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Predictors of Iron-Rich Foods Consumption among Children Aged between 24 - 59 Months in the Butezi Health District, Eastern Region, Burundi

Munezero Belyse[1,2,3*], **Kisuse Juma**[4], **Senkoro Mbazi**[4], **Mfinanga Sayoki**[4], **Sindayikengera Sévérin**[1,2,3], **Niyukuri Jonathan**[1,2,3]

[1]Food Science and Technology Research Center (CRSTA), University of Burundi, Bujumbura, Burundi
[2]Doctoral School, University of Burundi, Bujumbura, Burundi
[3]East African Nutritional Sciences Institute, Bujumbura, Burundi
[4]National Institute for Medical Research, Dar es Salaam, Tanzania
Email: *belysemunezero127@gmail.com

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Abstract

Background: Iron-deficiency anemia is a major public health problem among young children worldwide, particularly in sub-Saharan Africa, where it impairs growth, immunity, and cognitive development. Iron deficiency, primarily from insufficient intake of iron-rich foods, is a leading cause of childhood anemia. Burundi is no exception, and data on factors associated with the consumption of iron-rich foods among preschool-aged children remain scarce. **Objective:** This study aimed to determine the prevalence of iron-rich food consumption and the factors associated with it among children aged 24 to 59 months in the Butezi health district of Burundi, to provide findings that could inform policymakers in the fight against malnutrition caused by micronutrient deficiencies. **Methods:** A cross-sectional study was conducted among 602 mother-child pairs in the Butezi health district. Consumption of iron-rich foods was defined as consumption of at least 2 of the following foods: legumes, meat, eggs, and green vegetables. The data were collected using a structured, pre-tested questionnaire administered in person in Kirundi by trained interviewers, and were then entered and analyzed using Stata 15 software. A descriptive statistical analysis, a univariate analysis, and a multivariate analysis with logistic regression were used to describe and identify the factors associated with the consumption of iron-rich foods. Adjusted odds ratios (aORs) and their 95% confidence intervals (CIs) have been calculated and included. **Results:** The prevalence of iron-rich food intake was 41.20% (95% CI: 37.3% - 45.1%). Most of the children in the study ate more legumes (51.33%) and green vegetables (71.59%) than meat (11.13%) and eggs (1.99%). In the multivariate model, consumption of iron-rich foods was significantly associated with male gender (aOR = 1.71, 95% CI: 1.23 - 2.40), with the mother having completed secondary or higher education (aOR = 2.00, 95% CI: 1.12 - 3.58), owning both small and large livestock (aOR = 3.50, 95% CI: 1.26 - 10.01), the mother's nutrition education (adjusted OR = 1.65, 95% CI: 1.03 - 2.62), the father's involvement in the child's feeding (aOR = 1.62, 95% CI: 1.09 - 2.40), and meal frequency (aOR = 0.54, 95% CI: 0.34 - 0.84 for one meal per day versus at least two per day). **Conclusions:** As the identified predictive factors were sociodemographic and dietary habits, interventions aimed at improving infant nutrition in the study area should consider multidimensional strategies, including maternal education, agricultural diversification, gender-equitable dietary practices, and promoting fathers' involvement in feeding children. Considering the very low intake of iron from animal sources, these interventions should also encourage the consumption of foods that promote the absorption of non-heme iron, such as fruits and vegetables rich in vitamin C eaten with legumes. Strengthening these multidimensional strategies could help increase the consumption of iron-rich foods and, subsequently, reduce the burden of anemia among children aged 24 to 59 months in the Butezi health district.

Keywords

Nutrition, Preschool Children, Iron-Deficiency Anemia, Burundi

1. Introduction

Iron plays an important role in the formation of human tissues and cells. It is involved in oxygen transport in tissues, cell growth, and energy metabolism [1]. It plays a crucial role in the cognitive development of a child [2]. Dietary iron is found in either heme from animals or non-heme from vegetables [3]. The heme form is more bioavailable and better absorbed than the non-heme form [4]. At preschool age, between the ages of two and five, children's nutritional needs are substantial to enable the child's overall development [5] [6].

Low consumption of iron-rich foods leads to iron deficiency (ID) and, if not addressed, eventually to anemia [7]. ID is more likely caused by inadequate dietary iron intake in childhood [8] [9]. ID and anemia among children are global public health problems, particularly in low- and middle-income countries [6]. The prevalence of Iron deficiency anemia is estimated at 16.6% among children under five [10]. Worldwide and specifically in the sub-Saharan African region, anemia affects 39.8% and 60.2% of children aged 6 - 59 months, respectively [11] [12].

