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## Inadequate Feeding Practices Persist in Burkina Faso

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### Abstract

In Burkina Faso, undernutrition remains a public health issue. The food quality for under 23-month-old children constitutes a key pillar of child nutritional status. The objective of this study is to assess the adequacy of child feeding practices in Burkina based on the norms framed jointly by WHO/Unicef in 2011. The dataset used has been issued from the nutritional cross-sectional nation-wide survey conducted from November to December, 2015. It is the sub-sample of under two-year-old children (8 202) who were targeted by this essentially descriptive analysis. Hardly half of the children were early initiated to breast-feeding. Only half was exclusively breast-fed during their first 6 months of life. The low diversity of complementary feeding affected more than seven children out of ten. The priority was put on high dense energetic food at the expense of those of high biological value ones. Except the continuation of breast-feeding at two years old, all the other aspects of the child feeding practices deserve strengthening. The improvement to be carried out in favour of child

nutrition should be early initiation to breastfeeding, feeding diversification based on qualitative foods and preventive support of long-term interventions.

**Key-words:** *Feeding, Undernutrition, Child, Burkina-Faso*

## **1. Introduction**

Child undernutrition is a public health problem in Burkina Faso. As an indication, the prevalence of stunting rose from 35.1% in 2009 to 29.1% in 2014 [1-2]. Despite the efforts made, the decline was not sufficient to get out of the crisis situation according to the WHO categorization [3]. In addition, micronutrient deficiencies are widespread (iron, vitamin A, iodine, zinc) [4]. In response, Burkina Faso has made the fight against undernutrition a priority in its 2016-2020 National Economic and Social Development Programme [5]. This governmental programme is based on a new national nutrition policy adopted in 2016 and implemented by a multi-sector strategic plan with the aim of reducing the number of children with growth faltering by 40% at the horizon of 2025, echoing the Rome Declaration and its action plan [6][7].

This reflects the gradual awareness on multiple and multifaceted consequences of undernutrition. It has a significant negative impact on a child's cognitive development [8-9]. It induces a psychological disorder including increased anxiety, depressive syndromes, low self-esteem, antisocial behaviours, relational impulsivity, decreased attention and hyperactivity [10]. This is accompanied by poor academic performance and an irregular presence at school [11-12]. With Barker's "foetal programming" theory, intra-uterine or early child undernutrition leads to an increased risk of chronic diseases in adulthood (Obesity, high blood pressure, diabetes, dyslipidaemia) [13]. Cohort studies in developing countries have made a similar observation [14]. Already, more than 80% of deaths due to chronic diseases occur in developing countries [15]. The situation will continue to deteriorate in light of the current high rates of undernutrition and unbalanced food consumption [16].

The proximate determinants of child undernutrition are food consumption and all other factors that contribute to overall health [17]. However, the quality of food consumption could at the outset be especially singled out, since it strongly influences undernutrition [18]. In many contexts, inadequate feeding practices over a long period of time are the predominant factors

in the deterioration of the nutritional status of under 5-year-old children [19]. Generally, disease overlaps and accelerates a pre-existing undernutrition linked to inappropriate feeding [20]. Awareness about this fact has triggered an action plan launching to scale-up the IYCN interventions for the period 2013-2025 in Burkina Faso [21].

To this end, WHO has made recommendations on best practices for infant and young child nutrition (IYCN) that can ensure balanced growth and normal development. These practices include initiation to breastfeeding within one hour after birth, exclusive breastfeeding (EBF) in the first six months of life, introduction of a timely, appropriate, adequate complementary feeding after 6 months, and continued breastfeeding until the age 23 months and over [22]. In Bamako, the deviation from this standard was related to non-compliance with EBF by early introduction of hot water and tisane. Early breastfeeding and continued breastfeeding for up to 23 months were applied by one in two women [20]. In Nigeria, EBF was impaired by glucose and herbal intake from a local plant during the first week that was supposed to prevent disease [23]. For complementary feeding, it was generally inappropriate because it consisted mainly of cereal porridge whose density did not cover the child's energy needs [24]. In Côte d'Ivoire, the choice of supplement foods depended solely on seasonal availability and only on the mother's appreciation of the accurate moment to introduce solid or semi-solid food [25]. In the province of Gnagna in eastern Burkina Faso, food inadequacy was due to the late introduction of complementary foods and their poor quality [26].

