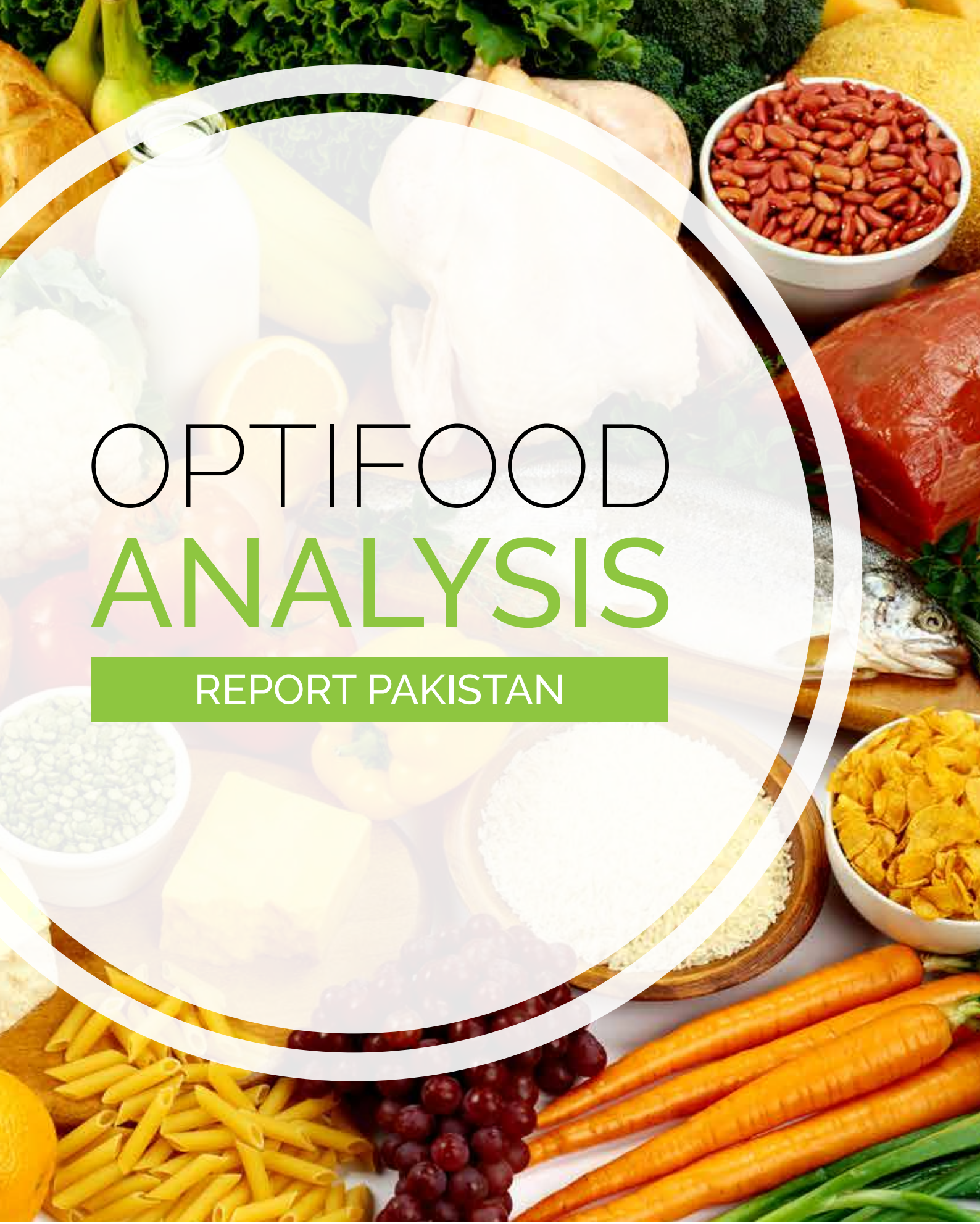

OPTIFOOD ANALYSIS

REPORT PAKISTAN

Nutrition Wing
Ministry of National Health Services,
Regulations and Coordination,
Government of Pakistan

UKaid
from the British people

unicef
for every child

OPTIFOOD ANALYSIS
REPORT PAKISTAN

August 2018

unicef

for every child

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Acknowledgments

I would like to thank the Ministry of National Health Services, Regulation and Coordination and the UNICEF-Pakistan team for their support to the Optifood study and especially to Dr Saba Shuja for her day-to-day communication, coordination and guidance. Furthermore, I would like to thank Pablo Rodriguez for his guidance.

Great appreciation goes to the Research and Development Solutions (RADS) team, and especially to Dr Adnan A. Khan and Safoora Malik for mobilizing the team of data collectors and supervisors.

This analysis would not have been possible without the willing help of the women who participated in the interviews which is greatly appreciated. Lastly, I would like to thank all persons not mentioned by name who contributed to the success of this project.

Julie Peletier

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Disclaimer:

The study has been made possible with the financial assistance of the Department for International Development (DFID), United Kingdom. The views expressed herein should not be taken, in any way, to reflect the official opinion of the DFID.

Foreword

Appropriate feeding practices are essential for the nutritional status, growth, development and survival of infants and young children. Infants should be exclusively breastfed for the first six months of life, and thereafter receive nutritionally-adequate and safe complementary foods, while breastfeeding should continue up to at least two years of age. Poor or suboptimal breastfeeding practices are an important determinant of all forms of undernutrition, especially during the first 1,000 days of a child's life. It is recommended that babies should receive complementary foods from six months of age when they begin to require adequate nutritious foods in addition to breastmilk.

As part of the National Complementary Feeding Assessment, the Optifood tool was used to develop food-based recommendations and identify problem nutrients based on habitual diets in 12 districts across the country. This will strengthen efforts to optimize nutrient adequacy among children aged 6–23 months.

The Nutrition Wing of the Ministry of National Health Services, Regulation and Coordination highly appreciates the financial support from the United Kingdom Department for International Development in conducting this analysis and the efforts of Research and Development Solutions in carrying out the fieldwork. The role and contribution of different stakeholders and partners in carrying out the research, and later in reviewing and helping finalize the report, is highly appreciated. These include the provincial and regional departments of health, UN organizations (WHO, UNICEF, WFP), international and national organizations (NI, GAIN), and federal line ministries.

I would like to mention the hard work put in by Dr. Saba Shuja (UNICEF) in completing the National Complementary Feeding Assessment successfully. Furthermore, I would like to thank Melanie Galvin, Dr. Wisal Khan and Sumra Kureshi as well as my team at the Nutrition Wing, especially Dr. Khawaja Masuood Ahmed, for his inputs as well as for reviewing and finalizing the document.

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Acronyms

AJK	Azad Jammu and Kashmir
APN	Absolute Problem Nutrient
FATA	Federally Administered Tribal Areas (now the tribal districts of KP)
FAO	Food and Agriculture Organization
FBR	Food-Based Recommendation
FCT	Food Composition Table
GB	Gilgit-Baltistan
g/day	grams per day
g/meal	grams per meal
kcal	kilocalories
KP	Khyber Pakhtunkhwa
MoNHSR&C	Ministry of National Health Services, Regulations & Coordination
PN	Problem Nutrient
PPN	Partial Problem Nutrient
RADS	Research and Development Solutions
RNI	Recommended Nutrient Intake
UNICEF	United Nations Children's Fund
WFP	World Food Programme
WHO	World Health Organization

Abstract

The aim of this study is to identify specific "problem nutrients" (inadequate nutrients in the population) and to develop realistic food-based recommendations and non-food-based recommendations based on habitual diets to optimize nutrient adequacy among children aged 6–23 months in Pakistan in a modelled diet.

Optifood, a linear modelling tool, was used to develop and compare food-based recommendations and identify problem nutrients in modelled diets based on 24-hour recall data about children aged 6–8 months, 9–11 months and 12–23 months in 12 districts of Pakistan. From each zone (n=17) six clusters were selected, and 24-hour recall data for 9 children per age group in every cluster was collected (n=2,754).

Similar problem nutrients were identified across age groups and districts. The main identified problem nutrients were iron, zinc, folate, calcium, and vitamins A, B1, B3 and B6. The best food-based recommendations for every target group often included eggs, dairy products, grains and cereals based on the habitual diets leading to nutrient adequacy for calcium and vitamins B1, B3 and B6. However, nutrient adequacy was usually not reached in all age groups for vitamin A, iron, zinc and in children aged 12–23 months for folate. Food groups high in vitamin A, iron and zinc (like meat, fish and green leafy vegetables) did not or barely appeared in the food lists used for modelling diets once assumptions were made within the program (food consumed by > 5% of the children per target group, 10th–90th percentiles).

Food-based recommendations may help to achieve nutrient adequacy for certain problem nutrients, however certain problem nutrients remain even after optimizing the diet with food-based recommendations within local dietary patterns. For this reason, it is recommended to consider non-food supplementation strategies to achieve nutrient adequacy for the remaining problem nutrients.

1

Objective and methodology

1.1 Objective

The objective of the study is to identify specific "problem nutrients" (inadequate nutrients in the population) and develop realistic food-based recommendations (FBRs) based on habitual diets, in order to optimize nutrient adequacy with the use of the linear program Optifood in children aged 6–23 months in Pakistan.

Under this over-arching objective, the Optifood analysis aims to:

1. Identify of specific "problem nutrients" (inadequate nutrients in the population) based on habitual diets;
2. Test alternative food-based interventions; and
3. Identify optimal diets which are realistic (i.e. fit within habitual diets).

1.2 Methods

1.2.1 Data collection

The study design was finalized in collaboration with UNICEF, a World Food Programme (WFP) consultant and Research and Development Solutions (RADS), and was approved in consultation with national stakeholders including the Ministry of National Health Services, Regulations & Coordination (MoNHSR&C) and provincial health departments. The partners also helped select 12 districts across Pakistan for the study. These included two districts from each of the four provinces (Sindh, Punjab, Balochistan and Khyber-Pakhtunkhwa or KP) and one from each of the administrative areas: Islamabad Capital Territory, Gilgit-Baltistan (GB) and Azad Jammu and Kashmir (AJK). Additionally, one agency from the Federally Administered Tribal Areas (FATA) was included, a region which was subsequently merged with KP province and now constitutes its tribal districts.