A meta-analysis conducted in Africa showed that 56.75% of children under five consume insufficient amounts of iron-rich foods [13]. Sociodemographic factors and dietary practices can influence children's intake of iron-rich foods [14] [15].

In the Eastern Africa region, the burden of childhood anemia is particularly heavy, and Burundi is among the countries where the prevalence of anemia exceeds the regional average of 55.56%; This places it among the countries with a single critical prevalence rate exceeding 40%, according to WHO estimates [16]. Recently, multinational analyses of data from demographic and health surveys have also shown that Burundi has the highest prevalence of co-occurrence of anemia and malnutrition among children aged 6 to 59 months in the East African region, with a rate of 40.63 percent, and that high-risk areas have been identified throughout most of the country [17].

Nationally representative data also show a heavy burden of chronic malnutrition among Burundian children; a situation closely linked to micronutrient deficiencies such as iron deficiency [18].

The country also has a 41.2% prevalence of food insecurity; Ruyigi province is among provinces with high prevalence of food insecurity and low dietary diversity, contributing to high rates of malnutrition [19] [20].

Despite the importance of iron in the health of children, there is a lack of data on the specific consumption patterns among children aged 24 - 59 months regarding iron-rich foods in Burundi.

This study aimed to assess dietary iron intake, socioeconomic status, health and eating factors affecting dietary iron-rich foods intake. By understanding these patterns, we can inform targeted interventions such as promoting locally available iron-rich foods, supporting food fortification, or implementing supplementation programs to reduce iron deficiency in the region. Addressing iron deficiency is critical to improving health outcomes for children in Eastern Burundi and supporting the country's progress toward global nutrition and health goals.

2. Methods

2.1. Study Design, Setting and Population

We conducted a community-based cross-sectional study among mother-caregiver pairs in the Butezi health district, Ruyigi province, in eastern Burundi. Ruyigi province has four health districts, among which Butezi has the highest prevalence of chronic child malnutrition.

The Butezi health district covers two communes (Butezi and Nyabitsinda) and is predominantly rural, with an economy based on subsistence agriculture and small-scale livestock farming. The district is served by a network of health centers organized around the Butezi District Hospital.

Figure 1 below shows the Ruyigi health province with its districts.

The whole card of the country, including Ruyigi, is in the annex. Burundi currently has five provinces, and the former province of Ruyigi is part of Buhumuza Province.

The source population included all children aged 24 to 59 months residing in the Butezi health district. The study population included children aged 24 to 59 months whose mothers or primary caregivers resided in the selected hills and had agreed to participate. We included in the study children whose mothers had agreed to participate. Children whose mothers or primary caregivers were absent after two home visits, or who were ill at the time of the interview, were excluded.

