

Improving the Nutritional Status of Talibé Children through Maternal Empowerment in Senegal: The Meouane+ Project

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Abstract

Talibé children in Senegal are often exposed to begging, food insecurity, and nutritional deficiencies. Daaras—traditional Quranic schools—are theoretically responsible for providing adequate food to their residents, but in practice, food provision is frequently insufficient. Addressing the nutritional needs of talibé children requires both systemic support and greater community engagement, particularly through maternal involvement. **Objectives:** This project aimed to improve the nutritional status of talibé children and to strengthen the social and economic empowerment of their mothers within the framework of daara-based interventions. **Methods:** A mixed-methods, quasi-experimental design was used, comparing intervention and control daaras over time and location. The intervention comprised four components: i) establishing a workshop to produce enriched cassava flour, ii) training mothers in hygiene, nutrition, and dietary practices, iii) supporting mothers in flour production and marketing, and iv) integrating enriched flour into the school meals of the intervention daara. The project was launched in 2022. **Results:** A total of 50 children were enrolled, including 35 in the intervention group. The average age of children was 7.12 years (± 1.83), and the mothers were on average 37.45 years old (± 8.83). Results showed an 80.2% reduction in diarrheal cases among talibé children. Mothers' knowledge of nutritional practices improved by 68.5%, and their average monthly income increased by 32.5%. Multivariate analysis revealed that satisfaction was significantly associated with a positive assessment of training quality (OR = 2.5 [1.4 - 4.5]), the use of quality local foods (OR = 2.9 [1.5 - 5.6]), and the empowerment of local actors (OR = 1.8 [1.2 - 2.7]). Increased purchasing power also showed a positive

trend (OR = 2.6 [0.9 - 3.7]), though not statistically significant. **Conclusion:** The Meouane+ project demonstrated measurable benefits in improving child nutrition and promoting women's empowerment in the context of daaras. In Senegal, traditional religious schools can be modernized through integrated nutritional, educational, and economic strategies. Empowering mothers—particularly through community-based, female-led entrepreneurship—can serve as a key lever in addressing child vulnerability and curbing forced begging among talibés.

Keywords

Nutrition, Talibés, Mothers, Daaras, Empowerment, Senegal

1. Introduction

The expansion of Senegalese Islam has largely relied on Islamic education, traditionally delivered in Quranic schools (daaras) by teachers recognized for their religious knowledge and authority [1] [2]. *Talibés* refer to children in Senegal and several West African countries who are entrusted to Quranic schools to receive religious instruction under the supervision of a Quranic teacher known as a *marabout* (or *sérif* or *boroom daara*). While this practice has deep cultural and religious roots, it has become the subject of growing social, ethical, and political debate due to the often precarious living conditions of these children [3].

Historically, the *talibé* tradition was rooted in rural settings, where children received Quranic instruction while participating in agricultural work to meet their subsistence needs. This approach combined religious learning with livelihood activities, grounded in a model of community solidarity. However, with the rapid pace of urbanization, many *daaras* relocated to urban areas, losing access to agricultural resources to support the children [4]. As a result, *talibés* became increasingly reliant on street begging to survive, shifting an educational tradition into a phenomenon now widely criticized.

Estimates suggest that tens of thousands of *talibés* live in Senegal, often in extremely vulnerable conditions. Many are forced to beg in the streets to bring back money, food, or other goods to their *marabouts*. This exposes children to significant risks including malnutrition, exploitation and abuse, disease due to poor sanitation, and a lack of access to formal education [5]. A large number of *talibés* interviewed by Human Rights Watch between 2018 and early 2019, describing their experiences over the years, reported that they received no food at their *daara* and were compelled to beg for all their meals. One 13-year-old *talibé* who had run away from his *daara* explained to Human Rights Watch: “We had to beg for food, and the oldest among us ate first what we had collected. If anything was left, we could eat. If nothing remained, we had to go out again to beg for food.” [6]

In response, the Senegalese Ministry of National Education launched a *daara* modernization program in 2002, which has been supported since 2011 by the Is-

Islamic Development Bank (IsDB) through its Support Project for the Modernization of Daaras (PAMOD) [7] [8]. Since then, various modernization initiatives have been introduced, experimenting with different *daara* models. However, economic and nutritional challenges remain. This project seeks to address the need for food availability and diversity, promote safe food access and use, and support the empowerment of mothers of *talibé* children in the Méouane community.

2. Description of the Méouane Modern Daara Project (Méouane+)

2.1. Project Objectives

The overall objective of the project was to create a model of an autonomous *Daara* in terms of food and economic sustainability, by establishing a fortified flour production unit within the *Nuuru Darayni Daara* to strengthen the nutritional and economic capacities of the female guardians of *talibé* children.

More specifically, the project aimed to: i) establish a cassava processing unit for fortified flour production; ii) improve the nutritional status of *talibé* children in the *Daaras*; iii) train the women guardians of *talibés* in Méouane in the production of fortified cassava flour; iv) conduct workshops on nutritional education and good local culinary practices; and v) enhance the financial autonomy of the women processors through the sale of the fortified flour sachets they produce.

The project was implemented from June 2022 to June 2023, with a pre- and post-intervention evaluation.