The data collection tool was finalized with UNICEF and the international expert from WFP. It was pretested in a poor urban area in Rawalpindi district, Punjab, in order to contextualize it for Pakistan.

The research partner, RADS, had previously conducted livelihood zoning in each of the selected districts based on predominant sources of income, using the Cost of the Diet methodology under the guidance of a UNICEF consultant.[1] This process identified 1–2 livelihood zones within each selected district, making a total of 17 zones in 12 districts. These were then sampled for collection of Optifood data which was based on 24-hour dietary recall.

Two female enumerators, one male supervisor and one male monitor were recruited for data collection and monitoring from each district, making a total of 25 enumerators and 12 supervisors. In addition, 12 monitors were recruited. They were all brought to Islamabad between 20 and 22 December 2017 for combined training to standardize their data collection practices. Training was conducted by trainers who had received master training by WFP international experts. Training covered good research practices and ethics, use of electronic tablets for data collection, and the content of the survey. Participants also underwent mock data collection sessions and familiarized with multiple field-based scenarios that they might encounter. Training was monitored by members of the UNICEF team for quality.

Six clusters were selected in each zone based on geographic distribution to ensure coverage was representative across the zone. Within each cluster, nine mothers with children aged 6–8 months, nine with children aged 9–11 months and nine with children aged 12–23 months were interviewed. In all, 2,754 interviews were conducted across the 17 zones in 12 selected districts.

RADS provided field plans to every enumerator individually. In each cluster, enumerators identified a specific landmark in the target area from which to initiate sampling. They started interviews from the third household to the right of the landmark and covered every third household from there onwards (systematic random sampling) until the requisite number of interviews had been completed.

[1] The findings of this research are available in Ministry of National Health Services, Regulations & Coordination (MoNHSR&C), UK Aid & UNICEF Pakistan, "Cost of diet analysis in 12 districts, 17 livelihood zones – Pakistan", 2018.

In addition to the interviews, enumerators also measured the amount of food ingested using standard measuring tools (measuring cup, jug and plate).

During data collection, enumerators were monitored by RADS teams to ensure quality via field visits, daily debriefing meetings for supervisors, and by calling randomly identified respondents to verify the visits.

In addition to this physical monitoring, data were also monitored electronically. Data were collected using RADS software, which is specifically designed for survey work. Interviews were automatically uploaded onto a server as they were completed. This allowed checking of incoming data in real time (several times a day, every day) for completion, time of interviews, duration, location through geo-stamps, missing values and skip patterns.

The RADS team also provided standard serving size measurements of common foods that were requested by UNICEF and WFP.

1.2.2 Data preparation and analysis

Data preparation

For data preparation, geographical areas were merged as follows:

- Balochistan (combining Naseerabad and Loralai districts),
- Gilgit district (GB)
- Haveli district (AJK)
- Islamabad (Islamabad Capital Territory)
- Khyber agency (former FATA, now the KP tribal districts)
- KP (combining Charsadda and Tank districts),
- Punjab (combining Faisalabad and Rajanpur districts)
- Sindh (combining Sanghar and Jacobabad districts).

Three age groups were included: children aged 6–8 months, 9–11 months and 12–23 months, in each geographical area. In total 24 target groups were considered.

Twenty-four hour recall data was used to define model parameters for Optifood per target group, with the use of MS Excel 2010 and MS Access 2010 computer programs. The defined parameters were: the list of foods consumed by the target group, the minimum and maximum of food servings per week (frequencies) for the food groups, food sub-groups and foods in Optifood and the median serving size for each food. The latter was expressed in grams per day (g/day), except for "grains and grain products" which were defined as grams per meal (g/meal). This measure was found to be more accurate for foods in this food group since there was substantial variation in the number of times they were eaten per day.

In defining modelling parameters for Optifood, the following assumptions were made:

- Food list: The foods included were those consumed by > 5% of the children within the target group.
- Food groups and food sub-groups: The number of servings per week (frequencies) of the food groups and food sub-groups were defined with the use of percentiles derived from the intake data. The chosen percentiles correspond with the minimum, average and maximum frequencies of the food groups and food-sub groups. The 10th, 50th and 90th percentiles were used for all target groups, with the exception of the group of children aged 6–8 months from Haveli (AJK) since the high energy constraint could not be met using these percentiles. For this target group alone, the 5th, 50th and 95th percentiles were used.
- Food frequencies: Every food frequency per food item for a specific target group was estimated using the following formulas:

- Minimum: % subjects consuming the food / sum of the % of subjects consuming the foods that are part of the sub-group x 10th percentile of the food sub-group.
- Maximum: % subjects consuming the food / sum of the % of subjects consuming the foods that are part of the sub-group x 90th percentile of the food sub-group.

To estimate the minimum and maximum food frequencies of the different target groups, frequencies of the food groups were used. The minimum and maximum frequencies of food groups were distributed among all the foods eaten within that food group, based on the percentage of subjects that consumed the foods. Foods (expressed in g/day) were consumed a maximum of seven times a week.

- **Food serving sizes:** To determine serving sizes for foods per target group, the median serving size was taken. The serving sizes are expressed in g/day, except for foods in the "grain and grain products" food group, which are expressed in g/meal.
- **Breastmilk:** According to the World Health Organization (WHO), children should be exclusively breastfed for the first six months of life, followed by continued breastfeeding with appropriate complementary foods for two years or beyond (WHO, 2009). Breastmilk frequency data was measured in the study, but not actual intake data. Therefore, the estimations of average daily breastmilk intake for children aged 6–8 months, 9–11 months and 12–23 months was determined by calculating the energy requirement from breastmilk per age group. The number of kilocalories (kcal) via breastmilk intake was calculated using average weight-for-age data from WHO and the Food and Agriculture Organization (FAO) (WHO, 1998). The daily serving size of breastmilk was estimated based on the amount of kilocalories needed from breastmilk intake (M. Vossenaar et al., 2016). The calculated reference serving size of breastmilk intake was entered into Optifood (maximum of seven times a week).
- **Food Composition Table (FCT):** Values from Pakistan were used (FCT Pakistan, 2001). Missing information was supplemented with values from the Bangladesh FCT (FCT Bangladesh, 2013) or the online tables of the United States Department of Agriculture (USDA, 2018).
- **Recommended nutrient intake (RNI) values:** Recommended RNI values from WHO/FAO were used for all nutrients (Appendix 1; WHO, 1998). Thirty per cent of the recommended intake of energy derived from fat. For energy the energy equation used was: 77 times bodyweight for children aged 6–11 months, and 82.5 times bodyweight for children aged 12–23 months. Recommended grams of proteins a day was calculated using the formula: 1.14 times bodyweight for children aged 6–11 months, and 1.03 times bodyweight for children aged 12–23 months (WHO, 1998).

Linear programming analysis using Optifood

All analyses in this report were carried out using Optifood. Optifood is a linear programming tool with a multifactorial approach developed by the London School of Hygiene and Tropical Medicine in partnership with WHO, the Food and Nutrition Technical Assistance Project (FANTA) III and digital solutions provider blue-infinity (E.L. Ferguson et al., 2004). Optifood is used to analyse the nutrients people obtain from their local diets and identify "problem nutrients" (those expected to remain low in diets due to existing dietary patterns and availability of food). It then permits the formulation, testing and comparison of alternative food-based recommendations (FBRs) to optimize dietary adequacy. The tool helps to inform decisions when planning a food-based intervention. Optifood models with the following 13 nutrients: protein, fat, calcium, iron, zinc, vitamins A, B1, B2, B3, B6, B12, C, and folate.

Optifood uses the following three modules to analyse alternative FBRs:

- **Module I** checks if model parameters are generating realistic diets.
- **Module II** formulates two nutritionally-best diets for the target group, the food pattern and no food pattern

diet, to show whether the local diet can reach nutrient adequacy. The food pattern diet is the best diet close to the average food patterns of the target populations. The no food pattern diet is the best diet that can deviate from average food patterns whilst remaining within the upper and lower food group pattern constraint levels.

- **Module III** tests FBRs. The FBR that reaches adequacy for the highest number of nutrients is selected as the best FBR. Before FBRs are tested, problem nutrients are identified with the estimated nutrient intake distribution, so minimized (worst-case scenario) and maximized (best-case scenario) nutrient content per diet is estimated. In the worst-case scenario the least nutrient-dense foods from the list of foods are chosen, while in the best-case scenario the most nutrient-dense foods are chosen (J.L. Buttriss et al., 2014).

Problem nutrients are identified in module III before FBRs are selected. A nutrient is identified as an absolute problem nutrient (APN) when the best-case scenario does not reaches 100 per cent of RNI. An APN will always remain a problem nutrient because it will never reach 100 per cent of RNI even when FBRs are introduced. A nutrient is identified as a partial problem nutrient (PPN) when 100 per cent of RNI is reached in the best-case scenario, but 70 per cent of RNI is not reached in the worst-case scenario. The reason for selecting 70 per cent of RNI as the cut-off point is due to the assumption that this value corresponds to the estimated average requirement. When 70 per cent is reached in the worst-case scenario, it is assumed that perhaps half of the people will reach an adequate intake for this nutrient. Therefore, when including FBRs in the diet we aim to reach 70 per cent of RNI in the worst-case scenario for as many nutrients as possible.

The selected FBR per target group is that which achieves the highest number of nutrients reaching 70 per cent of RNI in the worst-case scenario. When this is the case for multiple FBRs, we selected the simplest and most realistic FBR in line with FBRs for other age groups in that district.

2

Results

2.1 Food intake

The food list of a target group consists of all food items consumed by at least 5 per cent of children within that group. In total, 47 different food items appeared on a food list for all target groups in Pakistan (Appendix II). The food items consumed were very similar between districts and age groups. On average, 16 different food items were consumed by children aged 6–8 months, 21 by children aged 9–11 months, and 22 by children aged 12–23 months.