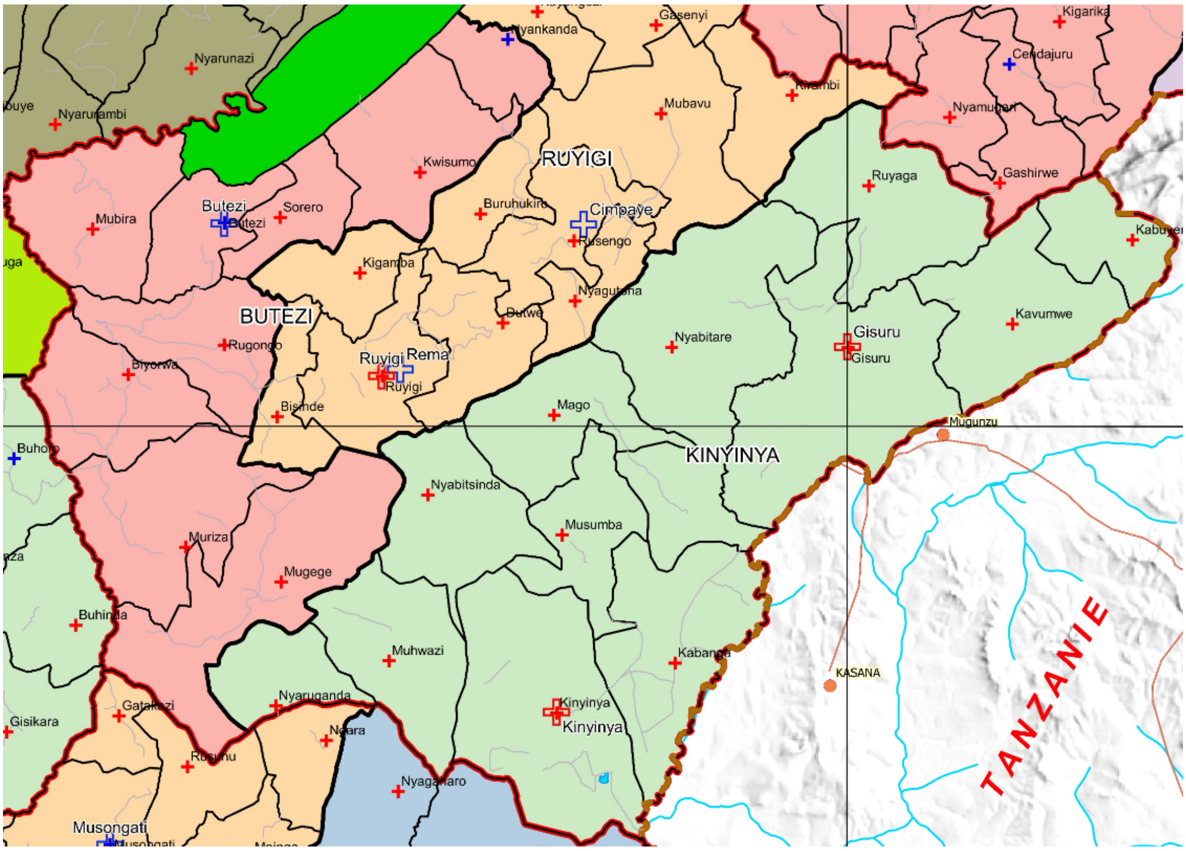

Figure 1. Butezi health district. From the Burundian Sanitary Health Card 2016 [21].

2.2. Sample Size Considerations

We calculated the sample size using the proportion formula for a single population: $n = p(1 - p)Z\alpha^2/i^2$, or $(0.5 \times 0.5 \times 1.96^2)/(0.03)^2$, which yielded 544 children. By adding 10% to account for nonresponse, the sample size was set at 598 children.

The final target sample was set at 602 children, distributed proportionally among the hills in the two municipalities based on the estimated number of eligible children per hill, so that no hill would be overrepresented or underrepresented relative to its population size.

2.3. Sampling Method

We used a two-stage cluster sampling method. In the first stage, hills (the lowest administrative units of the district) were used as clusters, and the number of children to be surveyed in each hill was allocated proportionally to its population of children aged 24 - 59 months. In the second stage, within each selected hill, households with an eligible child were identified from community health worker household lists, and children were then randomly selected from this sampling frame using simple random sampling until the hill's quota was reached. Survey participants were therefore randomly identified based on a list of children aged 24 to 59 months in the hills of the study area, ensuring that the sampling method was reproducible.

2.4. Data Collection Tool and Procedures

We developed a questionnaire based on a literature review of other research carried out on the subject, with aspects relating to socio-demographic data, households, and children, and data on child nutrition. The questionnaire's content validity was reviewed by a panel of nutrition and public health experts, who assessed the relevance and clarity of each item; the tool was revised accordingly before pretesting.

A pre-test of the questionnaire was conducted in a health district neighbouring Butezi, within Ruyigi province but outside the study area, so as to avoid contaminating the population that would subsequently be enrolled in the main survey, to ensure that the terms used were understood before going into the field.

The questionnaire was originally developed in French/English and was translated into Kirundi, the local language, by bilingual public-health personnel proficient in both languages; it was then back-translated into English by an independent bilingual translator, and discrepancies between the original and back-translated versions were reconciled to ensure semantic equivalence before use in the field.

Interviewers were trained on data collection tools. The interviewers were trained on the questionnaire, the purpose of the study, the data collection process, and quality assurance mechanisms for the data collected. We shared an informed consent form explaining the purpose of the study and requesting consent signed which was signed by study participants before the interview was conducted. A pretest of the questionnaire was conducted in the Ruyigi district to ensure that the terms used were understood before going into the field. Survey participants were randomly identified based on a list of children aged 24 to 59 months in the hills of the study area. Each interview lasted no more than 20 minutes, and the interviewers used the local language, Kirundi.