2.2. Project Context

This project was conducted in Senegal, a West African country rich in local food products (millet, maize, groundnuts, cowpeas, sorghum, cassava, sweet potatoes, etc.), though these resources are often underutilized. Cassava, a perennial plant originally from South America and widely cultivated in Africa, is a key example [9]. Its starch-rich roots are used to produce flour, an interesting and natural alternative to wheat flour. Cassava flour is gaining popularity due to its nutritional qualities and various advantages: i) Gluten-free: Ideal for individuals with gluten intolerance or celiac disease, this flour offers a texture and flavor similar to wheat flour, without the fragility often associated with other gluten-free options. ii) Easy digestion: Its high starch content makes it gentle on the digestive system. iii) Satiety effect: Its richness in starch promotes a quick feeling of fullness, making it an ideal energy food. However, its low protein and fiber content requires supplementation with other whole flours to meet nutritional needs [10]. To address local needs for balanced nutrition, especially for children suffering from moderate malnutrition, it is crucial to develop enriched flour production units. These flours must meet several criteria: be tailored to the nutritional needs of vulnerable groups (children, pregnant women, the elderly), derive from local production available year-round, be culturally accepted, and be economically accessible. Cassava thus represents a valuable resource for promoting sustainable and locally

adapted nutrition [11] [12].

The commune of Méouane is located in the Tivaouane department, in the Thiès region. It covers an area of 334.3 km², or 31.99%. It originally included 92 villages, but since 2015, following the relocation of three of these villages (Mbar Diop, Mbar Ndiaye, Thiamoura) by the Senegalese Chemical Industries (ICS) to Pire, it now comprises 89 villages. It is bordered to the north by the Louga region and the rural community of Darou Khoudoss, to the south by the commune of Pire, and to the west by the rural communities of Taïba and Darou Khoudoss, which together make up the three local authorities of the arrondissement. The commune is divided into three zones: Méouane zone with 35 villages (southern zone), Meckhé-village zone with 21 villages (central zone), and Ndombil zone with 26 villages (western zone) [13]. The climate is Sudano-Sahelian with an average temperature of 30°C. It is characterized by a long dry season (9 months) and a very short rainy season (approximately 3 months from July to September). Rainfall varies between 300 and 500 mm. The vegetation is typically Sahelian, shrub-like in nature, dominated by mimosa species (kadd), combretaceae (Nguère, Combretum, dougor, etc.), baobab, rhone, salane, eucalyptus, cashew, mango, soump, and especially nguiguiss. Groundwater is the commune's main water resource, consisting of a shallow aquifer (depth 30 - 50 m) and a Maastrichtian aquifer (depth 42 - 74 m depending on the area). According to the General Census of Population and Housing (RGPHAE), the commune's population is 52,000 [14], with 48.99% men and 51.01% women, and a natural growth rate of 1.8%. The population of Méouane is young: in 2002, individuals under 15 years of age represented 15% of the total population, and 73% were under 30. Adults aged 30 - 59 made up 21%, and those over 60 only 6%. The main agricultural products in the commune are millet, cassava, groundnuts, and cowpeas. Most plots of land feature a relatively homogeneous crop rotation of cassava, groundnuts, cowpeas, and millet. Due to its longer growth cycle, cassava is favored by farmers over the short rainy season. In some areas, crop farming is complemented by arboriculture (mango and cashew). Market gardening is practiced in artificial basins operated by ICS by the surrounding villages. Cassava remains the dominant crop in terms of cultivated surface area, followed by millet, groundnuts, and then cowpeas. The commune's Community-Based Organizations (CBOs) include various types of producer groups. In each village, there are organizations of young people, women, and men such as Economic Interest Groups (GIE), Women's Promotion Groups (GPF), Cultural and Sports Associations (ASC), Dahiras, Parent-Teacher Associations (APE), Village Development Committees (CVD), mixed associations, and unions. These actors are mostly involved in livestock farming, small trade, agriculture, handicrafts, market gardening, and environmental protection through reforestation. The exact number of Daaras in the area has not been documented.

2.3. Establishment of the Enriched Cassava Flour Production Unit

The enriched cassava flour production unit was built on a 75 m² area. The main

equipment included a solar-powered mill, a solar dryer, and other accessories. Women were trained in the use of the equipment and in the process of transforming cassava into flour. The different steps involved in producing flour from fresh cassava are as follows:

Step 1: Root Selection

Sorting is done manually to remove debris and poor-quality tubers. Healthy, mature, firm, and freshly harvested cassava roots should be selected. They should be free of bruises, have white flesh without cracks, and contain very few fibers.

Step 2: Peeling

Peel the roots, removing the stem and any fibrous parts with a sharp knife. Improper peeling can lead to discoloration of the final product. The cassava peels can be used as animal feed after drying, or composted—they should not be discarded.

Step 3: Washing

Wash the peeled cassava roots with clean water to remove any dirt such as sand, soil, leaves, or other impurities.

Step 4: Grating

Grate the cassava roots using a pre-perforated metal sheet or a mechanical grater to obtain a fine paste.

Step 5: Pressing

Place the grated cassava into a clean sack (e.g., jute or sisal bag) to remove excess water. Use a rotary press or hydraulic jack to press the bag until the cassava becomes crumbly.

Step 6: Drying

Carefully spread the pressed paste onto a clean black plastic sheet placed on a gentle slope in direct sunlight. Ideally, the sheet should be elevated and not placed directly on the ground.

Dry the paste until it becomes flour-like. Cover it with a mesh net to protect it from flies and birds. While solar dryers, ovens, and hot air dryers are more expensive, they ensure a more consistent drying process and produce higher-quality flour.

Step 7: Milling

Grind the dried cassava paste into flour using a hammer mill or similar equipment.

Step 8: Sieving

Using a homemade sieve, sift the flour to remove fibrous material and impurities. Sieving is crucial to obtain high-quality flour with a good texture and no visible fibers.