Across Pakistan, commonly consumed food items (with the average percentage of children consuming the food items from all districts) among children aged 6–8 months were breastmilk (67 per cent), biscuits (40 per cent) and cereal (36 per cent). Commonly consumed food items among children aged 9–11 months were breastmilk (56 per cent), roti wheat flatbread (53 per cent), and ghee (48 per cent). Commonly consumed food items among children aged 12–23 months were roti (73 per cent), ghee (67 per cent) and onions (61 per cent). Small children more often consumed infant milk and cereals, while older children more often consumed grain products like roti and rice, and vegetables like tomatoes and onions (Appendix III).

Serving sizes per day varied between food items. Serving sizes of less than 10 g/day were often seen for food groups "added fats", "sweetened snacks and desserts" and "vegetables". Serving sizes of the "dairy products" food group ranged from 8 to 500 g/day but were mostly around 220 g/day. Serving sizes for "grains and grain products" varied considerably from a few grams per meal up to 250 g/meal (Appendix III). By and large, serving sizes increased with age. In particular, grain products were consumed more frequently and in larger portion sizes with increasing age.

2.2 Baseline diet

On average, there were seven problem nutrients in the baseline diets of children aged 6–8 months, eight in baseline diets of children aged 9–11 months, and nine in the baseline diets of children aged 12–23 months.

A similar pattern was seen in APNs and PPNs. Within the baseline diet of children aged 6–11 months (i.e. the two younger target age groups in this study), vitamin A, iron and zinc were identified as APNs, and calcium, vitamin B1, B3, B6 and folate were identified as PPNs.

Within the baseline diet of children aged 12–23 months, iron and zinc were identified as APNs; calcium, vitamin B1, B3, B6, B12 as PPNs; and folate and vitamin A as either APNs or PPNs (Table 2).

2.3 Diet including food-based recommendations

The best set of FBRs per target group was developed based on the highest number of adequate nutrients reached when FBRs were included in diets. The selected FBRs included recommendations for eggs, dairy, infant milk, milk products, grains, roti and cereals, on the food group, food-sub group and food level (Table 1).

FBRs for children aged 6–8 months and 9–11 months often included recommendations for eggs, infant milk, roti and cereals. FBRs for children aged 12–23 months often included recommendations for eggs, dairy, grain products and roti. A higher number of servings/week and a larger set of recommendations is seen with increasing age (Table 1).

Table 1: Food-based recommendations for Pakistan children aged 6–8 months, 9–11 months and 12–23 months

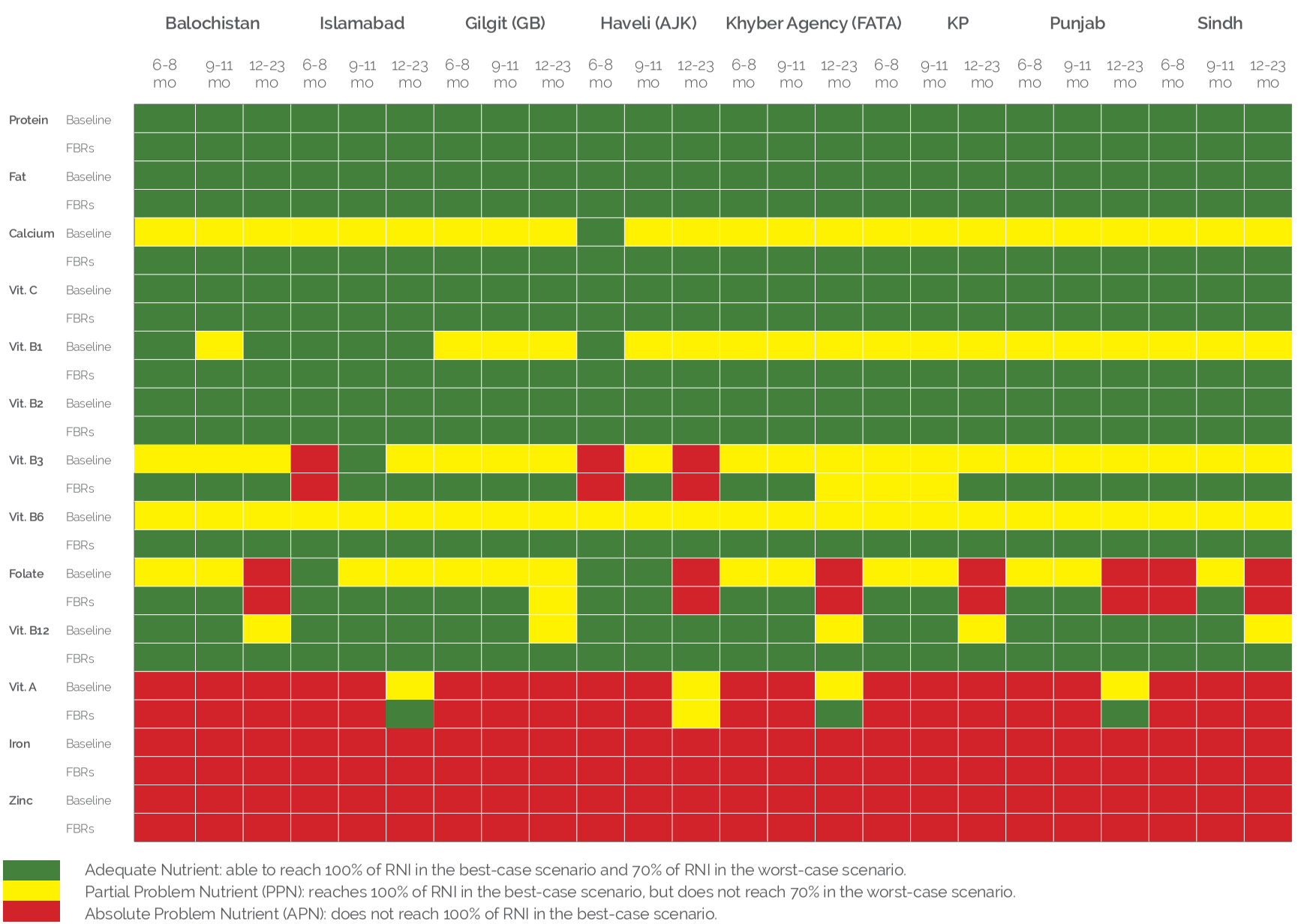
Food based recommendations (FBRs) in servings/week							
Food group		Human milk		Dairy		Grains	
Food sub-group				Infant milk	Milk		Cereals[2]
Food			Eggs			Roti	
Balochistan	6–8 months	7[1]		1		6	
	9–11 months	7			7	4	4
	12–23 months	7		2		1	5
Gilgit (GB)	6–8 months	7		1			4
	9–11 months	7		7			7
	12–23 months	7	7	7		14	7
Haveli (AJK)	6–8 months	7		1			4
	9–11 months	7					7
	12–23 months	7	7	14		10	
Islamabad	6–8 months	7	4	7		7	
	9–11 months	7	4	1		14	
	12–23 months	7	7	10		14	
Khyber Agency (KP tribal districts)	6–8 months	7	4			4	4
	9–11 months	7	4		7		7
	12–23 months	7	7	9			
KP	6–8 months	7		2		4	
	9–11 months	7	7	1		4	
	12–23 months	7	7			21	7
Punjab	6–8 months	7	7		4	4	
	9–11 months	7	7		13	6	
	12–23 months	7	7		7	10	
Sindh	6–8 months	7			7	7	7
	9–11 months	7			14	14	4
	12–23 months	7			14	14	7

[1] Shaded cells indicate the set minimum servings with which Optifood models.

[2] Food sub-group "cereals" includes the food items dalia (porridge) and cereal.

When including FBRs, most PPNs in all target groups reached the adequate intake level of 70 per cent of RNI in the worst-case scenario (Table 2). However, when including FBRs, the percentage RNI of APNs increased even in the worst-case scenario, but these values lay far from 70 per cent of RNI (Appendix IV). Furthermore, an APN of the baseline diet will never reach nutrient adequacy when FBRs are introduced since 100 per cent of RNI was not reached in the best-case scenario.

Table 2: Adequate and problem nutrients in children's diets in Pakistan



Adequate Nutrient: able to reach 100% of RNI in the best-case scenario and 70% of RNI in the worst-case scenario.
Partial Problem Nutrient (PPN): reaches 100% of RNI in the best-case scenario, but does not reach 70% in the worst-case scenario.
Absolute Problem Nutrient (APN): does not reach 100% of RNI in the best-case scenario.

3

Key findings

The objective of this study was to develop food-based recommendations (FBRs), non-food-based recommendations and to evaluate the effect of introducing FBRs to the diet on absolute problem nutrients (APN) and partial problem nutrients (PPN) for children aged 6–8 months, 9–11 months and 12–23 months in Pakistan.

It is seen that the **number of different food items consumed slightly increases with age**, which is expected since older children are expected to consume proportionally more normal food items than younger children. **All target groups consumed a small number of food items with an average of 16–22 different food items per target group.** Many food items consumed were similar between the different target groups with, in total, 47 different food items consumed. Using the same standardized recipes for all districts might have decreased the differences in recipes and food items consumed between districts. This list of food items consumed is smaller than the actual consumed list of food items collected during data collection due to the assumptions made.

Based on these assumptions, foods that were consumed by less than 5 per cent of children within the target group were omitted and frequencies based on the 10th–90th percentiles were used which again excluded certain food items. However, children aged 6–8 months from Haveli (AJK) did not reach the energy minimum constraint between these percentiles, and Optifood is not able to model when the energy minimum constraint cannot be met. However, the energy minimum constraint in Haveli could be met for children aged 6–8 months when the 5th-95th percentiles were used because more food items were included with higher food frequencies. As a result, it is likely that fewer problem nutrients were identified for Haveli using the 5th–95th percentiles than would have been identified using the 10th–90th percentiles.