Data collection took place over five days (November 23-28, 2023) and was conducted by 14 trained interviewers, divided into parallel teams covering different hills simultaneously, under the daily supervision of the study coordinators. This made it possible to complete the 602 planned interviews within the fieldwork timeline agreed upon with local administrative and health authorities.

2.5. Variables of the Study

For the outcome assessment, we used a dichotomous variable: consumption of iron-rich foods. The foods that we considered to be rich in iron were, according to WHO recommendations: green vegetables, legumes, meat and eggs [22]. We defined good consumption of iron-rich foods as Children who have consumed at least two of the following food groups: legumes/leguminous, meat, eggs, and green vegetables, based on childhood iron-rich foods consumption guidelines [23] [24]. The independent variables were sociodemographic, health factors, and dietary practices.

2.6. Data Management and Analysis

The data were processed daily, with the completeness and consistency of the collected data rigorously verified. Descriptive and inferential statistical methods were adopted in the analysis. All analyses were done using Stata 15 software.

The Chi-square test was applied to compare proportions, assessing the presence or absence of statistically significant differences between the outcome variable and each independent variable, with significance determined at a p-value threshold of less than 0.05. Before interpreting results, assumptions were checked, particularly ensuring that no expected cell count was below 5; if this, Fisher's exact test was employed.

We calculated the crude odds ratio (COR) using the univariate logistic regression analysis to assess the strength of the association between independent variables and the outcome variable.

All variables with a $p < 0.20$ in the bivariate analysis were included in the multiple logistic regression model. To obtain a parsimonious model, the backwards variable selection method was used. The best model was chosen based on the criterion of low Akaike information criterion (AIC). Variables with a p-value < 0.05 were considered to be significantly associated with the consumption of iron-rich foods. Adjusted ORs accompanied by their 95% confidence intervals were calculated and interpreted. Statistical significance was considered when the 95% confidence intervals (CI) for the OR did not include 1. The results were presented in table form.

2.7. Ethical Considerations

The research protocol was approved by (CNE/14/2023). Before the start of the study, we visited the administrative and health authorities in the study area to explain the purpose of the research and to obtain their participation and support.

For participants, a consent form and an explanation of the benefits of this research were prepared and shared before any data were collected. Only participants who consented to participate in the study were invited for the data collection. In data management, we assigned a code to participants to ensure anonymity and the protection of personal data.

3. Results

Greater proportions of children belonged to the age group of 24 - 35 months (41.69%), while males were slightly higher in number compared to females. Most (60.8%) children in the study households were the third or later-born children in the family, while more than half (56.98%) of the households in the area had more than two children under five years of age. As for maternal education, 62.46% were from primary education levels; a significant number of mothers (98.5%) were farmers. Most (96.01%) mothers were married, and more than half of the households in the area had less than 20,000 Burundian francs income per month (9 Euros). Also, 90.53% of the households owned farmland, and about half, 48.50%, were raising small stock, though 47.34% did not own livestock (Table 1). Overall, these statistics reflect a predominantly rural, agricultural, and low-income population with limited household resources—characteristics that, as is well known, lead to limited dietary diversity and reduced access to animal-based foods.

Table 1. Socio-demographic characteristics of children aged 24 - 59 months and their households, Butezi Health District, Burundi (N = 602), November 2023.

Characteristics	count	Percent (%)
Age of child in months		
24 - 35	251	41.69
36 - 47	203	33.72
48 - 59	148	24.58
Sex of child		
Female	298	49.50
Male	304	50.50
Rank in siblings		
Oldest	126	20.93
Youngest	110	18.27
3rd and above	366	60.80
Children under five		
One child	259	43.02
2 children and above	3143	56.98
Mother's level of instruction		
None	148	24.58
Primary	376	62.46
Secondary and above	78	12.96
Profession of mother		
Cultivator	593	98.50
Civil servant and other profession	9	1.50
The matrimonial status of the mother		
Single	10	1.66
Married	578	96.01
Cohabitation	8	1.33
Widow	6	1.00
Gender of household head		
Female	35	5.81
Male	567	94.19

Continued

Profession of father		
None	7	1.16
Cultivator	568	94.35
Civil servants and other	27	4.49
Monthly income		
Less than 20,000	335	55.65
Between 20,000 - 40,000	203	33.72
More than 40,000	64	10.63
Farmland		
No	57	9.47
Yes	545	90.53
Types of livestock		
None	285	47.34
Small livestock	292	48.50
Large livestock	6	1.00
Small and large livestock	19	3.16

The majority (82.06%) of the mothers had attended at least one session of nutrition education, 77.24% of children were born in health facilities, and 95.51% of mothers had attended at least three consultations during pregnancy. Regarding health problems, in the fortnight preceding the survey, 68.27% had fever, and the following illnesses were reported: 13.29% of the children had malaria and 20.10% diarrhea. (Table 2). The high rate of utilization of prenatal and nutrition education services suggests good geographic and financial access to health services among this population.