Step 9: Fortifying the Cassava Flour

The cassava flour is then mixed with whole millet flour, moringa powder (nébéday), cowpea flour (niébé), and other necessary ingredients to enrich its nutritional value.

Step 10: Packaging and Storage

Place the sieved enriched flour into moisture-resistant black plastic bags. Seal the bags using a candle flame (or an electric sealing machine if electricity is avail-

able) and label them with the production and expiry dates (six months after production). Place the bags into cardboard boxes to protect them from light. Store the boxes in a well-ventilated, cool, and dry place.

2.4. Training of Mothers and Guardians of Talibé Children

For each talibé, a female guardian—either the mother or a designated caretaker, regardless of direct kinship—was assigned. Her role was to ensure the child’s well-being by monitoring his health, nutrition, and education under the supervision of the *boroom daara* (Qur’anic teacher). To strengthen their capacities, twenty of these guardians participated in three training workshops that included both theoretical and practical components (see **Image 1**). The first training focused on hygiene and dietary practices, aiming to equip participants with essential skills for maintaining a healthy and balanced living environment. The second training covered food processing and the production of enriched cassava flour, providing women with techniques for transformation and nutritional fortification. The third training addressed best practices in cooking, food preservation, and commercialization, enabling women to apply local culinary skills tailored to children’s nutritional needs and to manage food resources efficiently. As a result of these sessions, the guardians acquired the necessary skills to manage a cassava production unit, process and cook cassava-based products, and ensure proper storage and marketing of the final products.



Image 1. Photo of mothers of talibé children producing cassava flour.

3. Project Evaluation Methodology

3.1. Study Type and Period

This was a longitudinal, descriptive, and evaluative experimental study, following a “here-there” comparative protocol. The methodological approach was based on the comparison of two groups:

- The “HERE” group, corresponding to *Daara Nuuru Darayni*, benefited from the intervention, which consisted of incorporating enriched cassava flour into the children’s diet starting in March 2022. The impact of this intervention was evaluated in July 2023.
- The “THERE” group, corresponding to *Daara Al Hazar*, served as the control group. No changes were made to their regular community-based diet, allowing for a comparison with children who were not exposed to the intervention.

This methodological framework enabled the measurement of changes in nutritional indicators in both groups and allowed for a more reliable attribution of observed differences to the implemented project.

3.2. Study Population

The individuals targeted for evaluation were *talibés* (Quranic school students) from two *daaras* (Daara Nuuru Darayni and Daara Al Hazar) and the caregivers of the *talibés* (mothers or guardians).

Included in the study were children residing in Méouane who were regularly enrolled in the *daaras*, as well as the caregivers responsible for their nutrition.

Excluded from the study were children who had been withdrawn or expelled from the *daaras* before the end of the project and caregivers who declined to participate.

3.3. Outcome Measures

The primary outcome measure of the project was an improved nutritional status among the *talibés* in the intervention group compared to the control group.

Secondary outcome measures included:

- Increased knowledge of food processing and nutrition among mothers or caregivers of *talibés* in Daara Nuuru Darayni
- Greater financial autonomy among caregivers of *talibés* in Daara Nuuru Darayni through the economic valorization of enriched cassava flour, reflected by increased monetary gains

3.4. Recruitment of Statistical Units

All students from the two *daaras* and their respective mothers or guardians were recruited. This was an exhaustive, full-coverage project.

3.5. Data Collection

The main variables collected in the study are described below, along with their measurement methods and interpretation:

1) Body Mass Index (BMI)

BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2). This anthropometric indicator is widely used to assess the nutritional status of individuals. For children, BMI is interpreted using age- and sex-specific growth charts to classify individuals as underweight, normal weight, overweight,

or obese according to WHO standards [15].

2) Mid-Upper Arm Circumference (MUAC)

MUAC was measured in centimeters using a standardized measuring tape placed around the midpoint of the upper arm, between the shoulder and the elbow. This indicator is particularly useful for screening acute malnutrition, especially in children under five. A MUAC < 125 mm typically indicates moderate to severe acute malnutrition, while a value \geq 125 mm is considered normal [16].

3) Mothers' Knowledge Level in Nutrition and Food Processing

This variable was assessed through structured questionnaires covering three key thematic areas:

- Cassava flour enrichment techniques: Questions evaluated whether the mother understood and applied techniques to enrich cassava flour with locally available nutritious ingredients (such as legumes, soy, or peanuts) [17].
- Good culinary practices: This included knowledge of food hygiene, cooking methods that preserve nutrients, and meal preparation suited to children's needs.
- Child nutrition practices: This assessed knowledge of breastfeeding, complementary feeding, frequency of meals, food diversity, and dietary needs of children at different ages.

Scores were assigned to each correct response, and the total score was used to categorize mothers into different levels of knowledge (e.g., low, moderate, high).

4) Monthly Production Volume of Enriched Cassava Flour

This variable was quantified by recording the average number of kilograms of enriched cassava flour produced per household or per cooperative per month. This indicator reflects the level of adoption and sustainability of the food processing activity and serves as a proxy for both economic activity and nutritional intervention scale.

5) Profitability (Benefit)

Profit was calculated using the formula: Profit = Selling Price – Production Cost

This economic indicator assesses the financial viability of enriched cassava flour production. A positive value indicates a profit, while a negative value signals a financial loss. Monitoring this indicator allows for evaluation of the scalability and attractiveness of the income-generating activity for participating households.