Serving sizes of most food items increased with age, which was expected. Optifood selects FBRs from the relatively small available list of food items. When serving sizes are small, Optifood is not likely to select those items. For example few vegetables are on the list and they appear in small serving sizes. The program is not likely to choose these food items. The combination of nutrient content, serving size and frequency consumed all have impacts on the final selected set of FBRs. Different sets of FBRs may be developed all reaching the same number of adequate nutrients. To select the final best set of FBRs might become a subjective process based on multiple assumptions.

A relatively large number of nutrients were identified as problem nutrients within all target groups, at an average of 54–69 per cent per age group. The identified APNs and PPNs within the baseline diet were similar between target groups, which is expected since the food list and frequencies and portion sizes of the food items consumed were very similar. The average amount of problem nutrients per age group within the baseline diet increased with age. The existing differences in problem nutrients within the baseline diet between the different age groups are probably due to differences in type and quantity of food items consumed, like breastmilk, infant milk and cereals. Nutrient inadequacy for folate in children aged 12–23 months might also be explained due to the significant differences in RNI value between children aged 6–11 months (80 µg Dietary Folate Equivalent per day) and children aged 12–23 months (150 µg Dietary Folate Equivalent per day).

Similar FBRs were selected for different districts since the identified problem nutrients and food lists were similar. Differences between FBRs are probably due to the differences in food items within the food list. For example **eggs appeared as a recommendation for all areas except Balochistan and Sindh where eggs did not appear in the food list.**

Differences in recommendations, especially between the age groups, were likely due to the differences within the food list and the differences in serving/week per food item. It is seen that children aged 6–8 months and 9–11 months often consumed infant milk and cereals, while children aged 12–23 months often consumed eggs and grain products. Therefore the set of FBRs differs between the age groups.

It is seen that essential micronutrients were lacking in the baseline diet for all target groups, but that dietary adequacy for all three age groups could be improved with the introduction of FBRs to the diet (Appendix IV). Most of the PPNs were able to reach 70 per cent RNI in the worst-case scenario when FBRs were included to optimize the diet. However, all **APNs (primarily vitamin A, iron and zinc) were not able to reach nutrient adequacy in all target groups when FBRs were included in the diet** and remained APNs. **Food products high in vitamin A, iron and zinc, like meat, fish and green leafy vegetables, did not or barely appeared in the food list** available to Optifood. If this food item did occur in the food list, the serving sizes were often small. Therefore, it is likely that vitamin A, iron and zinc remain problem nutrients when FBRs are introduced to meet the optimized modelled diet.

Key problem nutrients in children aged 6–23 months in Pakistan	
Absolute problem nutrients	**Partial problem nutrients**
Vitamin A	Vitamin B1
Iron	Vitamin B3
Zinc	Vitamin B6
Folate (12–23 months)	Folate (6–11 months) Vitamin B12 (12–23 months)

Strengths and limitations of the study

A major strength of the study is the large number of participants involved and the use of nationwide sampling. Children aged 6–23 months from all target districts are represented in large numbers. Therefore the outcomes may be generalized nationwide. Optifood is a good, objective tool to develop and predict the potential impact of introducing FBRs on nutrient adequacy while staying close to the local diet. However, many assumptions were made concerning the input data and parameters for Optifood. These assumptions may have led to deviations from the actual diet. For example, an assumption that might have caused deviation from the actual diet is the incomplete updated Pakistan FCT. In the absence of food composition values in the Pakistan FCT, alternative sources from other countries were used. Furthermore, the use of standardized recipes and the assumed reference breastmilk intake might lead to deviation from the actual diet.

The limitations of the method should also be taken into account. A single 24-hour recall might not be considered representative of habitual diet at an individual level. Furthermore, social desirability bias and recall bias might have occurred. The impact of these limitations on the outcome of the study cannot be quantified.

4

Recommendations

Multiple problem nutrients exist in the modelled diet of children aged 6–23 months in Pakistan. Optimizing the diet with FBRs as calculated by Optifood based on available input, may help to reach nutrient adequacy for most PPNs: generally, these are calcium, vitamins B1, B3 and B6, and folate.

Selected FBRs were similar between the target groups and included a combination of recommendations on eggs, dairy products, infant milk, milk products, grains, roti and cereals. It is recommended to test the feasibility of selected FBRs locally, for example with local nutritionists and mothers. Selected FBRs should be evaluated against increased diet costs. Too-high costs may become a barrier for healthy food choices.

Incorporating FBRs might lead to nutrient adequacy for most PPNs, however APNs do not reach adequate levels even when FBRs are introduced. Therefore, it is recommended to consider investigating and introducing non-food supplementation programmes to reach adequate nutrient levels for the identified APNs: vitamin A, iron and zinc for children aged 6–23 months, and folate for children aged 12–23 months in Pakistan.

Recommendations
Food-based recommendations
• Eggs, dairy products, milk products, grains, roti and cereals. • Most of the problem nutrients reach 70 per cent of RNI after food-based recommendations are included, except for vitamin A, iron and zinc for children aged 6–23 months and folate for children aged 12–23 months.
Non-food-based recommendations
• Non-food supplementation programmes are recommended for vitamin A, iron and zinc for children aged 6–23 months and folate for children aged 12–23 months.

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Appendices

Appendix I: WHO/FAO recommended nutrient intake for children aged 6–23 months

Table 3: WHO/FAO recommended nutrient intake values for children aged 6–23 months

Recommended nutrient intake (RNI) values		
Nutrient	**Children 6-11 months**	**Children 12-23 months**
Calcium (mg/day)	400	500
Vitamin C (mg/day)	30	30
Thiamin (mg/day)	0.3	0.5
Riboflavin (mg/day)	0.4	0.5
Niacin (mg/day)	4	6
Vitamin B-6 (mg/day)	0.3	0.5
Folate (µg Dietary Folate Equivalent/day)	80	150
Vitamin B-12 (µg /day)	0.7	0.9
Vitamin A (µg Retinol Activity Equivalents/day)	400	400
Iron 5% (mg/day)	18.6	11.6
Zinc low (mg/day)	8.4	8.3

Appendix II: Foods consumed by children in Pakistan

Table 4: Foods consumed by children aged 6–23 months in Pakistan

	Food	Group	Sub Group
1	Ghee	Added fats	Butter,ghee,margarine (unfortified)
2	Sugar white	Added sugars	Sugar (non-fortified)
3	Cereal	Bakery & breakfast cereals	Ready-to-eat (RTE) cereals, fortified
4	Dalia[1]	Bakery & breakfast cereals	Ready-to-eat (RTE) cereals, fortified
5	Bread	Bakery & breakfast cereals	Refined grain bread, unenriched/unfortified
6	Biscuits	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified
7	Cake	Bakery & breakfast cereals	Sweetened bakery products, unenriched/unfortified
8	Banana shake	Beverages (non-dairy or blended dairy)	Fruit/dairy-containing blended beverages
9	Green tea	Beverages (non-dairy or blended dairy)	Brewed tea,herbal infusions (w/wo sugar or milk)
10	Tea	Beverages (non-dairy or blended dairy)	Brewed tea,herbal infusions (w/wo sugar or milk)
11	Shezan juice[2]	Beverages (non-dairy or blended dairy)	Juices - commercial, pure, other
12	Cream	Dairy products	Cream,sour cream
13	Milk buffalo	Dairy products	Fluid or powdered milk (non-fortified)
14	Milk goat	Dairy products	Fluid or powdered milk (non-fortified)
15	Milkpak[3]	Dairy products	Fluid or powdered milk (non-fortified)

	Food	Group	Sub Group
16	Milk cow dried whole	Dairy products	Fluid or powdered milk (non-fortified)
17	Lactogen 1[4]	Dairy products	Infant formula (fortified)
18	Lactogen 2[4]	Dairy products	Infant formula (fortified)
19	Lactogen 3[4]	Dairy products	Infant formula (fortified)
20	Apple	Fruits	Other fruit
21	Banana	Fruits	Other fruit
22	Guava	Fruits	Vitamin C-rich fruit
23	Orange	Fruits	Vitamin C-rich fruit
24	Mix fruits	Fruits	Other fruit
25	Noodles	Grains & grain products	Refined grains and products, unenriched/unfortified
26	Paratha[5]	Grains & grain products	Refined grains and products, unenriched/unfortified
27	Roti[6]	Grains & grain products	Refined grains and products, unenriched/unfortified
28	Vermicelli	Grains & grain products	Refined grains and products, unenriched/unfortified
29	Wheat flour	Grains & grain products	Refined grains and products, unenriched/unfortified
30	white Rice	Grains & grain products	Refined grains and products, unenriched/unfortified
31	Semolina	Grains & grain products	Whole grains and products, unenriched/unfortified
32	Breastfeed	Human milk	Breastmilk
33	Almond	Legumes,nuts & seeds	Nuts,seeds,and unsweetened products
34	Kidney beans cooked	Legumes,nuts & seeds	Cooked beans,lentils,peas
35	Lentil cooked	Legumes,nuts & seeds	Cooked beans,lentils,peas
36	Mung bean cooked	Legumes,nuts & seeds	Cooked beans,lentils,peas
37	Eggs	Meat,fish & eggs	Eggs
38	Beef	Meat,fish & eggs	Red meat
39	Chicken meat	Meat,fish & eggs	Poultry, rabbit
40	Potato chips	Savoury snacks	Savoury snacks, salted,spiced,fried
41	Potatoes	Starchy roots & other starchy plant foods	Other starchy plant foods
42	Candy	Sweetened snacks & desserts	Sweet snack foods (candy and chocolate)
43	Chocolate	Sweetened snacks & desserts	Sweet snack foods (candy and chocolate)
44	Coriander	Vegetables	Condiment vegetables
45	Onion	Vegetables	Condiment vegetables
46	Tomatoes	Vegetables	Other vegetables
47	Mix vegetables	Vegetables	Vitamin A source dark green leafy vegetables

[1] Porridge.
[2] Popular brand of fruit juices and juice drinks.
[3] Popular brand of UHT milk.
[4] Popular brand of infant formula for children aged 0–6 months, 6+ months and 12+ months respectively.
[5] Flatbread made of wheat flour and oil.
[6] Flatbread made of wheat flour.