Table 2. Health characteristics of children aged 24 - 59 months, Butezi Health District, Burundi (N = 602), November 2023.

Characteristics	count	Percent (%)
Nutrition education		
No	108	17.94
Yes	494	82.06
Children's place of birth		
Healthcare center	465	77.24
At home	18	2.99
Hospital	119	19.77
Antenatal consultation		
At least 2 sessions	17	2.82
3 to 4 sessions	575	95.51
5 and above	10	1.66

Continued

Malaria 2 Weeks before		
No	522	86.71
Yes	80	13.29
Diarrhea		
No	481	79.90
Yes	121	20.10
Fever		
Non	411	68.27
Yes	191	31.73

Regarding dietary practices, only 17.77% of the children were still breastfeeding, of whom a majority, 80.37%, belonged to the age group of 24 - 35 months. Cow's milk consumption was negligible, as only 3.99% of children consumed milk on the day previous to the survey. Most children don't have fruit juice to drink. The majority of children, 78.74%, were fed two to three times a day, and 20.93% were fed only once a day.

As far as feeding practices are concerned, fathers' participation was reported in 72.43% of cases. In the case of consumption of iron-rich food, a minimum intake of two out of the following food groups was reported by 41.20% of children: legumes, 51.33%; meat, 11.13%; egg, 1.99%; green vegetables, 71.59%. Although the consumption of legumes and vegetables was high, the consumption of meat and eggs—the food groups richest in heme iron, which is more bioavailable—was extremely low, indicating that most children's iron intake came primarily from non-heme iron, which is less bioavailable (Table 3).

Table 3. Dietary/eating habits of children aged 24 - 59 months, Butezi Health District, Burundi (N = 602), November 2023.

Characteristics	count	Percent (%)
Children still breastfed		
No	495	82.23
Yes	107	17.77
Breastfed infants by age (n=107)		
24 - 35	86	80.37
36 - 47	15	14.02
48 - 59	6	5.61
Cow's milk consumption		
No	578	96.01
Yes	24	3.99
Daily product consumption		
No	590	98.01
Yes	12	1.99

Continued

Fruit juice consumption		
No	580	96.35
Yes	22	3.65
Frequency of meals per day		
Once at most	126	20.93
More than 2 times	476	79.07
Husband's involvement in childhood nutrition		
No	166	27.57
Yes	436	72.43
Consumption of pulses		
No	293	48.67
Yes	309	51.33
Meat consumption		
No	535	88.87
Yes	67	11.13
Consumption Eggs		
No	590	98.01
Yes	12	1.99
Green vegetables		
No	171	28.41
Yes	431	71.59
Consumption of iron-rich foods		
No	354	58.80
Yes	248	41.20

The final model had several significant predictors for iron-rich food consumption. Male children were 1.71 times more likely to consume iron-rich foods than female children (aOR = 1.71, 95% CI: 1.23 - 2.40, p = 0.002). Maternal education played a role, where children of mothers who had secondary education or higher were 2.08 times more likely to consume iron-rich food than in the case of children of illiterate mothers (aOR = 2.00, 95% CI: 1.12 - 3.58, p = 0.020). Having livestock also had some effects on food consumption because children from families raising both small and large livestock were 3.50 times more likely to consume iron-rich foods compared to those without any livestock (aOR = 3.50, 95% CI: 1.26 - 10.01, p = 0.018).

In addition, children whose mothers had attended nutrition education sessions were 1.65 times more likely to have an iron-rich diet (aOR = 1.65, 95% CI: 1.03 - 2.62, p = 0.036), and the father's involvement in the child's feeding was associated with a 1.62-fold higher likelihood of such consumption (aOR = 1.62, 95% CI: 1.09 - 2.40, p = 0.016). The frequency of meals was significantly associated with the outcome: children fed only once a day were less likely to consume iron-rich foods than those fed at least twice a day (adjusted OR = 0.54, 95% CI: 0.34 - 0.84, p = 0.007), confirming the existence of a relationship between meal frequency and dietary quality (Table 4).