In order to help reduce the prevalence of undernutrition and its various correlated impacts in terms of morbidity and mortality, the objective of this study is to determine the pattern of gaps between the dietary recommendations and practices on children in Burkina Faso. For mothers, this should help raise awareness of inadequate feeding practices for their offspring and the impact throughout their lives. For caregivers, it aims at achieving better targeting food components that ensure better scaling up programme of IYCN.

## **2. Materials and methods**

The data used in this analysis come from a cross-sectional survey carried out from November 16 to December 10, 2015. The information collected through questionnaires is the socio-demographic characteristics and foods consumed by children aged 0-23 months. The interviews were conducted in local languages and in French. Interviews were conditioned on obtaining verbal consent from the mothers or caretakers.

The survey used a two-staged stratified sampling based on the country administrative division into 13 regions and 45 provinces. The regions are groupings of 1 to 6 provinces. Seven regions were taken as full strata and the 23 provinces of the other 6 remaining regions were considered as strata, say 30 strata in all. In each stratum, the number of children to be surveyed was calculated using the Schwartz formula with the prevalence of stunting coming from the 2010 Demographic and Health Survey (EDSBF-IV) [27-28]. By using this source, the precision and the cluster effect are 3% and 1.5 respectively. The number of households to be surveyed was obtained by dividing the number of children by an average size of 6.36 members per household, a proportion of under-five year old children of 17.8% in the whole population (RGPH 2006) and a non-respondent rate of 2% according to previous surveys.

For the selection, the first stage selected 30 clusters within each stratum proportionally to the size in number of households, say 900 clusters in all. These clusters are the enumerating areas delineated in the 2006 General Population and Housing Census, encompassing from 150 to 200 households. The second stage of selection retained households sequentially within the previously selected clusters. The number of households surveyed in each cluster ranged from 21 to 30 depending on the stratum. In these selected households, all eligible children were surveyed. Overall, 894 clusters were covered, representing a rate of 99.3%. The number of under-five year old children surveyed was 20,590 from 13,792 households. The analysis of food consumption was limited to 8,202 children under the age of two, in concordance with the child's diet quality assessment approach [29].

A double-entry of the data was carried out and the inconsistencies detected by the Epi-Info software. The processing and tabulation were performed using Stata software. A weight factor taking into account the survey plan was calculated. Given the sampling is complex, the analysis used Stata svyset procedure, which takes into account both the weight and the structure of household selection.

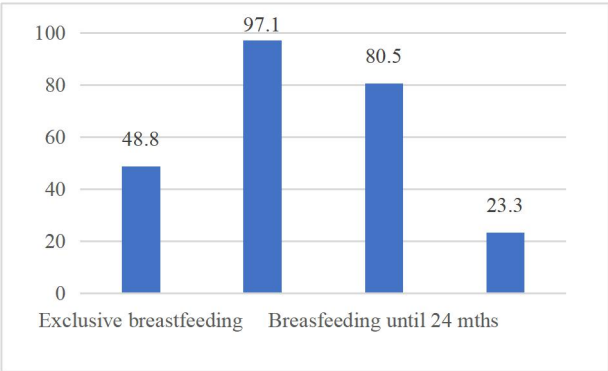
For the collection of food consumption information, the last 24 hours recall procedure has been used. The entire process of building the synthetic index was based on the World Health Organization guide [29]. For breastfeeding initiation, it is the duration since birth the child received breast milk for the first time. It is considered as early if breast milk is given within one hour since birth. For EBF, the criterion was that the child should be under 6 months of age, should be breastfed and should not receive any solid or liquid food including water or other tisane. However, an exception is made for medicines, vitamins and other syrups. The quality of complementary feeding was assessed for children 6-23 months of age. Food

diversity was sufficient if all daily meals included at least four distinct food groups. Moreover, additional criteria vary depending on whether the child is breastfed or not. For 6-8 months breastfed children, the number of solid or semi-solid foods (meals) to be consumed must be at least 2, for those aged 9-23 months and breastfed, this number is at least 3 and for those aged 6-23 months and not breastfed, the number is 4, without considering dairy products. For all age groups, daily diet should include at least four food groups, without counting dairy products. For non-breast-fed children, it is recommended specifically to consume dairy products at least twice a day to supply the absence of breast milk.

As for age, its collection was based on identity documents. By default, an approximation was made by comparing the child concerned to those in the same household or by using a regional calendar of events. Their age was seized in months to prevent significant biases in the categorization of the child's nutritional status.

**3. Results**

For breastfeeding initiation, about half of children (49.4%) received breast-milk within the first hour after birth in accordance with the recommendations (Figure 1). In contrast, 6.8% of children were not initiated until after their first day. As for the EBF, less than half of children under 6 months of age had been complied with by their mothers (48.8%).