Appendix III: Characteristic foods consumed by children in Pakistan

Table 5: Characteristic foods consumed in Balochistan

Balochistan												
	6-8 months				9-11 months				12-23 months			
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Added fats												
Ghee	1	17	0	7	3	29	0	7	15	63	0	7
Added sugars												
Sugar (white)	3	11	0	7	11	19	0	7				
Bakery & breakfast cereals												
Cereal	26	26	0	7	37	25	0	7	44	9	0	7
Bread									75	11	0	7
Biscuits	3	15	0	7	3	26	0	6	11	29	0	6
Cake					3	5	0	1	15	8	0	2
Beverages (non-dairy or blended dairy)												
Green tea					85	5	0	1				
Tea	67	34	0	7	78	49	0	6	191	61	0	7
Dairy products												
Cream	3	11	0	7	11	16	0	7				
Milk (buffalo)	295	6	0	1	528	9	0	1	133	8	0	1
Milk (goat)									220	5	0	1
Milkpak	200	24	0	6	125	40	0	6	200	35	0	5
Milk (cow dried whole)	305	5	0	2	405	8	0	4	261	9	0	7
Lactogen 1	200	10	0	5	270	8	0	4				
Fruits												
Apple									29	9	0	2
Banana					39	7	0	7	44	17	0	4
Grains & grain products												
Paratha									23	5	0	1
Roti	28	14	0	6	28	37	0	11	165	73	0	13
Rice (white)	6	18	0	8	25	35	0	10	122	39	0	7
Human milk												
Breastmilk	617	64	6.9	7.1	565	50	6.9	7.1	512	42	6.9	7.1
Legumes, nuts & seeds												
Almonds					2	16	0	7				
Savoury snacks												
Potato chips									2	16	0	7
Starchy roots & other starchy plant foods												
Potatoes	20	18	0	7	20	18	0	7	76	49	0	7
Vegetables												
Coriander									1	60	0	7
Onions	1	17	0	7	6	24	0	7	23	60	0	7
Tomatoes	1	17	0	7	6	24	0	7	23	59	0	7

[1] Serving size in grams. [2] Percentage of children consuming the food item. [3] Minimum servings/week. [4] Maximum servings/week.

Table 6: Characteristic foods consumed in Islamabad

Islamabad												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Added fats												
Ghee	1	40	0	7	2	65	0	7	2	71	0	7
Bakery & breakfast cereals												
Cereal	18	54	0	7	26	20	0	7				
Bread									18	14	0	7
Biscuits	3	29	0	5	11	37	0	6	11	43	0	6
Cake	12	10	0	2	12	9	0	1	12	8	0	1
Beverages (non-dairy or blended dairy)												
Tea					55	28	0	7	78	55	0	6
Shezan Juice									67	15	0	7
Dairy products												
Milk buffalo	75	21	0	4	110	28	0	4	110	22	0	3
Milk pack	125	12	0	2	125	24	0	3	125	37	0	4
Milk cow dried whole									200	5	0	2
Lactogen 1								4				
Lactogen 2	125	14	0	7	230	7	0	4				
Lactogen 3					188	7	0		125	14	0	5
Fruits												
Apple	7	6	0	1	29	9	0	2	29	11	0	2
Banana	39	35	0	6	39	22	0	5	55	26	0	5
Guava									75	5	0	3
Grains & grain products												
Paratha					53	6	0	1	53	9	1	1
Roti	28	27	0	5	28	63	0	10	28	75	5	9
White rice	8	8	0	2	25	17	0	3	32	29	2	4
Human milk												
Breastfeed	617	90	6.9	7.1	565	65	6.9	7.1	512	22	6.9	7.1
Legumes, nuts & seeds												
Kidney beans cooked									9	6	0	3
Lentil cooked	3	6	0	7	5	13	0	4	11	9	0	4
Mung bean cooked					15	7	0	2				
Meat, fish & eggs												
Eggs	19	17	0	7	13	30	0	7	29	31	0	7
Beef					15	13	0	7				
Chicken meat					12	11	0	7	5	11	0	7
Savoury snacks												

Islamabad												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Potato chips	2	12	0	7	9	20	0	7	10	45	0	7
Starchy roots & other starchy plant foods												
Potatoes	4	17	0	7	14	32	0	7	14	48	0	7
Sweetened snacks & desserts												
Candy					2	13	0	4	3	11	0	3
Chocolate					6	13	0	4	6	15	0	4
Vegetables												
Onion	1	25	0	7	2	43	0	7	5	62	0	7
Tomatoes	1	21	0	7	1	35	0	7	5	62	0	7
Mix vegetables									80	9	0	7

[1] Serving size in grams
[2] Percentage of children consuming the food item.
[3] Minimum servings/week
[4] Maximum servings/week

Table 7: Characteristic foods consumed in Khyber Agency (tribal districts of Khyber Pakhtunkhwa)

Khyber Agency (tribal districts of Khyber Pakhtunkhwa)												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Added fats												
Ghee			0	7	4	59	0	7	6	78	0	7
Added sugars												
Sugar (white)					11	22	0	7	16	11	0	7
Bakery & breakfast cereals												
Cereal	38	41	0	7	38	15	0	7				
Biscuits	3	34	0	6	11	24	0	7	15	32	0	5
Cake	2	5	0	1					3	9	0	2
Beverages (non-dairy or blended dairy)												
Tea	55	26	0	7	78	57	0	7	115	59	0	7
Dairy products												
Cream					11	21	0	7				
Milk goat	220	11	0	2	220	15	0	2	220	5	0	1
Milk pack	250	26	0	5	189	36	0	5	250	32	0	6
Milk cow dried whole	500	12	0	5	375	12	0	7	225	22	0	7

Khyber Agency (tribal districts of Khyber Pakhtunkhwa)												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Lactogen 1	310	7	0	2								
Fruits												
Apple	4	11	0	4	4	22	0	4	4	21	0	4
Banana	10	9	0	3	10	16	0	3	39	18	0	3
Grains & grain products												
Paratha					53	20	0	3	53	23	0	4
Roti	55	31	0	9	28	63	0	11	28	75	0	12
Rice (white)	29	16	0	5	13	39	0	7	32	29	0	5
Human milk												
Breastfeed	617	41	6.9	7.1	565	19	6.9	7.1	512	21	6.9	7.1
Legumes, nuts & seeds												
Almond					2	21	0	7				
Mung bean cooked									26	7	0	7
Meat, fish & eggs												
Eggs	19	14	0	7	45	40	0	7	45	34	0	7
Beef	60	12	0	7	86	10	0	7	27	9	0	7
Chicken meat					75	17	0	7	75	21	0	7
Savoury snacks												
Potato chips					8	20	0	7	6	21	0	7
Starchy roots & other starchy plant foods												
Potatoes	21	24	0	7	29	50	0	7	29	61	0	7
Vegetables												
Onion	8	24	0	7	8	54	0	7	12	69	0	7
Tomatoes	6	20	0	7	8	50	0	7	12	65	0	7

[1] Serving size in grams
[2] Percentage of children consuming the food item.
[3] Minimum servings/week
[4] Maximum servings/week

Table 8: Characteristic foods consumed in Gilgit (GB)

Gilgit (GB)												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Added fats												
Ghee	9	59	0	7	3	79	0	7	5	87	0	7
Added sugars												
Sugar white	15	18	0	7	13	19	0	7	9	16	0	7
Bakery & breakfast cereals												
Cereal	40	30	0	7	31	18	0	7	26	13	0	7
Biscuits					11	8	0	3	3	5	0	2
Cake					12	9	0	4	12	8	0	4
Beverages (non-dairy or blended dairy)												
Banana shake	160	11	0	7								
Green tea									73	6	0	3
Tea									55	6	0	4
Dairy products												
Milk pack	160	72	0	7	210	62	0	7	250	59	0	7
Milk cow dried whole					250	7	0	7				
Lactogen 2	180	5	0	7								
Fruits												
Apple					41	7	0	1	44	7	0	1
Banana	125	29	0	7					55	35	0	6
Orange									99	9	0	7
Grains & grain products												
Noodles									251	5	0	1
Paratha					26	8	0	2	46	7	0	1
Roti	110	47	0	9	28	72	0	14	23	83	4	12
Vermicelli									220	5	0	1
Wheat flour	18	5	0	1					10	8	0	1
White rice	80	19	0	4	32	28	0	6	32	33	2	5
Semolina					26	11	0	7				
Human milk												
Breastfeed	617	95	6.9	7.1	565	85	7	7.1	512	62	6.9	7.1
Meat, fish & eggs												
Eggs					19	15	0	7	45	14	0	7
Savoury snacks												
Potato chips					10	12	0	7	10	20	0	7
Starchy roots & other starchy plant foods												

Gilgit (GB)												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Potatoes	52	40	0	7	14	61	0	7	15	75	0	7
Sweetened snacks & desserts												
Candy									8	6	0	3
Chocolate									6	7	0	4
Vegetables												
Onion	16	48	0	7	6	73	0	7	8	81	0	7
Tomatoes	16	45	0	7	6	69	0	7	8	81	0	7

[1] Serving size in grams
[2] Percentage of children consuming the food item.
[3] Minimum servings/week
[4] Maximum servings/week

Table 9: Characteristic foods consumed in Haveli (AJK)

Haveli (AJK)												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Added fats												
Ghee	1	7	0	7	3	21	0	7	6	61	0	7
Added sugars												
Sugar (white)	2	7	0	7	8	17	0	7				
Bakery & breakfast cereals												
Cereal	5	7	0	7	56	13	0	7				
Biscuits					11	8	0	3	15	18	0	7
Cake					18	11	0	4				
Beverages (non-dairy or blended dairy)												
Tea					55	13	0	7	55	34	0	7
Dairy products												
Cream					8	13	0	7				
Milk buffalo	154	16	0	7	180	25	0	7	211	39	0	7
Milk pack	165	29	0	7	205	47	0	7	210	64	0	7
Lactogen 1	248		0	7	305	9	0	7				
Fruits												
Apple									60	8	0	2
Banana	32	6	0	7	55	13	0	7	55	18	0	5
Grains & grain products												

Haveli (AJK)												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Roti	14	7	0	7	21	18	0	6	28	53	0	10
Rice (white)	5	8	0	7	32	27	0	8	46	53	0	10
Human milk												
Breastfeed	617	88	6.9	7.1	678	81	6.9	7.1	512	42	6.9	7.1
Legumes, nuts & seeds												
Almond					1	13	0	7				
Meat, fish & eggs												
Eggs					19	15	0	7	45	11	0	7
Savoury snacks												
Potato chips									10	23	0	7
Starchy roots & other starchy plant foods												
Potatoes									14	32	0	7
Vegetables												
Onion	4	6	0	7	5	19	0	7	9	58	0	7
Tomatoes	4	6	0	7	5	19	0	7	9	57	0	7

[1] Serving size in grams

[2] Percentage of children consuming the food item.