Table 4. Factors associated with iron-rich food consumption among children aged 24 - 59 months, multivariate logistic regression, Butezi Health District, Burundi (N = 602), November 2023.

Predictors	Iron-rich food consumption				
	n+	Percent	OR adjusted	95% CI	p-value
Sex of child					
Female	104	41.94	1		
Male	144	58.06	1.71	[1.23 - 2.40]	**0.002**
Mother's level of instruction					
None	53	21.37	1		
Primary	153	61.69	1.17	[0.77 - 1.76]	0.461
Secondary and above	42	16.94	2.00	[1.12 - 3.58]	**0.020**
Types of livestock					
None	101	40.73	1		
Little livestock	131	52.82	1.36	[0.96 - 1.93]	0.080
Large livestock	3	1.21	1.65	[0.31 - 8.65]	0.553
Little and large livestock	13	5.24	3.50	[1.26 - 10.01]	**0.018**
Education on nutrition					
No	33	30,67	1		
Yes	215	86.69	1.65	[1.03 - 2.62]	**0.036**
Involvement of husband in childhood nutrition					
No	53	21.37	1		
Yes	195	78.63	1.62	[1.09 - 2.40]	**0.016**
Frequency of meal					
At least twice	37	14.92	1		
Once	211	85.92	0.54	[0.34 - 0.84]	**0.007**

4. Discussion

This study explored the socio-demographic, health, and dietary characteristics of children aged 24 - 59 months in a rural setting and identified significant predictors of iron-rich food consumption. The findings revealed a population facing persistent poverty, high fertility rates, and limited dietary diversity—factors known to impact child nutrition outcomes [25]-[30].

A substantial proportion of children were third-born or later (60.8%), and more than half of the households had multiple children under five, which may increase competition for food and caregiving resources. High fertility has been associated with poor nutritional outcomes, particularly in low-resource settings [31]. Additionally, the predominance of subsistence farming and the extremely low household incomes (under €9/month for over half the sample) reflect socioeconomic vulnerabilities that can hinder adequate food provision [32] [33].

Despite these challenges, maternal health service utilization was encouraging: over 95% of mothers attended at least three antenatal consultations, and 82% received nutrition education. These indicators suggest that health facilities are well-positioned to deliver nutrition interventions [34] [35].

However, this access did not translate into diversified child diets. Only 41.2% of children consumed iron-rich foods, and intake of animal-source foods—meat (11.13%) and eggs (1.99%)—was critically low. This pattern is common in rural African communities, where cost, availability, and cultural preferences often limit consumption of iron-rich foods [36] [37].

The observed prevalence (41.2%) is lower than the range of 43% - 56% reported in several other settings in sub-Saharan Africa using comparable indicators [13] [14], and is closer to the figures reported among young children (6 to 23 months) in areas with similar levels of food insecurity in Sierra Leone and across sub-Saharan Africa [12] [14]. This low prevalence, compared to other African contexts, is likely due to a combination of several factors: above-average food insecurity in Ruyigi Province, its mainly vegetable-based subsistence agriculture, and the low household incomes in our sample, all of these limiting access to more expensive animal-based foods, such as meat and eggs.

Moreover, gender disparities were observed: male children were significantly more likely to consume iron-rich foods, with 1.71 times greater odds than females. Such disparities have been reported in similar settings, reflecting cultural norms that may prioritize male children in food distribution [38].

Maternal education emerged as a protective factor—children of mothers with secondary or higher education were twice as likely to consume iron-rich foods. Maternal education is consistently linked to improved child feeding practices and nutrition outcomes, likely due to greater health literacy, autonomy, and decision-making capacity [39].

Livestock ownership, particularly of both small and large animals, was associated with a 3.5-fold increase in the likelihood of iron-rich food consumption. Livestock can serve both as a direct food source and as a means of economic empowerment, contributing to dietary diversity and micronutrient intake [40].

Importantly, parental roles in child nutrition were also influential. Nutrition education for mothers increased the odds of iron-rich food consumption by 1.65 times, and paternal involvement had a similar effect (OR = 1.62). Engaging both parents in nutrition messaging may therefore enhance household decision-making and food allocation [41].

Finally, feeding frequency played a significant role. Children who were fed more than once daily had greater odds of consuming iron-rich foods. This aligns with WHO recommendations emphasizing frequent, responsive feeding as a key practice for child nutrition [42] [43].