3.6. Statistical Analysis

Quantitative variables were described using the mean, median, standard deviation, and range. Categorical variables were presented as absolute frequencies, relative frequencies, and their 95% confidence intervals. Statistical tests, including Fisher's exact test and Student's t-test, were performed [18].

3.7. Ethical Considerations

Informed and voluntary consent was obtained from each mother or designated female guardian, documented through a signed consent form. Minors were in-

cluded in the study based on the consent provided by their guardians, and assent was sought from the children themselves whenever appropriate. This project demonstrated a positive impact on the community. It contributed to strengthening women's culinary practices and improving the nutritional status of talibé children. From an economic perspective, it enhanced women's income through the production and commercialization of enriched cassava flour. The long-term objective is to equip women with sustainable tools to improve dietary practices while fostering their social and economic empowerment. All required administrative authorizations were obtained from the Ministry of Health, through the Regional Medical Officer of Thiès and the District Medical Officer of Tivaouane.

4. Results

4.1. Characteristics of Mothers and Guardians of Talibé

The profile of mothers or guardians across both groups is relatively similar. A majority have no formal education (64.5% in the intervention group and 62.5% in the control group), and most households are considered low-income (74.2% and 87.5%, respectively). Polygamous marriages are slightly more frequent, especially in the control group (62.5% vs. 48.4%). Regarding health insurance coverage, both groups show very limited access, with over 80% of respondents declaring no coverage. A minority benefit from a family safety net grant (9.7% in the intervention group vs. 12.5% in the control group).

Knowledge of micronutrient-rich species and foods appears more developed in the control group, with 87.5% rated as having “good” knowledge of micronutrient-rich species, compared to 61.3% in the intervention group. However, only participants in the intervention group reached the “excellent” level. Knowledge of cassava's nutritional benefits is more frequent among control respondents (50% vs. 29.0%), while knowledge of moringa and cowpea is high in both groups, with 100% of control participants recognizing the benefits of cowpea.

Most respondents from both groups consider food hygiene and balanced diets important or very important. However, slightly more participants in the intervention group rated these aspects as “very important”, particularly for food hygiene (19.3% vs. 0%). Interestingly, the importance of dietary diversity is perceived more strongly in the control group, where 87.5% rated it as “important” compared to 48.4% in the intervention group.

Key recommended practices such as food diversification, exclusive breastfeeding, and proper food hygiene are widely reported in both groups. Notably, compliance with food hygiene and cleanliness of preparation areas is high in both, with handwashing before meals reaching above 87% in all cases. However, certain behaviors such as proper food storage and use of enriched flours show disparities. For instance, only 32.3% in the intervention group practice proper storage, compared to 62.5% in the control group. The use of enriched flours remains limited in both groups (19.4% vs. 12.5%).

Practices related to the preservation of micronutrients—such as avoiding high-

heat cooking or freezing vegetables—are poorly adopted, with very few reporting the use of steaming (12.9% in the intervention group and 0% in the control). Respect for kitchen hygiene is exceptionally high in both groups (96.8% and 87.5%, respectively).

Household livestock raising is common across both groups, with over 87% reporting animal husbandry practices. However, the processing of local or forest products is more common in the intervention group (41.9% vs. 25%).

Table 1 compares various sociodemographic, knowledge-based, attitudinal, and behavioral indicators between two groups of *daaras*: one benefiting from the intervention (N = 31) and a non-intervention control group (N = 8). It offers insights into the reach and potential impact of the Meouane+ project among mothers or guardians of *talibé* children.

Table 1. Characteristics of mothers and guardians of *talibé*.

Variables	Categories	Intervention Daara (N = 31)		Daara without intervention (N = 8)		Total (N = 39)	
		n	%	n	%	n	(%)
SOCIODEMOGRAPHIC CHARACTERISTICS							
Instruction of mothers or guardians	Yes	11	35.48	3	37.5	14	35.90
	No	20	64.52	5	62.5	25	64.10
Marital status	Single	1	3.23	0	0	1	2.56
	Married (monogamous)	15	48.39	4	50	19	48.72
	Married (polygamous)	15	48.39	5	62.5	20	51.28
Economic situation of households	Middle income	8	25.81	2	25	10	25.64
	Low income	23	74.19	7	87.5	30	76.92
	None	25	80.65	7	87.5	32	82.05
Health insurance coverage	Budget allocation	2	6.45	0	0	2	5.13
	Mutual health insurance	0	0.00	1	12.5	1	2.56
	Institutional scheme	3	9.68	0	0	3	7.69
Beneficiary of Family Safety Net Grant	Yes	3	9.68	1	12.5	4	10.26
	No	28	90.32	7	87.5	35	89.74
KNOWLEDGES							
Knowledge of plant or animal species rich in micronutrients	Good	19	61.29	7	87.5	26	66.67
	Moderate	5	16.13	1	12.5	6	15.38
	Excellent	7	22.58	0	0	7	17.95
Knowledge of micronutrient-rich foods for household consumption	Fair	3	9.68	1	12.5	4	10.26
	Moderate	9	29.03	1	12.5	10	25.64
	Good	8	25.81	1	12.5	9	23.08
	Very good	8	25.81	4	50	12	30.77