**Figure 1: Prevalence of different components of breastfeeding in Burkina Faso**

Amongst those who had not been exclusively breastfed in the first 6 months of life, 89% had received water and 36.1% had received tisane (Table 1). If we consider these two drinks together, they were consumed by 97.8% of children not exclusively breastfed. In 61.7% of

cases, this is due to water alone, in 8.9% of cases tisane alone is concerned and in 27.2% of cases, water and tisane are evoked. Only 2.2% of children who did not receive EBF received something other than water and tisane (results not presented).

**Table 1: Consumption of water and tisane by under-five month non-breastfed children**

Water	Tisane		Total	N
	Yes	No		
Yes	30.6 (75.5)	69.4 (97)	100 (89)	944
No	80.3 (24.5)	19.7 (3,0)	100 (11)	117
Total	36.1 (100)	63.9 (100)	100 (100)	1061

( ) : Percentage in column

As for continued breastfeeding, almost all (97.1%) women had breastfed their children for up to a year. At two years, the proportion drops to 80.5% (Figure1). However, the appropriate breastfeeding that is exclusive breast milk for up to 6 months, then introducing complementary foods at 6 months while continuing to breastfeed for up to 23 months was respected by less than a quarter (23.3 %) of children in Burkina Faso.

For the introduction of complementary food at 6-8 months, only 4.6% had received adequate nutrition (Table 2). Amongst the others whose introduction of complementary food was inadequate, half (50.8%) received less than 2 meals a day. For breastfed children aged 9-23 months, the proportion of children fed accurately was 17.2%. Of the others who did not receive a balanced diet, the proportion with a lower number of meals required (3 meals) was 2 out of 5. For children aged 6-23 months who were not breastfed, only 18.1% were adequately fed. Amongst the others who were not adequately fed, the proportion of those who had less than 4 meals per day was about 2 out of 5 (38.3%).

To compensate for the lack of breast milk, non-breastfed children should consume dairy products at least twice a day. Unfortunately, 80.4% of non-breastfed children had not been able to meet this condition (Table 2). Among children aged 6-23 months who were not breastfed and had inadequate feeding status, 98.2% consumed less than twice dairy products a day. This inadequacy of dairy products therefore mainly explains the inaccuracy of their diet.

**Tableau 2: Number of diets or dairy products consumed per day according to feeding status**

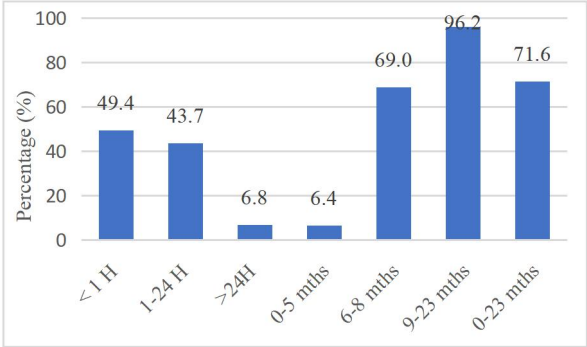
Number of diets	Adequate complementary		Total	N
	No	Yes		
6-8 month children breast-fed				
<2 diets/day	100 (50.8)	0.0 (0.0)	100 (48.5)	429
≥2 diets/day	91.0 (49.2)	9.0 (100)	100 (51.5)	456
% together	95.4 (100)	4.6 (100)	100 (100)	885
9-23 month breast-fed children				
<3 diets/day	100 (40.3)	0.0 (0.0)	100 (33.4)	1661
≥3 diets/day	74.2 (59.7)	25.8 (100)	100 (66.6)	3316
% together	82.8 (100)	17.2 (100)	100 (100)	4977
6-23 month children non breastfed				
<4 diets	100 (36.1)	0.0 (0.0)	100 (29.5)	98
4 diets or +	74.4 (63.9)	25.6 (100)	100 (70.5)	234
Together	81.9 (100)	18.1 (100)	100 (100)	121
6-23 month children non breastfed				
<2 dairy products	100 (98.2)	0.0 (0.0)	100 (80.4)	267
≥2 dairy products	7.7 (1.8)	92.3 (100)	100 (19.6)	65
Together	81.9 (100)	18.1 (100)	100 (100)	332

( ) : Percentage in column

For food diversity, 95.1% of 6-8-month-olds had not had at least 4 required food groups (Table 3). For 9-23 months old breastfed children, more than three-quarters (78.8%) have not received a sufficiently diversified diet. Among children aged 6-23 months who were not breastfed and had poor nutrition, more than half (55.4%) had an undiversified diet. Overall, low feeding diversity was characteristic of the majority of children of 6 months of age and over.