[3] Minimum servings/week

[4] Maximum servings/week

Table 10: Characteristic foods consumed in Khyber Pakhtunkhwa (KP)

Khyber Pakhtunkhwa												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Added fats												
Ghee	2	28	0	7	3	45	0	7	3	61	0	7
Added sugars												
Sugar white	8	10	0	7	8	14	0	7				
Bakery & breakfast cereals												
Cereal	18	24	0	7	26	13	0	7				
Biscuits	11	58	0	7	15	57	0	7	15	62	0	7
Cake	12	21	0	7	18	22	0	7	12	21	0	7
Beverages (non-dairy or blended dairy)												
Tea	85	10	0	7	110	25	0	7	115	62	0	7
Dairy products												

Khyber Pakhtunkhwa												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Milk goat									220	6	0	1
Milk pack	250	30	0	7	245	44	0	7	220	37	0	6
Milk cow dried whole					250	11	0	7				
Lactogen 1	125	10	0	7								
Fruits												
Banana	39	21	0	7	29	19	0	7	55	15	0	7
Grains & grain products												
Paratha					26	16	0	2	26	25	0	4
Roti	28	28	0	8	28	52	0	8	28	75	0	13
White rice	32	21	0	6	32	21	0	3	32	21	0	4
Human milk												
Breastfeed	617	41	6.9	7.1	565	42	6.9	7.1	512	18	6.9	7.1
Legumes, nuts & seeds												
Lentil cooked									11	8	0	7
Meat, fish & eggs												
Eggs	45	11	0	7	45	17	0	7	45	21	0	7
Savoury snacks												
Potato chips	10	20	0	7	15	42	0	7	24	59	0	7
Starchy roots & other starchy plant foods												
Potatoes	65	40	0	7	65	60	0	7	65	71	0	7
Sweetened snacks & desserts												
Candy	12	18	0	7	12	15	0	7	12	21	0	6
Chocolate									24	5	0	1
Vegetables												
Onion	3	17	0	7	6	33	0	7	6	53	0	7
Tomatoes	3	16	0	7	3	28	0	7	6	30	0	7

[1] Serving size in grams

[2] Percentage of children consuming the food item.

[3] Minimum servings/week

[4] Maximum servings/week

Table 11: Characteristic foods consumed in Punjab

Punjab												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Added fats												
Ghee	4	13	0	7	4	35	0	7	3	48	0	7
Added sugars												
Sugar white	4	14	0	7	3	28	0	7	11	17	0	7
Bakery & breakfast cereals												
Cereal	18	44	0	6	18	18	0	4	16	9	0	7
Biscuits	11	39	0	7	15	42	0	7	15	37	0	7
Dalia	4	5	0	1	4	10	0	2				
Beverages (non-dairy or blended dairy)												
Tea	35	12	0	7	78	34	0	7	78	35	0	7
Dairy products												
Cream					11	16	0	7	11	10	0	7
Milk buffalo	150	13	0	2	176	28	0	7	352	39	0	4
Milk goat	211	5	0	1								
Milk pack	125	36	0	5	61	45	0	7	74	32	0	3
Fruits												
Apple									7	6	0	1
Banana	15	27	0	7	55	28	0	6	55	23	0	4
Mix fruits					173	6	0	1	460	17	0	3
Grains & grain products												
Paratha					39	6	0	2	39	16	1	4
Roti	55	15	0	8	28	58	0	15	28	79	4	19
Vermicelli					53	6	0	2	75	6	0	2
White rice	8	13	0	6	26	37	0	10	28	43	2	10
Human milk												
Breastfeed	617	59	6.9	7.1	565	61	6.9	7.1	512	38	6.9	7.1
Legumes, nuts & seeds												
Almond					2	16	0	7	2	10	0	7
Meat, fish & eggs												
Eggs	45	52	0	7	38	41	0	7	45	43	0	7
Beef									15		0	7
Chicken meat					6	10	0	7				
Savoury snacks												
Potato chips					7	23	0	7	9	33	0	7
Starchy roots & other starchy plant foods												
Potatoes	92	14	0	7	65	28	0	7	52	31	0	7
Vegetables												

Punjab												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Onion					6	33	0	7	6	45	0	7
Tomatoes					6	32	0	7	6	45	0	7

[1] Serving size in grams
[2] Percentage of children consuming the food item.
[3] Minimum servings/week
[4] Maximum servings/week

Table 12: Characteristic foods consumed in Sindh

Sindh												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Added fats												
Ghee	3	21	0	7	3	51	0	7	4	64	0	7
Added sugars												
Sugar white	8	25	0	7	8	40	0	7	11	36	0	7
Bakery & breakfast cereals												
Cereal	38	60	0	6	26	23	0	5	38	9	0	4
Biscuits	11	66	0	7	15	63	0	6	15	38	0	5
Cake	3	21	0	7	18	11	0	1	18	16	0	2
Dalia	5	10	0	1	5	12	0	2	4	7	0	3
Beverages (non-dairy or blended dairy)												
Tea	55	40	0	7	78	81	0	7	78	90	0	7
Dairy products												
Cream					11	24	0	7	11	31	0	7
Milk buffalo	75	21	0	3	110	30	0	7	110	33	0	7
Milk pack	31	23	0	4	43	41	0	7	64	43	0	7
Fruits												
Banana	39	20	0	7	55	22	0	7				
Grains & grain products												
Roti	28	14	0	3	28	61	0	12	55	75	4	10
White rice	9	17	0	4	32	50	0	10	32	63	3	9
Human milk												
Breastfeed	617	61	6.9	7.1	565	48	6.9	7.1	512	35	6.9	7.1
Legumes, nuts & seeds												
Almond					2	24	0	7	2	31	0	7
Savoury snacks												

Sindh												
		6-8 months				9-11 months				12-23 months		
Food group/foods	S.S.[1]	%[2]	Min[3]	Max[4]	S.S.	%	Min	Max	S.S.	%	Min	Max
Potato chips	10	14	0	7	15	34	0	7	22	55	0	7
Starchy roots & other starchy plant foods												
Potatoes					65	34	0	7	20	51	0	7
Sweetened snacks & desserts												
Candy					12	11	0	4	25	24	0	5
Chocolate					24	7	0	3	24	12	0	2
Vegetables												
Onion	5	12	0	7	5	42	0	7	7	60	0	7
Tomatoes	5	12	0	7	5	42	0	7	7	60	0	7

[1] Serving size in grams
[2] Percentage of children consuming the food item.
[3] Minimum servings/week
[4] Maximum servings/week

Appendix IV: Percentage recommended nutrient intake in children's diets in Pakistan

Table 13: Percentage of recommended nutrient intake in the worst- and best-case scenarios in (a) baseline diet and (b) diet including food-based recommendations in Balochistan

Balochistan									
Nutrients	6-8 months			9-11 months			12-23 months		
	Baseline		With FBRs	Baseline		With FBRs	Baseline		With FBRs
	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case
Protein	134.1	226.5	147.9	116.9	251.5	188.8	135.4	337.2	294.8
Fat	131.2	191.6	157.1	104.4	202.8	155.3	75.4	202.6	144.5
Calcium	642	164.9	71.9	47.62	212	130.8	32.5[2]	255.5	196.1
Vit. C	106.1	236.1	164.7	94.9	290.1	134.6	84.2	247.3	154.6
Vit. B1	73.3	173.6	130.8	632	242.8	151.6	42.22	242	138.2
Vit. B2	119.3	244.5	159.5	101.2	312.4	172.7	77.4	373.3	294.2
Vit. B3	36.42	108.9	75.7	34.52	152.4	85	28.7[2]	238.5	75
Vit. B6	45.22	116.3	86.6	43. 22	180.5	78	35.5[2]	226.5	81.8
Folate	66.22	118.4	93.2	60.52	139.6	78.3	27.6	74[1]	48.4
Vit. B12	117.2	311.7	139.2	77.2	406.3	220.1	54.4[2]	481.3	357.2
Vit A	43.3	67.31	51.4	30.5	81[1]	55.9	27.4[2]	124.4	87.5
Iron	7.8	23.81	12.8	7.5	30.9[1]	17.7	11.3	61.5[1]	33.3
Zinc	21.2	441	37.2	20.1	55.7[1]	27.7	25.5	67.7[1]	55.7

[1]Absolute problem nutrient; not able to reach 100% of the RNI in the best-case scenario

[2] Partial problem nutrient; reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Table 14: Percentage of recommended nutrient intake in the worst- and best-case scenarios in (a) baseline diet and (b) diet including food-based recommendations in Gilgit (GB)