Continued

Knowledge of the virtues of cassava	Yes	9	29.03	4	50	13	33.33
	No	22	70.97	4	50	26	66.67
Knowledge of the virtues of moringa	Yes	23	74.19	6	75	29	74.36
	No	8	25.81	2	25	10	25.64
Knowledge of the virtues of cowpea	Yes	25	80.65	8	100	33	84.62
	No	6	19.35	0	0	6	15.38
ATTITUDES AND PERCEPTIONS							
Compliance with food hygiene conditions	Not Important	0	0.00	1	12.5	1	2.56
	Important	25	80.65	7	87.5	32	82.05
	Very Important	6	19.35	0	0	6	15.38
Respect for a balanced diet	Not Important	1	3.23	0	0	1	2.56
	Important	25	80.65	4	50	29	74.36
	Very Important	4	12.90	0	0	4	10.26
Consumption of sufficient nutritious foods	Not Important	1	3.23	0	0	1	2.56
	Important	26	83.87	8	100	34	87.18
	Very Important	4	12.90	0	0	4	10.26
Proper food storage	Not Important	1	3.23	0	0	1	2.56
	Important	28	90.32	7	87.5	35	89.74
	Very Important	2	6.45	0	0	2	5.13
Importance of dietary diversification	Not Important	9	29.03	1	12.5	10	25.64
	Important	15	48.39	7	87.5	22	56.41
	Very Important	7	22.58	0	0	7	17.95
PRACTICES							
Good nutritional practices	Diversification of foods consumed	25	80.65	7	87.5	32	82.05
	Consumption of sufficient nutritious foods	23	74.19	5	62.5	28	71.79
	Exclusive breastfeeding from birth until 6 months	21	67.74	5	62.5	26	66.67
	Compliance with food hygiene conditions	26	83.87	7	87.5	33	84.62
	Proper food storage	15	48.39	7	87.5	22	56.41
	Respect for good culinary practices	21	67.74	7	87.5	28	71.79
	Balanced diet	16	51.61	5	62.5	21	53.85
	Complementary feeding for children from 6 months	19	61.29	7	87.5	26	66.67

Continued

	Wash hands before handling and consuming food	30	96.77	7	87.5	37	94.87
	Washing hands with soap or other things before handling and consuming food	29	93.55	6	75	35	89.74
	Cleanliness of cooking and food storage areas	25	80.65	5	62.5	30	76.92
	Cleanliness of meal consumption areas	25	80.65	5	62.5	30	76.92
	Washing utensils	25	80.65	7	87.5	32	82.05
Good food hygiene practices	Cooking food to the right temperature	17	54.84	4	50	21	53.85
	Proper food storage	10	32.26	5	62.5	15	38.46
	Adapted household waste disposal system	20	64.52	4	50	24	61.54
	Consumption of well-preserved drinking water	18	58.06	3	37.5	21	53.85
	Clean clothing before handling food	23	74.19	5	62.5	28	71.79
	Disinfection with bleach of vegetables eaten raw	19	61.29	4	50	23	58.97
	Do not expose food to dust	14	45.16	5	62.5	19	48.72
	Avoid freezing fruits and vegetables	5	16.13	0	0	5	12.82
	Avoid cooking meat/fish in oil at high temperatures	17	54.84	3	37.5	20	51.28
Good food preparation practices that preserve micronutrients	Respect hygiene measures in kitchens	30	96.77	7	87.5	37	94.87
	Prefer steaming vegetables	4	12.90	0	0	4	10.26
	Avoid prolonged boiling in water	9	29.03	2	25	11	28.21
Household breeding practice	Yes	29	93.55	7	87.5	36	92.31
	No	2	6.45	1	12.5	3	7.69
Processing of local and/or forest products in the household	Yes	13	41.94	2	25	15	38.46
	No	18	58.06	6	75	24	61.54
Use of enriched flours	Yes	6	19.35	1	12.5	7	17.95
	No	25	80.65	7	87.5	32	82.05

The average age of mothers is 37.45 years (± 8.83) in the intervention zone and 28.52 years (± 4.65) in the non-intervention zone. The proportion of household expenditures controlled by women is 58.7% (± 30.74) in the intervention zone and 71.42% (± 26.72) in the non-intervention zone. The proportion of land managed by women is 7.5% (± 26.19) in the intervention zone and 6% (± 0) in the non-intervention zone.

4.2. Characteristics of Talibé Children

Regarding sex distribution, boys were the majority in both groups, accounting for 63.79% in the intervention *daaras* and 80% in the control group. The proportion of children who experienced diarrhea was notably lower in the intervention group (10.34%) compared to the non-intervention group (26.67%), potentially reflecting improved sanitation or safer dietary practices in the beneficiary areas. The rate of supplementation with vitamins or other nutritional complements was significantly higher among children in the intervention *daaras* (25.86%) than in those without intervention (4%), indicating better coverage or access to nutritional support. Similarly, deworming within the past six months was more frequently reported in the intervention group (79.31%) versus 26.67% in the non-intervention group, likely reflecting the preventive health activities implemented through the project.

Regarding vaccination coverage, 94.83% of children in the intervention *daaras* had received all required vaccines, compared to 73.33% in the control group. This suggests better adherence to vaccination schedules in areas targeted by the intervention. Finally, no cases of edema were reported in either group, which is a reassuring indicator suggesting the absence of severe acute malnutrition with clinical complications.

In summary, the results indicate that children in intervention *daaras* generally benefited from greater access to preventive health services (including deworming, vaccination, and supplementation) and presented lower rates of illness such as diarrhea compared to those in non-intervention settings.

Table 2 presents several health and care-related indicators for a total sample of 50 children, comparing those from *daara* schools that benefited from the Meouane+ intervention with those from non-intervention *daaras*.

Table 2. Characteristics of talibé children.