Analysis of the food groups consumed indicates that cereals, roots and tubers are most given to children and followed by fruits and vitamin A rich vegetables, especially among children who have not been adequately fed (Table 3). The relative importance of the latter group is linked to carrot season which corresponded to the data collection period. On the other hand, food groups such as eggs, dairy products, other fruits and vegetables were very poorly given to children. The most significant rupture was observed among breastfed and inadequately fed 6-8-month-olds who had a diet outrageously dominated by cereals, roots and tubers (97%) and a small proportion of fruits and vegetables rich in vitamin A (24%) compared to other food groups (<10%).

The introduction of complementary foods is made too early in 6.4% of children under 6 months of age (Figure 2). In the 6-8-month age group, contrary to the recommendation, 31.0% of children had not yet received complementary foods. In 3.8% of cases, this introduction was very late, i.e. it took place after 9 months.



**Figure 2: Duration (hours) to breast-feeding initiation and age (months) solid food introduction**

Overall, less than a quarter (23.8%) children under the age of 23 months were adequately fed, regardless of age group and breastfeeding status. This proportion was strongly influenced by the high prevalence of EBF (48.8%) among children aged 0-5 months, compared to 4.6%, 17.2% and 18.1% respectively of adequate nutrition for children aged 6-8 months, 9-23 months, 6-23 months respectively. Moreover, regional variations in prevalence are significant. While the central plateau region covering the capital-city Ouagadougou has the lowest prevalence (14.4%), three regions (Central, Cascades, Central-East) have the highest levels (respectively 37.9%, 28.8%, 28.8%).



**Tableau 3: Proportion of children having consumed less than 4 food groups and rates of food groups consumed according to feeding status**

% <4 food groups	Food groups								N
	Cereals	Legum	Dairy	Meat	Egg	Vit. A rich	Other		
0-8 month breastfed									
No	99,8	97,0	8,8	8,0	7,3	0,7	24,0	6,3	537
Yes	0,0	100	75,6	34,1	70,7	14,	95,1	46,3	41
Togethe	95,1	97,2	13,5	9,9	11,8	1,7	29,1	9,2	578
9-23 month breastfed									
No	95,1	98,0	25,0	11,4	17,7	1,8	59,4	14,8	396
Yes	0,0	99,4	80,8	31,2	73,5	11,	92,5	42,7	855
Togethe	78,8	98,3	34,9	14,9	27,6	3,4	65,3	19,8	481
6-23 month non breastfed status									
No	67,7	100	60,5	16,5	43,6	2,3	58,3	21,8	266
Yes	0,0	98,3	62,7	47,5	47,5	6,8	54,2	27,1	59
Togethe	55,4	99,7	60,9	22,2	44,3	3,1	57,5	22,8	325

#### 4. Discussion

These analyses reveal profound inadequacies in child feeding practices in Burkina Faso. The insufficiency begins very early in the new-born life. Half of the children (50.6%) is not breastfed within one hour after birth, almost the same proportion (51.2%) was not exclusively breastfed.

This increases the risk of neonatal mortality. Indeed, three prospective cohort studies have found a protective effect of early initiation of breastfeeding. This early initiation ensures that the child receives colostrum available up to 3-4 days after birth; this first milk which has multiple recognized protective effects [30]. It was found that when the child was breastfed within one hour after birth, there was a low risk of neonatal death (RR=0.56; IC=0.79) [31]. In Ghana, children who had been introduced late to breast milk (1 hour) had a higher risk of neonatal mortality (AOR=2.40; IC=(1.69-3.40)). More specifically, the risk increased from 1.45 (IC=(0.90-2.35)) for a duration of 1-24 hours and reached 4.42 (IC=(1.76-11.09)) after 3 days [32]. The reduction in mortality induced by early initiation of breastfeeding was linked to the decrease in the incidence of diarrhoea, which remained the leading cause of death. In fact, early initiation reduced the occurrence of diarrhoea by 26.0% (IC=(2.0%-44.0%)) [33]. In addition, early initiation encouraged further breastfeeding. In Japan, mothers who breastfed

their children within 120 minutes after birth had a higher propensity to breastfeed for up to 4 months more than others [34]. In Mali, the effect was rather significant on the practice of EBF [35].