Gilgit (GB)									
Nutrients	6-8 months			9-11 months			12-23 months		
	Baseline		With FBRs	Baseline		With FBRs	Baseline		With FBRs
	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case
Protein	102.2	231.3	163.4	123.7	241.6	195.9	152	280.6	252.5
Fat	119.3	202.7	154.6	102.5	183.8	146.6	87.9	176.7	129.9
Calcium	48.8[2]	133.4	109.3	46.3[2]	182.2	137.9	36.4[2]	128.4	117.2
Vit. C	101.5	221.9	193.5	94.3	185.4	152.8	84.6	304.4	136.4
Vit. B1	47.9[2]	192.2	153	60.8[2]	235.6	151.1	68.8[2]	184.1	118.6
Vit. B2	79.5	219.2	181.8	84.9	271.6	194.1	93.8	219.1	192.9
Vit. B3	33.6[2]	169.2	56.72	36.9[2]	164.4	70.8	49.7[2]	133.5	70.5
Vit. B6	37.8[2]	213.9	90	47.9[2]	169.9	125.5	40.9[2]	135.4	92.8
Folate	62.4[2]	124.8	92.3	59.8[2]	128.3	87.3	33.3	79.9[1]	59.7[1]
Vit. B12	82.5	265.7	154.8	77.1	347.8	252.6	56.6[2]	283.8	260
Vit A	33	73.3[1]	58.4[1]	30.7	75.2[1]	57.4[1]	27.5	94.2[1]	74[1]
Iron	7.1	28.1[1]	25.4[1]	7.6	27.9[1]	22.8[1]	21.8	63.8[1]	441
Zinc	16.9	38.4[1]	32.9[1]	21.2	42.7[1]	33.5[1]	27	53.4[1]	41.1[1]

[1]Absolute problem nutrient; not able to reach 100% of the RNI in the best-case scenario

[2] Partial problem nutrient; reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Table 15: Percentage of recommended nutrient intake in the worst- and best-case scenarios in (a) baseline diet and (b) diet including food-based recommendations in Haveli (AJK)

Haveli (AJK)									
Nutrients	6-8 months			9-11 months			12-23 months		
	Baseline		With FBRs	Baseline		With FBRs	Baseline		With FBRs
	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case
Protein	135.3	206.4	137.7	117.2	219.5	162	188.1	302.2	299.2
Fat	152.6	199	165.5	123.1	211.1	137.6	115.4	207	173.8
Calcium	71	148.4	80.2	56.8[2]	167.8	106.7	57.5[2]	167.2	160.6
Vit. C	107.2	237.9	211.4	111.9	267.6	204.7	89.8	142.3	99.4
Vit. B1	71.8	136.9	110.3	57.82	215.9	194	56.3[2]	142.5	111.1
Vit. B2	125	201.5	170	102	231.1	153.6	115	237.7	210.4
Vit. B3	35.9[2]	74.4[1]	39.4	37.6[2]	114.1	87.7	27.5	91.9[1]	73.3

Haveli (AJK)									
Vit. B6	41.3[2]	104	83.8	31[2]	148.4	76.1	51.8[2]	162.2	76.1
Folate	73.9	119.3	106.1	72.4	138.9	74.9	40.5	78.6[1]	63.7
Vit. B12	131.8	258.4	156.8	92.3	313.8	169.8	118.3	331.8	314.5
Vit A	48	63.4[1]	56.9	37	78.7[1]	58	49.12	108	89.1
Iron	8.6	20.2[1]	17.7	8.9	32.8[1]	29.8	16.7	38.4[1]	28.9
Zinc	19.7	44[1]	39	19.8	49.6[1]	32.6	27.6	50.9[1]	35.9

[1]Absolute problem nutrient; not able to reach 100% of the RNI in the best-case scenario

[2] Partial problem nutrient; reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Table 16 : Percentage of recommended nutrient intake in the worst- and best-case scenarios in (a) baseline diet and (b) diet including food-based recommendations in Islamabad

Islamabad									
Nutrients		6-8 months		9-11 months			12-23 months		
	Baseline		With FBRs	Baseline		With FBRs	Baseline		With FBRs
	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case
Protein	149.7	199.1	174.3	143.3	214.2	162.9	174.7	325.4	223
Fat	138.6	185.4	161.7	115	191.6	133.4	102.5	174	139.7
Calcium	67.9[2]	127.5	105	48.9[2]	173.1	94.2	59.6[2]	209.6	145.7
Vit. C	114.4	203	142.1	95.4	241.1	150.4	93.8	692.6	454.8
Vit. B1	85.9	170.6	125.2	71.5	226.5	166.4	79.2	181	140.5
Vit. B2	122.1	219.3	167.4	114.5	277.4	173.1	133.7	308.2	233.7
Vit. B3	36.7	95.4[1]	70.3	35.8	164.5	101.2	48.4[2]	119.5	73.9
Vit. B6	60.9[2]	114.3	83.4	68.7[2]	175	128.3	64.8[2]	183.7	129.1
Folate	71.4	120.3	89	62.1[2]	137	87.4	40[2]	102.6	75.8
Vit. B12	113.4	205.8	159.5	83.9	275.6	114.1	71.6	375.9	171.5
Vit A	43.6	68.8[1]	52.6	32.1	80.7[1]	47.5	43.3[2]	240.1	76
Iron	11.5	26.4[1]	14.6	8.9	34.5[1]	18.9	17.5	77.4[1]	49.9
Zinc	24.1	36.8[1]	28.7	25.8	65.7[1]	39.4	35.6	91.4[1]	68.5

[1]Absolute problem nutrient; not able to reach 100% of the RNI in the best-case scenario

[2] Partial problem nutrient; reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Table 17: Percentage of recommended nutrient intake in the worst- and best-case scenarios in (a) baseline diet and (b) diet including food-based recommendations in Khyber Agency (tribal districts of Khyber Pakhtunkhwa)

Khyber Agency (tribal districts of Khyber Pakhtunkhwa)									
Nutrients	6-8 months			9-11 months			12-23 months		
	Baseline		With FBRs	Baseline		With FBRs	Baseline		With FBRs
	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case
Protein	133.7	255.8	170.4	115.9	351.7	220.3	158.2	419.9	336.5
Fat	123.7	203.9	136.1	108.7	231.4	157.8	103.9	213.2	174.6
Calcium	48.8[2]	166.3	70.8	46.2[2]	213.4	148.2	36.1[2]	255.5	218.6
Vit. C	101.5	239.9	138.5	92.9	193.5	162.8	84.5	147.5	107.3
Vit. B1	56.72	193.3	160.3	482	236.7	173.4	40.52	151	84.9
Vit. B2	105.5	244.5	127	89.7	312.4	208.6	91.4	373.3	327.6
Vit. B3	36.4[2]	164.7	105.2	31.4[2]	276	76.8	25.2[2]	215.4	35.9[2]
Vit. B6	52[2]	148.3	74.1	46.2[2]	210	101	522	174.2	83.6
Folate	62.52	125	71.6	57.92	129.5	93.5	31.3	85.3[1]	72
Vit. B12	82.7	375	130.4	76	498.8	261	55.42	504.9	447.6
Vit A	33	76[1]	46	30.2	94.3[1]	74.2	27.7[2]	123.3	107.2
Iron	7.3	27.3[1]	17.2	7.4	35[1]	27.6	13.5	61.3[1]	28.3
Zinc	22.3	44[1]	28.5	22.3	43.7[1]	34.1	31.6	66.7[1]	50.4

[1]Absolute problem nutrient; not able to reach 100% of the RNI in the best-case scenario

[2] Partial problem nutrient; reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Table 18: Percentage of recommended nutrient intake in the worst- and best-case scenarios in (a) baseline diet and (b) diet including food-based recommendations in Khyber Pakhtunkhwa

Khyber Pakhtunkhwa									
Nutrients	6-8 months			9-11 months			12-23 months		
	Baseline		With FBRs	Baseline		With FBRs	Baseline		With FBRs
	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case
Protein	111.2	238.2	147.9	108.1	268.6	232.2	154	272.8	248.3
Fat	119.8	196.3	165.6	103.8	197	159.5	99.2	183.5	130.8
Calcium	49.6[2]	138.7	77.7	47[2]	212	134.4	37.9[2]	108.8	94
Vit. C	101.4	238.4	207.8	93.1	197	101.7	87.8	169.2	93
Vit. B1	47[2]	195.4	130.6	47.1[2]	246.4	115.1	48.3[2]	157.8	106.3
Vit. B2	86.6	214.8	173.3	89.3	312.4	231.9	95.8	219.2	169.3

Khyber Pakhtunkhwa									
Vit. B3	33.4[2]	125.8	63.3[2]	32.7[2]	144.1	64.2[2]	36[2]	128.3	85.8
Vit. B6	25.7[2]	172.7	94.6	34.2[2]	193.5	86.5	64[2]	162.5	98.8
Folate	63.9[2]	132.4	106.2	60.5[2]	139.5	102.2	37	86.4[1]	55.9
Vit. B12	82.5	306.5	153.3	76	408.1	312.3	55[2]	242.7	204
Vit A	33	76.8[1]	55.9	30.2	90.8[1]	72.2	27.7	82.9[1]	64.1
Iron	7.8	25.2[1]	16.7	7.8	31.7[1]	13.9	17.6	50.1[1]	32.8
Zinc	18.1	44[1]	40.9	19.7	42.2[1]	36.2	33.7	51.8[1]	41.6

[1]Absolute problem nutrient; not able to reach 100% of the RNI in the best-case scenario

[2] Partial problem nutrient; reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Table 19: Percentage of recommended nutrient intake in the worst- and best-case scenarios in (a) baseline diet and (b) diet including food-based recommendations in Punjab