Variables	Terms and conditions	Intervention Daara (N = 35)		Daara without intervention (N = 15)		Total (N = 50)	
		n	%	n	%	n	(%)
Sex of child	Male	22	63.79	12	80.00	34	68.65
	Female	13	36.21	3	20.00	16	31.35
Does the child have diarrhea?	Yes	4	10.34	4	26.67	8	15.24
	No	31	89.66	11	73.33	42	84.76

Continued

Is the child taking vitamins or other dietary supplements?	Yes	9	25.86	1	4.00	10	19.30
	No	26	74.14	14	96.00	40	80.70
Has the child ever been dewormed in the last 6 months?	Yes	28	79.31	4	26.67	32	63.52
	No	7	20.69	11	73.33	18	36.48
Has the child received all of his or her vaccinations?	Yes	33	94.83	11	73.33	44	88.38
	No	2	5.17	4	26.67	6	11.62
Does the child have edema?	No	35	100	15	100.00	50	100.00

For children, the average age is 7.12 years (± 1.83) in the intervention zone and 9.7 years (± 3.76) in the non-intervention zone. The average birth order within the sibling group is 2.83 (± 1.75) in the intervention zone and also 2.83 (± 1.94) in the non-intervention zone. The average weight of children is 20.7 kg (± 4.25) in the intervention zone and 26.68 kg (± 10.68) in the non-intervention zone. The average height is 123.55 cm (± 9.45) in the intervention zone and 133.38 cm (± 17.85) in the non-intervention zone. Lastly, the average mid-upper arm circumference (MUAC) is 17.63 cm (± 2.69) in the intervention zone and 18.9 cm (± 2.91) in the non-intervention zone. **Figure 1** presents the means and standard deviations of several nutritional variables for the two study groups.

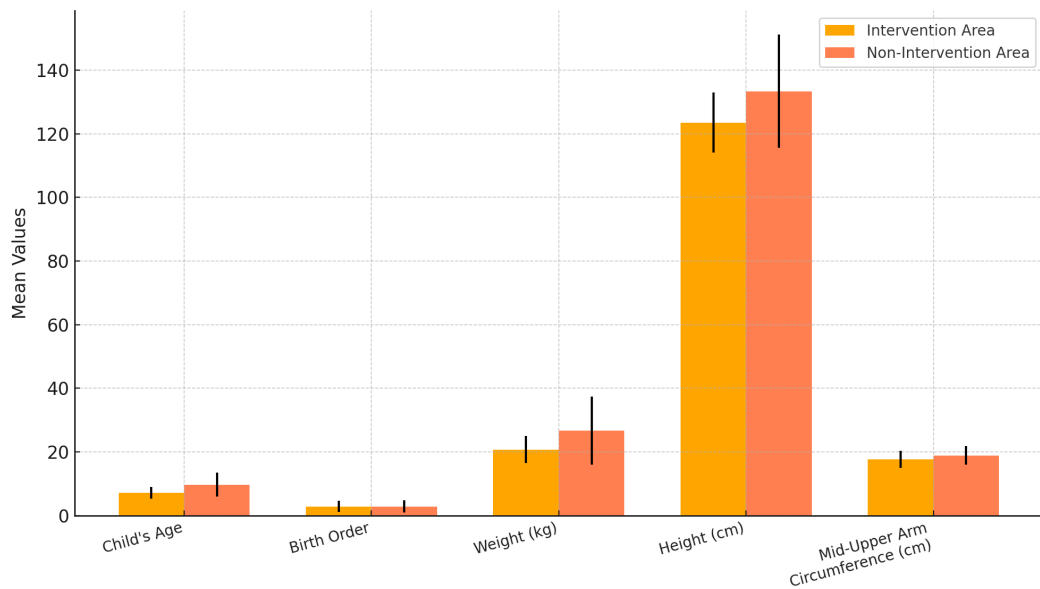


Figure 1. Comparison of mean nutritional indicators and standard deviations of children between intervention and non-intervention groups.

4.3. Impact of the Intervention on Children and Mothers

A marked decrease in diarrhea cases is observed in the intervention daaras, with a reduction of -80.2% , potentially reflecting a significant improvement in food

hygiene or the nutritional quality of meals. The mothers' knowledge score regarding good nutritional practices also shows substantial progress, with a +68.5% increase, suggesting enhanced awareness and strengthened competencies following the project's interventions. Economically, mothers' monthly income increased by +32.5%, which may be attributed to income-generating activities or the valorization of enriched cassava flour. Additionally, dietary diversity improved by +42.3%, likely indicating a greater variety in meals served to children, thanks to the integration of new food products. Overall, **Figure 2** highlights the positive overall effect of the project in the intervention daaras, in terms of both child health and improvements in nutritional knowledge and the living conditions of mothers. The chart illustrates the differences observed between the intervention daaras of the Meouane+ project (notably involving the introduction of enriched cassava flour) and the control daaras (non-beneficiaries). It underscores the positive impact of the project on several key indicators.