In Burkina Faso, EBF was relatively lower (48.8%) in comparison to the level obtained in Togo (66.1%), but it is higher than the prevalence for the whole sub-Saharan Africa (41%) [36-30]. The low level of EBF in Burkina Faso is largely, if not primarily, related to the introduction of water and/or tisane to children; which is responsible for almost all of the non-compliance with EBF (97.8%). This fact is quite damaging on the child nutritional status in that it exposes to waterborne diseases, especially diarrhoea which has a proven effect on stunting, especially when the episodes increases [8]. In a meta-analysis based on 9 communities in developing countries, growth retardation at 24 months was found to be a cumulative result of each diarrheal episode or the number of days of diarrhoea before that age. Thus the last five diarrhoeal episodes contribute to stunting by 25.0% (CI=(8.0%-38.0) [37]. In another meta-analysis, it appeared that the risk of diarrhoea was significantly increased when predominant breastfeeding was practiced i.e. when breast milk is accompanied by water or tisane (OR=1.26; IC=(0.81-1.95). Risk of pneumonia is also increased (OR=1.79; IC=(1.29-2.48)) [38].

This is all the more crucial since drinking water sources remain unreliable in Burkina Faso with 23.5% of households using unimproved water sources [28]. This practice is not only a source of morbidity. The introduction of water and tisane indirectly affects a child's ability to receive a sufficient amount of milk to meet the child's energy and micronutrient needs for balanced development [39]. Overall, the proportion of child deaths attributable to suboptimal breastfeeding is estimated at 11.6% [40]. In addition, socio-cultural considerations should be taken into account. According to Amir, many women know that breastfeeding is beneficial to the child, yet there remains a preference, a tendency to adopt collective behaviours and knowledges [41]. Thus, despite the numerous advantages exposed by health-workers to promote EBF practice, mothers turn irretrievably to predominant breastfeeding, driven by the community perception that "breast milk is not enough to satisfy their child". Mothers are still believing that infants under six months of age often need additional water drinking. The most common reasons cited are the ambient heat that can cause thirst in infants. Another cultural reason is the symbolism of water in traditional society. Offering water is a symbol of welcome to new-borns. For these different reasons, it happens that water is given to the child even before breast milk [42].

From 6 months onward, when supplementary food comes into consideration, the food status deteriorates. For the breastfed 6-8 months old children, the breastfed 9-23-month olds and the non-breast-fed 6-23-month olds, the appropriate feeding rates are only 4.6%, 17.2% and 18.1% respectively. These problematic levels are linked to an insufficient number of meals taken per day. For these three categories considered, this represents 50.8%, 40.3% and 36.1% of children who did not have the required number of meals for their age among those who were not adequately fed. This observed decline in the inadequacy of the number of meals is linked to a gradual introduction of solid and semi-solid foods into the child's diet when s/he grows up. However, the pace and frequency of this introduction remain well below the expected needs which limits the amount of energy and essential nutrients required.

This inadequacy in children's diet is also linked to a distortion in the quality of intakes. More than 9 out of 10 children of 6 months and over who were not adequately fed had less than the four food groups required. This insufficiency in food diversity is largely responsible for the imbalance in children's diets. This is almost due to the fact that the preferred types are mainly basic foods with high energy value (cereal, root, tuber), at the expense of those with high biological value (meat, egg, dairy). This is a general trend that is observed when poverty is widespread or education level is low. In this case, energy-dense, nutrient-poor products are more likely to be used [43]. The impact undoubtedly reverberated on nutritional and health status. Indeed, the risk of stunting was increased for Tunisian children who consumed a poor diet (OR=1.86; p=0.02) or low in animal protein (OR=1.91; p=0.03). Similarly, the consumption of a low-diversified diet increased this risk (OR=2.27; p=0.01) [44]. Inversely, food diversity had a protective effect on a child's stunting in Benin [45]. A similar result was also obtained by Tzioumis in his analysis on developing countries [46]. In India, an author came to the fact that stunting was dependent on food diversity. In a study of 18,463 children under the age of 5, consumption of four food groups between 6-23 months reduced the risk of underweight and stunting (respectively AOR=0.90; IC=(0.85; 0.94) and AOR=0.88; IC=(0.84-0.93)) [47]. In Bangladesh, food diversity reduced stunting risk in the 6-11 months and 12-23 months age groups (respectively AOR=0.85 (CI=(50.76-0.94) and AOR=0.74 (IC=(0.69-0.79)) [48].

