient follow-up by health workers can result in missed opportunities to address complications, monitor progress, and ensure adherence to treatment protocols.

6. Recommendations

Implement regular follow-up visits: Regular follow-up visits by health workers ensure that children adhering to treatment protocols are closely monitored. These visits allow for early identification of challenges such as side effects or relapse, enabling timely intervention. Home visits or community outreach programs can be utilized to reduce barriers, such as transport or clinic waiting times, that may discourage treatment adherence.

Educate caregivers on the importance of treatment completion and post-recovery nutrition: Caregiver education is critical for ensuring that treatment courses are completed and that proper nutrition practices are maintained after recovery. This involves sensitization programs on how RUTF works, emphasizing the dangers of incomplete treatment, and providing guidance on preparing balanced diets using available resources to sustain nutritional progress post-recovery.

Ensure consistent and reliable supply of RUTF: A steady supply of Ready-to-Use Therapeutic Food (RUTF) is vital for uninterrupted treatment. Stock-outs or shortages can lead to frustration and treatment discontinuation. Governments and implementing organizations must establish robust supply chains, monitor inventory levels, and allocate resources effectively to avoid disruptions.

Train health workers on SAM management protocols: Well-trained health workers are pivotal in achieving successful treatment outcomes. Training programs should focus on SAM management protocols, including the use of RUTF, growth monitoring, and effective case management. Additionally, health workers should be equipped with communication skills to foster trust and encourage caregivers to adhere to treatment.

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