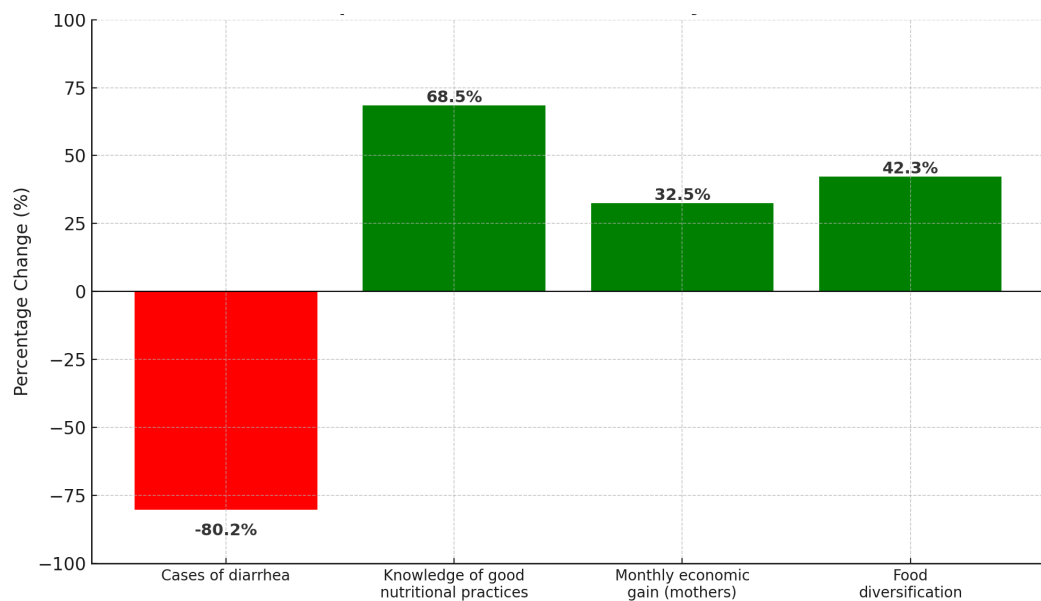


Figure 2. Impact of the intervention on children and mothers (*Daara with Intervention—Daara without Intervention*).

4.4. Determinants of Satisfaction among Talibé Mothers

This forest plot (see **Figure 3**) illustrates the key determinants associated with the satisfaction of *talibé* mothers within the framework of the intervention project. The data are presented as odds ratios (ORs) with 95% confidence intervals (CIs), providing insight into the strength and direction of associations between specific factors and reported satisfaction. An OR greater than 1 indicates a positive association with satisfaction. The variable “Good assessment of the quality of training” demonstrates a strong and statistically significant association, with an OR of 2.5 [1.4 - 4.5]. This suggests that mothers who rated the training quality favorably were 2.5 times more likely to report being satisfied with the project. Similarly,

“Use of quality of local foods” shows a substantial association (OR = 2.9 [1.5 - 5.6]), indicating that the integration of locally sourced, quality foods into daily practices was highly valued by the respondents and likely contributed positively to their overall satisfaction. The factor “Empowerment of local actors” is also positively associated with satisfaction (OR = 1.8 [1.2 - 2.7]), underscoring the importance of inclusive and participatory approaches that involve community stakeholders in the implementation process. This result supports the notion that building local capacity and ownership enhances the perceived legitimacy and effectiveness of interventions. Lastly, the variable “Increased purchasing power” yielded an OR of 2.6 [0.9 - 3.7]. While the point estimate suggests a positive trend, the confidence interval crosses the null value (1.0), indicating that this association, although promising, is not statistically conclusive. Further investigation may be required to confirm its effect. In summary, the results highlight that training quality, local food utilization, and actor empowerment are the most significant predictors of maternal satisfaction. These findings emphasize the need for community-based, culturally grounded, and skill-enhancing components in program design to ensure high beneficiary engagement and perceived relevance.

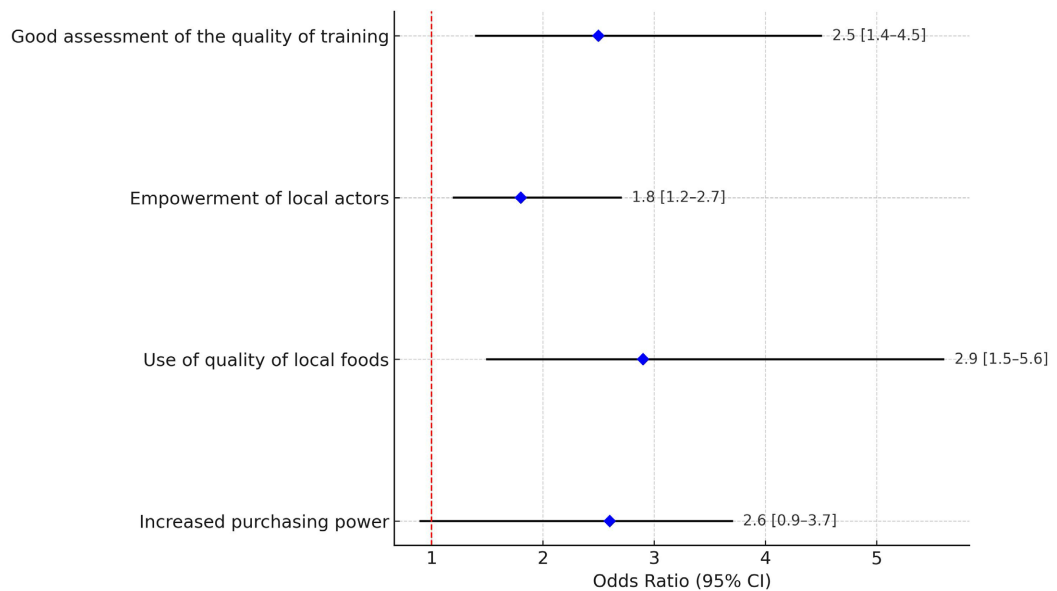


Figure 3. Determinants of satisfaction among talibé mothers: Odds ratios and 95% confidence intervals.

5. Discussion

In Senegal, as in many other African countries, the number of Arab-Islamic educational institutions has increased over the past few decades, and the boundaries between formal and non-formal education have become increasingly blurred. For more than twenty years, the state has introduced Arabic religious education as an optional subject in formal schools and established private Franco-Arab schools [1] [19].