Punjab									
Nutrients		6-8 months		9-11 months				12-23 months	
	Baseline		With FBRs	Baseline		With FBRs	Baseline		With FBRs
	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case
Protein	129.9	226	208.8	114.8	234.3	229.3	121.5	293.9	267.5
Fat	122.3	200.9	158.8	101.3	217.9	179.7	77.4	201.8	156.2
Calcium	48.8[2]	121.1	76.2	45.5[2]	158.5	133.3	33.7[2]	135.5	127.1
Vit. C	101.9	184.3	104.7	92.9	188.8	100.6	85	265.5	119.8
Vit. B1	69.5[2]	201.1	122.8	53.5[2]	256.6	127.1	49.8[2]	171.9	122.2
Vit. B2	101.4	195.4	151.5	87.1	215.2	178.8	78.7	194.7	167.4
Vit. B3	34.9[2]	158	87.7	32.6[2]	183.2	76.3	40.12	156.6	77.9
Vit. B6	39.8[2]	161	78.5	31.6[2]	235.3	79.5	41.8[2]	255	76.7
Folate	62.5[2]	126.9	96.3	58.4[2]	131.5	99.1	30	72.9[1]	54
Vit. B12	82.6	266.2	190.2	76	323.2	268.6	54.5[2]	306.4	240.5
Vit A	33	78[1]	57	30.2	89.5[1]	70.5	27.4[2]	120.4	81.5
Iron	7.4	24.3[1]	14.3	7.4	26.9[1]	14.4	16.2	57[1]	37.2
Zinc	20.7	33[1]	28	19.3	42.5[1]	27.8	26.1	55.3[1]	39

[1]Absolute problem nutrient; not able to reach 100% of the RNI in the best-case scenario

[2] Partial problem nutrient; reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Table 20: Percentage of recommended nutrient intake in the worst- and best-case scenarios in (a) baseline diet and (b) diet including food-based recommendations in Sindh

Sindh									
Nutrients		6-8 months			9-11 months			12-23 months	
	Baseline		With FBRs	Baseline		With FBRs	Baseline		With FBRs
	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case	Worst-case	Best-case	Worst-case
Protein	123.5	176.6	174.6	107.1	199.6	176.9	133.6	242.3	201.1
Fat	129	180.8	148.7	101.4	210.2	146.9	86.4	185.5	122
Calcium	54.4[2]	105.6	99.4	46[2]	136.6	113.3	34.92	115.7	104.1
Vit. C	105.3	182.1	157.7	93.5	194.3	110.8	86.6	161.4	127.1
Vit. B1	57[2]	197	161.1	50.2[2]	252.9	121.9	63.1[2]	188.9	113.4
Vit. B2	102.1	166.8	142.4	90.2	196.5	144	82.3	180.2	138.5
Vit. B3	44.4	94.6[1]	84.6	33.1[2]	161.4	70.8	56.6[2]	146.7	72.5
Vit. B6	39.1[2]	102.4	77	28.7[2]	228.4	101.3	51.6[2]	155.5	95.5
Folate	66.2	92.6[1]	71.3	59.9[2]	115.9	72.6	29.8	55.9[1]	38.3
Vit. B12	89.7	186.7	164.5	76	248.1	191.8	54.4[2]	204.8	171.8
Vit A	37.5	62.31	51.1	30.2	701	50.7	27.4	72.4[1]	54.9
Iron	8.4	23.4[1]	20.7	7.5	24[1]	11.8	16.2	46.4[1]	31.7
Zinc	20.7	31.4[1]	29.9	18.9	41.9[1]	32.5	30	54.6[1]	42.1

[1]Absolute problem nutrient; not able to reach 100% of the RNI in the best-case scenario

[2] Partial problem nutrient; reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Appendix V: Problem nutrients in children's diets in Pakistan

Table 21: Problem nutrients in (a) baseline diet and (b) diet including food-based recommendations in Balochistan

	Balochistan					
	6-8 months		9-11 months		12-23 months	
Nutrients	Baseline	With FBRs	Baseline	With FBRs	Baseline	With FBRs
	PN=7	PN=3	PN=8	PN=3	PN=8	PN=4
Protein						
Fat						
Calcium						
Vit. C						
Vit. B1						
Vit. B2						
Vit. B3						
Vit. B6						
Folate						
Vit. B12						
Vit A						
Iron						
Zinc						

Adequate Nutrient; able to reach 100% of the RNI in the best-case scenario and 70% in of the RNI in the worst-case scenario

Partial Problem Nutrient (PPN); reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Absolute Problem Nutrient (APN); not able to reach 100% of the RNI in the best-case scenario

Table 22: Problem nutrients in (a) baseline diet and (b) diet including food-based recommendations in Gilgit (GB)

	Gilgit (GB)					
	6-8 months		9-11 months		12-23 months	
Nutrients	Baseline	With FBRs	Baseline	With FBRs	Baseline	With FBRs
	PN=8	PN=4	PN=8	PN=3	PN=9	PN=4
Protein						
Fat						
Calcium						
Vit. C						
Vit. B1						
Vit. B2						
Vit. B3						
Vit. B6						
Folate						
Vit. B12						
Vit A						
Iron						
Zinc						

Adequate Nutrient; able to reach 100% of the RNI in the best-case scenario and 70% in of the RNI in the worst-case scenario

Partial Problem Nutrient (PPN); reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Absolute Problem Nutrient (APN); not able to reach 100% of the RNI in the best-case scenario

Table 23: Problem nutrients in (a) baseline diet and (b) diet including food-based recommendations in Haveli (AJK)

	Haveli (AJK)					
	6-8 months		9-11 months		12-23 months	
Nutrients	Baseline	With FBRs	Baseline	With FBRs	Baseline	With FBRs
	PN=5	PN=4	PN=7	PN=3	PN=8	PN=4
Protein						
Fat						
Calcium						
Vit. C						
Vit. B1						
Vit. B2						
Vit. B3						
Vit. B6						
Folate						
Vit. B12						
Vit A						
Iron						
Zinc						

Adequate Nutrient; able to reach 100% of the RNI in the best-case scenario and 70% in of the RNI in the worst-case scenario

Partial Problem Nutrient (PPN); reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Absolute Problem Nutrient (APN); not able to reach 100% of the RNI in the best-case scenario

Table 24: Problem nutrients in (a) baseline diet and (b) diet including food-based recommendations in Islamabad.

	Islamabad					
	6-8 months		9-11 months		12-23 months	
Nutrients	Baseline	With FBRs	Baseline	With FBRs	Baseline	With FBRs
	PN=6	PN=4	PN=6	PN=3	PN=7	PN=2
Protein						
Fat						
Calcium						
Vit. C						
Vit. B1						
Vit. B2						
Vit. B3						
Vit. B6						
Folate						
Vit. B12						
Vit A						
Iron						
Zinc						

Adequate Nutrient; able to reach 100% of the RNI in the best-case scenario and 70% in of the RNI in the worst-case scenario

Partial Problem Nutrient (PPN); reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Absolute Problem Nutrient (APN); not able to reach 100% of the RNI in the best-case scenario

Table 25: Problem nutrients in (a) baseline diet and (b) diet including food-based recommendations in Khyber Agency (tribal districts of Khyber Pakhtunkhwa)

	Khyber Agency (tribal districts of Khyber Pakhtunkhwa)					
	6-8 months		9-11 months		12-23 months	
Nutrients	Baseline	With FBRs	Baseline	With FBRs	Baseline	With FBRs
	PN=8	PN=3	PN=8	PN=3	PN=9	PN=4
Protein						
Fat						
Calcium						
Vit. C						
Vit. B1						
Vit. B2						
Vit. B3						
Vit. B6						
Folate						
Vit. B12						
Vit A						
Iron						
Zinc						

Adequate Nutrient; able to reach 100% of the RNI in the best-case scenario and 70% in of the RNI in the worst-case scenario

Partial Problem Nutrient (PPN); reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Absolute Problem Nutrient (APN); not able to reach 100% of the RNI in the best-case scenario

Table 26: Problem nutrients in (a) baseline diet and (b) diet including food-based recommendations in Khyber Pakhtunkhwa

	Khyber Pakhtunkhwa					
	6-8 months		9-11 months		12-23 months	
Nutrients	Baseline	With FBRs	Baseline	With FBRs	Baseline	With FBRs
	PN=8	PN=4	PN=8	PN=3	PN=9	PN=4
Protein						
Fat						
Calcium						
Vit. C						
Vit. B1						
Vit. B2						
Vit. B3						
Vit. B6						
Folate						
Vit. B12						
Vit A						
Iron						
Zinc						

Adequate Nutrient; able to reach 100% of the RNI in the best-case scenario and 70% in of the RNI in the worst-case scenario

Partial Problem Nutrient (PPN); reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Absolute Problem Nutrient (APN); not able to reach 100% of the RNI in the best-case scenario

Table 27: Problem nutrients in (a) baseline diet and (b) diet including food-based recommendations in Punjab

	Punjab					
	6-8 months		9-11 months		12-23 months	
Nutrients	Baseline	With FBRs	Baseline	With FBRs	Baseline	With FBRs
	PN=8	PN=3	PN=8	PN=3	PN=9	PN=3
Protein						
Fat						
Calcium						
Vit. C						
Vit. B1						
Vit. B2						
Vit. B3						
Vit. B6						
Folate						
Vit. B12						
Vit A						
Iron						
Zinc						

Adequate Nutrient; able to reach 100% of the RNI in the best-case scenario and 70% in of the RNI in the worst-case scenario

Partial Problem Nutrient (PPN); reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Absolute Problem Nutrient (APN); not able to reach 100% of the RNI in the best-case scenario

Table 28: Problem nutrients in (a) baseline diet and (b) diet including food-based recommendations in Sindh

	Sindh					
	6-8 months		9-11 months		12-23 months	
Nutrients	Baseline	With FBRs	Baseline	With FBRs	Baseline	With FBRs
	PN=8	PN=4	PN=8	PN=3	PN=9	PN=4
Protein						
Fat						
Calcium						
Vit. C						
Vit. B1						
Vit. B2						
Vit. B3						
Vit. B6						
Folate						
Vit. B12						
Vit A						
Iron						
Zinc						

Adequate Nutrient; able to reach 100% of the RNI in the best-case scenario and 70% in of the RNI in the worst-case scenario

Partial Problem Nutrient (PPN); reaches 100% of the RNI in the best-case scenario, but does not reach 70% in the worst-case scenario

Absolute Problem Nutrient (APN); not able to reach 100% of the RNI in the best-case scenario

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