

Research Article

# Effectiveness of Emergency Nutrition Interventions for Children in Conflict-affected Areas of Mali Between 2024 and 2025

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## Abstract

Child malnutrition continues to pose a significant public health challenge in conflict-affected settings, with prolonged armed conflict in Mali exacerbating food insecurity, disrupting health systems, and increasing vulnerability among children under five. This study assesses the effectiveness of emergency nutrition interventions for children in conflict-affected areas of Mali between 2024 and 2025, while also examining the main barriers that constrain their impact. A mixed-methods, cross-sectional design was employed, involving 143 respondents, including representatives from health facilities, non-governmental organizations, local authorities, and families affected by child malnutrition. Data were collected through structured questionnaires and semi-structured interviews and subsequently analyzed using descriptive statistics and thematic analysis to capture both quantitative outcomes and qualitative contextual insights. Findings revealed that insecurity and restricted access were the primary obstacles to the effectiveness of nutrition interventions, reported by 80-100% of respondents. More than 70% of health workers lacked specialized training in managing malnutrition in conflict settings, while 65-80% of participants identified logistical and financial constraints as additional challenges. Emergency nutrition interventions contributed to measurable improvements in the nutritional status of 55-60% of children; however, 35-45% remained vulnerable due to insecurity, displacement, and interruptions in treatment. Notably, effective coordination among stakeholders, reported by 75% of participants, and the implementation of integrated multisectoral approaches were strongly associated with improved child outcomes. These results underscore the critical role of emergency nutrition interventions in improving child nutritional status in conflict contexts, while highlighting that such measures alone are insufficient to address the complex, multidimensional nature of malnutrition. Sustainable impact requires strengthening health system capacity, enhancing community engagement, improving coordination among actors, and adopting integrated, multisectoral strategies.

## Keywords

Emergency Nutrition Interventions, Children, Conflict-affected Areas, MALI

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## 1. Introduction

Armed conflicts continue to pose one of the most significant threats to child survival and development worldwide, with children living in fragile and conflict-affected settings disproportionately affected by malnutrition and elevated mortality rates [1, 5]. Such conflicts disrupt local food systems, displace populations, undermine health service delivery, and limit humanitarian access, thereby exacerbating the nutritional vulnerability of children.

In Mali, over a decade of armed conflict has particularly impacted the northern and central regions, where chronic insecurity, population displacement, disruption of markets, and reductions in agricultural and pastoral production have contributed to persistently high levels of food insecurity and child malnutrition [2, 5-8].

To mitigate these challenges, emergency nutrition interventions including therapeutic feeding programs, community-based management of acute malnutrition (CMAM), and supplementary feeding initiatives have been widely implemented. These interventions aim to address crisis-related malnutrition and improve child health outcomes. However, evidence regarding their effectiveness in highly insecure and unstable contexts remains mixed, reflecting the complex operational, logistical, and contextual constraints inherent to conflict-affected settings.

This study seeks to contribute to the international literature by evaluating the effectiveness of emergency nutrition interventions for children living in conflict-affected regions of Mali between 2024 and 2025. It examines not only the impact of these interventions on child nutritional, health, and developmental outcomes but also the barriers and operational challenges that influence program implementation in fragile and insecure environments.

## 2. Methods

This study employed a cross-sectional mixed-methods design, integrating quantitative assessment of intervention outcomes with qualitative exploration of contextual and operational challenges. The analytical framework was based on UNICEF's conceptual model of child malnutrition, which links immediate causes such as inadequate dietary intake and disease, underlying causes including food insecurity and limited access to health services, and structural determinants such as conflict, insecurity, and poverty, to child nutritional outcomes.

The research was conducted in conflict-affected regions of northern and central Mali, where insecurity, population displacement, and limited access to basic services are prevalent. The study population included four categories of participants directly involved in or affected by emergency nutrition interventions: health facilities, non-governmental organizations (NGOs), local authorities, and families of children experiencing malnutrition.