The findings from the Meouane+ project reveal encouraging effects on both the

nutritional status of talibé children and the socio-economic empowerment of their mothers. In terms of child health, the intervention was associated with notable improvements in access to preventive care and reductions in common health issues. In particular, the incidence of diarrhea—a key indicator of nutritional and hygienic vulnerability—was significantly lower in the intervention daara compared to the non-intervention daara, reflecting a reduction of 80.2%. This likely reflects improved food quality and hygiene practices promoted by the project [20] [21]. Anthropometric indicators such as weight, height, and mid-upper arm circumference were lower in the intervention group, which may be explained by the younger average age of the children. Nevertheless, the absence of reported edema in both groups is a positive sign, suggesting the absence of severe acute malnutrition.

Beyond child health, the project significantly strengthened the empowerment and economic engagement of mothers. A reported 32.5% increase in monthly income and a 42.3% improvement in dietary diversity highlight the effectiveness of income-generating activities and nutrition education, particularly around the use of enriched cassava flour introduced through the project. Additionally, knowledge of good nutritional practices improved markedly (+68.5%), demonstrating the project's success in building the capacity of mothers to provide healthier, more diverse meals for their children [1] [22].

The project also contributed to improving women's knowledge and increasing their involvement in the management of the daara. Mothers who positively evaluated the quality of training were more likely to express satisfaction (OR = 2.5 [1.4 - 4.5]), and this satisfaction was also associated with the use of quality local foods (OR = 2.9 [1.5 - 5.6]) and the active involvement of local stakeholders (OR = 1.8 [1.2 - 2.7]). This model of daara management, which involves mothers' contributions, represents a resilient development approach. Children are better protected, and their nutrition is ensured [23]. The enriched cassava flour—fortified with cowpea, moringa, and maize—is carefully packaged and stored in a designated storage area within the workshop, ensuring proper preservation and optimal availability for various uses. This locally produced flour is used strategically to meet the diverse nutritional needs within the daara. A significant portion is used to prepare traditional dishes such as *thiééré* (couscous), *beignets* (fried snacks), and *rouye* (traditional porridge), which are not only nutritious but also deeply rooted in local culinary habits [23]. Talibé children in the daara directly benefit from this production. Every day, they are provided with balanced and varied meals prepared from the locally produced flour. These include snacks and substantial meals for lunch and dinner, ensuring their daily nutritional needs are met [9]. This initiative not only guarantees safe and appropriate food, but also reinforces cultural and educational bonds in the context of their religious learning. Meal distribution is methodically organized to fit seamlessly into the daily routine of the talibés. Meals are served during prayer breaks—key moments of the day—allowing the schedule to be respected while ensuring the children receive regular and sufficient nutrition [24]. This structure maintains a balance between the children's spiritual, educational, and nutritional needs.

By promoting the use of local resources, this approach contributes not only to the daara's food self-sufficiency but also to the sustainable development of the surrounding community. It reflects a vision where local production, tradition, and education converge to offer a better future for younger generations. Although a positive trend was also observed in the increase in purchasing power (OR = 2.6 [0.9 - 3.7]), this association was not statistically significant [25].

In conclusion, the Meouane+ project makes a tangible contribution to improving child nutrition and health, while reinforcing the empowerment of mothers. These results underscore the importance of integrating community-based nutrition interventions with economic and educational components to sustainably enhance the living and learning conditions of talibé children.

Limitations

The Meouane+ project presents several limitations that should be considered when interpreting the results. First, the sample size—particularly in the control group—is small and unbalanced, which limits the statistical robustness and generalizability of the findings. The absence of randomization increases the risk of selection bias, while the cross-sectional design prevents the establishment of causal relationships between the intervention and the outcomes observed. Moreover, reliance on self-reported data exposes the study to potential social desirability and recall biases. The lack of baseline data further complicates the accurate assessment of changes induced by the project. In addition, contextual differences between daaras (cultural, economic, geographic) may act as confounding factors. From a methodological standpoint, the nutritional assessment relies exclusively on anthropometric measurements, without the use of biological indicators. The short observation period may also fail to capture the long-term effects of the project. Finally, the quality and intensity of the training sessions delivered are not documented in detail, making it difficult to analyze the mechanisms of impact. These limitations do not invalidate the results but call for caution and highlight the need for complementary approaches—particularly longitudinal and mixed-methods designs—to strengthen the validity of future evaluations.

6. Conclusions

The Meouane+ project sheds light on the potential of integrated, community-based interventions to improve both the nutritional health of *talibé* children and the living conditions of their caregivers. The results demonstrate that enhancing access to preventive healthcare, nutrition education, and economic empowerment can lead to tangible benefits in child health outcomes, maternal knowledge, and food security. However, addressing the situation of *talibés* requires going beyond isolated interventions. These children embody a complex reality at the crossroads of cultural tradition, religious instruction, and human rights. A sustainable solution must therefore adopt a multidimensional approach. This includes educating *marabouts* on child rights, improving the living and learning conditions in *daaras*, and strictly enforcing laws that protect children from exploitation and forced begging.

Senegal now stands at a pivotal moment—an opportunity to reconcile tradition with modernity. By investing in the dignity, safety, and education of *talibé* children, the country can ensure their fundamental rights are respected while preserving the positive aspects of religious learning. The findings of this study contribute to this national reflection and advocate for stronger, coordinated actions to build a more just and inclusive future for all children.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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