5. Considerations Regarding Iron Bioavailability

An important aspect not addressed by our composite outcome measure is the bioavailability of the iron consumed. Dietary iron exists in two forms: heme iron, found in meat, poultry, and fish, which is efficiently absorbed (15% - 35%) largely independently of other dietary components; and non-heme iron, found in legumes and green vegetables, which is absorbed at a much lower rate (2% - 20%) and is highly sensitive to dietary factors that either promote or inhibit its absorption [3] [4]. In our sample, the most commonly consumed food groups—namely legumes (51.33%) and green vegetables (71.59%)—are sources of non-heme iron, whereas meat (11.13%) and eggs (1.99%), which provide more bioavailable heme iron, were rarely consumed.

This means that even the 41.2% of children classified as having "good" intake according to our definition may still be at risk of iron deficiency, since meeting the threshold of two food groups does not guarantee an adequate intake of absorbable iron when that intake is derived primarily from legumes and vegetables.

Legumes and leafy green vegetables, although they are valuable sources of many micronutrients, are also rich in phytates and other polyphenols, which inhibit the absorption of non-heme iron by binding to iron in the intestine and preventing its absorption. In the absence of an absorption-enhancing factor, meals consisting mainly of legumes and vegetables can therefore result in iron bioavailability that is lower than what the foods' crude iron content would suggest.

There are food biofortification programs in Burundi designed to enhance the bioavailability of micronutrients, including iron. Our goal remains to propose affordable strategies that would promote an iron-rich diet based on foods that are available and accessible to the local population.

6. Implications for Policy and Practice

Overall, the results indicate that nutrition programs in the Butezi district, as well as in comparable settings in Ruyigi province, cannot rely on a single-lever approach. To be effective, interventions should combine i) maternal literacy and nutrition education, ii) support for household livestock ownership and diversified subsistence agriculture, iii) explicit promotion of gender-equitable feeding practices to reduce the disadvantages observed among girls, iv) the involvement of fathers as active partners in feeding children rather than as secondary caregivers, and v) food-based dietary guidance that directly addresses iron bioavailability, rather than limiting itself to simply counting food groups. Integrating these messages into existing platforms with high reach—such as prenatal care and nutrition education sessions, which already reach the vast majority of mothers in this population—could serve as a viable entry point for scaling up efforts.

7. Limitations

This study has several limitations that should be taken into account when interpreting its results. First, dietary intake was assessed using a single-day food recall focusing on the consumption of food groups, rather than a validated 24-hour food recall repeated on non-consecutive days; this approach is subject to recall bias and daily variations in diet, and may not fully reflect habitual dietary patterns.

Second, the results were based on reports from mothers or caregivers and were not corroborated by biomarker data, such as hemoglobin or ferritin levels; consequently, we were able to describe dietary patterns but not directly assess the children's iron status or anemia. Data collection took place over a single month (November 2023); this timeframe does not allow us to capture potential seasonal variations in food availability and dietary practices, which are recognized determinants of iron-rich food consumption in subsistence agricultural settings.

Some subgroups in the multivariate analysis—notably households owning only large livestock (n = 3) or both small and large livestock (n = 13)—were small in size, resulting in wide confidence intervals around the corresponding odds ratios and limited precision for these estimates. Finally, since the study was conducted in a single health district, the extrapolation of the results to other districts in Ruyigi Province or to Burundi as a whole may be limited.

8. Conclusions

This study underscores the complex interplay between socioeconomic status, parental characteristics, and child dietary practices. While access to health services and nutrition education is relatively high, consumption of iron-rich foods remains inadequate. Interventions aiming to improve childhood nutrition in such settings must consider multi-dimensional strategies, including maternal education, agricultural diversification, gender-equitable food practices, and the involvement of fathers in child feeding.

These findings also suggest that programs aimed at reducing childhood anemia in the Butezi district should not merely focus on improving overall dietary diversity, but should specifically address the deficiency in animal-based foods and promote food combinations that enhance iron absorption.

Author Contributions

B.M. conceived and designed the study, participated in field data collection, performed the statistical analysis, interpreted the results, and drafted the manuscript. N.J., K.J., S.M., M.S. and S.S. supervised the study throughout its conduct, including the quality of data collection and analysis, and critically reviewed and revised the manuscript for important intellectual content. All authors read and approved the final version of the manuscript.

Conflicts of Interest

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

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