A total of 143 respondents were recruited through purposive sampling to ensure the inclusion of individuals with direct experience in managing or receiving nutrition interventions. This sample comprised 100 families (69.9%), 28 health facilities (19.6%), 12 local officials (8.4%), and 3 NGOs (2.1%).

The study considered dependent variables such as child nutritional improvement, continuity of treatment, and overall health and developmental outcomes. Independent variables included the security situation, health worker training, availability of resources, level of coordination among actors, and degree of community participation. Data collection was conducted using structured questionnaires for quantitative measurement and semi-structured interviews to obtain qualitative insights. Quantitative data were analyzed using descriptive statistics and chi-square tests ( $\chi^2$ ) to assess associations, with significance set at  $p < 0.05$ . Qualitative data were analyzed thematically and triangulated with quantitative findings to strengthen interpretation.

Ethical considerations were strictly observed throughout the study. Participation was voluntary, informed consent was obtained from all respondents, and confidentiality and anonymity were rigorously maintained to ensure the protection of participants.

## 3. Results

The study identified multiple barriers affecting the effectiveness of emergency nutrition interventions in conflict-affected regions of Mali. All surveyed families (100%) reported significant challenges in accessing nutrition services, primarily due to insecurity, road blockages, and disruptions in local markets. Humanitarian actors further indicated that nearly 80% of conflict-affected zones experienced substantial constraints in the delivery of nutrition supplies. Statistical analysis confirmed a significant association between insecurity and the effectiveness of nutrition interventions ( $p = 0.001$ ), with children living in highly insecure areas being considerably more likely to experience treatment interruptions and consequently poorer nutritional outcomes.

Limited human resource capacity was another major barrier. Among health workers, 71.4% reported not having received any specialized training in managing malnutrition within conflict contexts, while only 28.6% had participated in NGO-supported training programs. Children treated by trained personnel exhibited significantly higher recovery rates than those managed by untrained staff, a finding supported by statistical analysis ( $p = 0.002$ ). In addition, logistical and financial constraints were widespread, with 65-80% of respondents reporting shortages of therapeutic foods, essential medical supplies, and financial resources. These limitations were significantly associated with reduced coverage of nutrition interventions ( $p = 0.005$ ). Weak community engagement was also observed, as

only 40% of families reported active involvement in prevention, screening, or follow-up activities. Low levels of community participation were significantly linked to delayed detection of malnutrition ( $p = 0.012$ ).

Despite these barriers, emergency nutrition interventions had a measurable impact on children's nutritional and developmental outcomes. Approximately 55-60% of children receiving emergency nutrition support showed improvements in nutritional status, whereas 40-45% experienced stagnation or relapse. Children who received regular follow-up were significantly more likely to recover ( $p = 0.001$ ). In terms of overall health and development, 55% of children demonstrated improved physical health, but 35-40% continued to face growth delays or cognitive deficits. These persistent challenges were strongly associated with displacement, insecurity, and interruptions in treatment.

Effective coordination among actors emerged as a critical factor for success. Seventy-five percent of respondents highlighted that collaboration between NGOs, health services, and local authorities contributed substantially to program effectiveness. Statistical analysis confirmed a significant association between the level of coordination and improved nutritional outcomes among children ( $p = 0.001$ ). Overall, these findings underscore that while emergency nutrition interventions can positively influence child health in conflict-affected settings, their effectiveness is highly dependent on security, trained personnel, logistical support, community engagement, and multisectoral coordination.

## 4. Discussion

This study provides strong empirical evidence that emergency nutrition interventions can significantly improve child nutritional outcomes in conflict-affected settings, while also highlighting the structural and contextual factors that limit their overall effectiveness. The observed recovery rate of 55-60% aligns with findings from other conflict-affected regions, including South Asia, the Middle East, and the Sahel [1, 3]. Nevertheless, the continued vulnerability of 35-45% of children underscores the limitations of short-term, emergency-focused interventions, which often fail to address the broader and multidimensional determinants of malnutrition.