Breastfeeding for up to two years was carried out for 4 out of 5 children in Burkina Faso. Values observed elsewhere are generally lower. In neighbouring countries, the prevalence was 63.7% in Togo, 38% in Cote d'Ivoire and 50% in Ghana [49][50-51]. Overall, breastfeeding between 6-23 months was more common in Africa (77%; IC=(73%-81%)), followed by Asia

(62%, CI=(54%-71%)) and Latin America (60%; IC=(50%-69%)), with the lowest frequency in Eastern Europe (33%; IC=(24%-42%)) [40]. However, for appropriate breastfeeding at 0-23 months i.e. the practice of EBF, the introduction of complementary foods accompanied with continuation of breastfeeding up to two years, the prevalence was (23.3%). It is now well established that accurate breastfeeding prevents diarrhoea, respiratory infections, sudden child death and impaired cognitive development. For the mother, it reduces breast cancer [52]. Breastfeeding affects hormonal regulation and delays the return of ovulation after childbirth and thus lengthens the birth interval. In addition, breastfeeding also has an effect on fertility after resumption of menstrual periods; women who have their menses again would on average be less fertile when they continue to breastfeed [52].

Burkina Faso is an exception in the continuation of breastfeeding. It is therefore important to maintain or even reinforce this positive deviance. This provides children with a significant source of vitamin A, zinc, iodine, calcium, protein and protection from infections [53]. Prolonged breastfeeding combined with complementary feeding reduces clinical malnutrition by 70% [54]. However, the continuation of this practice should escape the paradox observed in many contexts. In Brazil and Senegal, children for whom breastfeeding was prolonged had mostly poor nutritional status [55]. It is a reaction of mothers to the precarious ill-health of their children. Unlike healthy children who are weaned more quickly, mothers prolong breastfeeding for their malnourished children to improve their health and ensure survival. Communication should therefore focus on bringing mothers not to link continuation of breastfeeding with child nutritional status. It should emphasize that even healthy children must also be breastfed for at least 23 months.

For the introduction of complementary foods, 6.4% received complementary foods too early and 3.8% too late, while the target age group had a proportion of 31.0% of children who received no solid food. This creates an imbalanced development in children who are affected. For non-breastfed children, the high proportion of those who did not receive any dairy products whether they were adequately fed or not is a major constraint. This deprives from sufficient calcium intake, which is paramount at this pivotal stage of height growth, although there is no perfect equivalence between breast and animal milk. This is therefore a double harm for the latter, especially since animal milk remains a palliative alternative. This results in a significant increase in death risk for all causes for these children (OR=3.68; IC=(1.46-9.29)) [38]. In Bangladesh, the effects of inadequate complementary food are comparable to those of diarrhoea on children's nutritional status [56].

It should be noted that the 24-hour recall technique used is subject to some limitations. It is based on remembrance and is therefore not free of memory effect. Moreover, because of its reduced reference period, the information cannot be representative of the individual's eating habits. In addition, it does not collect information on the quantity of products consumed to assess its sufficiency. A complementary technique called "multiple-passage" has been developed to systematize data collection and combines quantitative and qualitative aspects. It is composed by 5 stages, including information on the timing, type of meal, quantity, type of product, etc. [57]. However, its main disadvantage is the higher cost of collection since it requires more time and equipment (utensils).

Suboptimal complementary feeding is clearly a determinant of stunting and any improvements should target both the frequency of the diet and ensure adequate quality in terms of sufficient micronutrients. It would be relevant to focus on regions where gains would be significant, given the initial situation is worst (Centre, Centre-East and Cascades). To this end, interventions need to be divided into two essential dimensions: those specific to nutrition and those that are sensitive to nutrition. The first group would focus on formulating and implementing actions directly related to the food consumed by the child. This involves changing eating habits through nutritional education or nutritional supplementation based primarily on the promotion of animal products, meals with an energy density and the use of micronutrient supplementation, including vitamin A [58]. If necessary, depending on economic constraints and the season, product substitutions could be made. These interventions should be backed by second-level structural actions such as improving the quality of drinking water to prevent diarrhoeal episodes during the complementary feeding period that follows EBF. Hygiene should also be addressed to reduce environmental enteropathy following inflammation of the intestinal wall mucous, which justified the introduction of EBF at 6 months [59-60]. Deworming should increase the bioavailability of ingested nutrients. Encouraging antenatal care would allow health services to raise awareness. The practice of family gardening and small-scale animal breeding would help ensure food diversity [61-43].

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