The statistically significant association between insecurity and poor nutritional outcomes confirms prior research demonstrating that restricted humanitarian access remains the primary barrier in fragile and conflict-affected contexts [4]. Similarly, the strong influence of health worker training on child recovery supports evaluations by UNICEF and the World Food Programme emphasizing capacity building as a critical factor in ensuring the effectiveness of nutrition programs. In addition, community participation and coordination among stakeholders emerged as decisive, yet underdeveloped, elements in the success of interventions. Low engagement and weak collaboration can delay detection of malnutrition, reduce treatment continuity, and limit overall program impact.

These findings reinforce global recommendations advocating for integrated, multisectoral, and community-based approaches to address child malnutrition in conflict settings. Effective interventions require not only the provision of emergency nutritional support but also strengthening of local health system capacity, robust coordination among governmental and humanitarian actors, and active involvement of affected communities. By considering these structural and contextual determinants, programs can better mitigate the negative effects of conflict on child nutrition and enhance the sustainability of health and developmental outcomes for vulnerable populations.

## 5. Conclusion

Emergency nutrition programs play a vital role in mitigating child malnutrition in conflict-affected regions of Mali, yet they are insufficient on their own to fully address the complex and multidimensional nature of nutritional vulnerability. Sustainable improvements require addressing the persistent insecurity that limits access to affected populations, strengthening the capacity of local health systems, ensuring the continuous availability of essential resources, and fostering effective coordination among all stakeholders, including governmental bodies, humanitarian organizations, and local actors. Equally important is the active engagement of communities to promote culturally appropriate and locally accepted interventions. Integrated and multisectoral strategies that link nutrition with health services, food security, water, sanitation, hygiene, and early childhood development offer the most promising approach for enhancing both nutritional and developmental outcomes for children living in conflict-affected settings.

## 6. Contributions of the Study

### 6.1. Scientific Contribution

This study provides robust empirical evidence on the effectiveness of emergency nutrition interventions for children in conflict-affected areas, specifically in Mali during 2024-2025.

It highlights the multidimensional barriers that limit program impact, including insecurity, displacement, limited health system capacity, and logistical constraints. By documenting the outcomes of children receiving nutritional support under crisis conditions, the study enriches the limited literature on child malnutrition in conflict settings and identifies key determinants of successful interventions.

### 6.2. Clinical and Nutritional Contribution

The study demonstrates that integrated approaches combining therapeutic feeding, supplementary nutrition, and community-based monitoring can improve nutritional status and health outcomes in 55-60% of affected children. It emphasizes

the role of trained health personnel, consistent follow-up, and coordinated care in promoting recovery and mitigating relapse, offering practical guidance for optimizing emergency nutrition programs in fragile contexts.

### 6.3. Public Health and Policy Contribution

By identifying structural and operational barriers to effective nutrition interventions, the study provides evidence to guide policymakers, humanitarian actors, and NGOs in planning and implementing targeted, context-specific strategies. It underscores the importance of multisectoral coordination, community engagement, and resilient health systems in conflict zones, supporting evidence-based decisions to improve child nutrition and food security.

### 6.4. Academic and Educational Contribution

The study serves as a detailed case study and reference for researchers, public health professionals, and students, illustrating methodological approaches, field-based data collection, and program evaluation in resource-limited, conflict-affected environments. It provides a model for future research on child nutrition and emergency interventions in fragile settings.

## Abbreviations

|          |  |
|----------|--|
| CMAM     | Community-based Management of Acute Malnutrition |
| NGO      | Non-Governmental Organization                    |
| IMAM     | Integrated Management of Acute Malnutrition      |
| UNICEF   | United Nations Children's Fund                   |
| WFP      | World Food Programme                             |
| $\chi^2$ | Chi-square (statistical test)                    |
| p        | Probability Value (statistical significance)     |

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## Author Contributions

**Moussa Issa Lende:** Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Resources, Software, Writing – original draft

## Conflicts of Interest

The author declares no conflicts of interest.

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