Baseline Survey in Kapilvastu and Accham Districts for the Integrated Infant and Young Child Feeding and Micronutrient Powder (Baal Vita) Intervention in Nepal, 2012-2013

July 16, 2015
Revised February 18, 2016

Acknowledgements

We would like to express our sincere gratitude to New ERA for succefully completing the responsibility to conduct this survey.

We gratefully acknowledge District Public Health Officers, Nutrition focal persons and Cold-chain Officers at Kapilvastu and Achham District Health Offices for being an asset during the survey period. Special appreciation goes to health facility incharges, local health workers and Female Community Health Volunteers (FCHVs) in various communities of the selected district for logistical arrangements and support during the field work. Lastly but mostly, we would like to thank the survey participants who gave their time, knowledge and energy to participate in the survey.

The Government of Nepal, Ministry of Health and Population and UNICEF Nepal Country Office supported the implementation of the pilot intervention. UNICEF Nepal, with support from European Union, funded an external survey agency to conduct the monitoring surveys.

CDC supported funding of the internal monitoring of the intervention through Cooperative Agreement Number U50/CCU223771-04.

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Recommended citation

Ministry of Health and Population, UNICEF, European Union, CDC. Baseline Survey in Kapilvastu and Accham Districts for the Integrated Infant and Young Child Feeding and Baal Vita Micronutrient Powder Intervention in Nepal, 2012-2013. Kathmandu, Nepal: UNICEF, 2015.

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Abbreviations

AGP	Alpha-1-acid Glycoprotein
ASQ	Age Stages Questionnaire
CDC	U.S. Centers for Disease Control and Prevention
CHD	Child Health Division
CMAM	Community Management of Acute Malnutrition
CRP	C-reactive protein
DPHO	District Public Health Office
ECD	Early Childhood Development
EU	European Union
FCHV	Female Community Health Volunteers
GPS	Global Positioning System
IDA	Iron Deficiency Anemia
IU	International Unit
IYCF	Infant and Young Child Feeding
MDG	Millennium Development Goal
MNP	Micronutrient Powder
MRDR	Modified Relative Dose Response
MYCNSIA	Maternal and Young Child Nutrition Security Initiative in Asia
NDHS	Nepal Demogarphic and Health Suvey
NPHL	National Public Health Laboratory
NVAP	National Vitamin A Supplementation Program
ODF	Open Defecation Free
PPS	Population Proportion to Size
RTKs	Rapid Test Kits
RBP	Retinol Binding Protein
VDC	Village Development Committee
WFP	World Food Program
WHO	World Health Organization

Summary

Introduction

Child health and nutrition are public health problems in Nepal where 41% of children below five years of age are stunted, 29% are underweight, and 46% are anemic (MoHP, 2011). There are very limited data on other nutritional deficiencies among children, but it is likely that the prevalence of deficiency is high for multiple micronutrients.

Inappropriate infant and young child feeding (IYCF) practices contribute to undernutrition in the country; recent estimates show that 45% of mothers initiated breastfeeding within an hour of delivery (MoHP, 2011). Furthermore, 29% of children 6-23 months of age received the minimum dietary diversity and 24% received a minimum acceptable diet (MoHP, 2011) as per World Health Organization (WHO) guidelines (WHO, 2008). The WHO recommends micronutrient powder (MNP) home fortification in settings where the prevalence of anemia is greater than 20% in children less than two years or five years of age based on findings demonstrating their efficacy in reducing anemia and iron deficiency among young children in controlled trial settings (WHO, 2011). Accordingly, the Government of Nepal in collaboration with UNICEF designed and launched a pilot project of an integrated IYCF, MNP and early child development (ECD) intervention package in six districts starting in May 2010. The MNP product includes 15 vitamins and minerals and was branded as "Baal Vita" in Nepal. Sixty sachets of Baal Vita are provided to children 6-23 months for free through public distribution channels every six months. In 2013, the project was expanded to 9 additional districts, but prior to this expansion an evaluation was designed to take place in two of the 9 new districts: Kapilvastu and Achham. Kapilvastu is located in the terai eco-zone in the western region of the country and Achham is located in the hills ecozone in the far-western region of the country.

The evaluation design includes baseline (2012-2013) and follow-up (planned for 2015) cross-sectional population based household surveys of children 6 to 23 months of age. The objectives of the baseline survey are to assess the baseline nutritional and micronutrient status of children 6-23 months of age, as well as IYCF and ECD practices of families. The survey assessed the condition of anemia and status of iron, vitamin A, folate, vitamin B_{12} and zinc.

Survey Design

The baseline survey is a cross sectional population based household survey with two-stage cluster sampling in two districts: Kapilvastu and Achham. For the first stage of sampling, population proportion to size (PPS) sampling was used to select 40 clusters from Kapilvastu and 40 clusters from Achham. After selecting the clusters, a household census was conducted in all of the selected clusters in order to identify all children aged 6-23 months. For the second stage of sampling, a line-listing of the children 6-23 months was made from the census of each cluster and 34 children in each cluster in Kapilvastu and 32 children in each cluster in Achham were selected randomly. There was no replacement for refusals or for clusters with less than the needed number of children. The mother or caregiver of the children in those households was recruited as the main respondent. These were usually mothers and are referred to as such in the remainder of the report. Mothers were interviewed on various topics including the household background characteristics; water, sanitation and hygiene; household food security; knowledge and practices on IYCF; knowledge on micronutrients; and ECD practices.

Anthropometric (length and weight) measurements and venous blood specimens were collected from the selected children. The intravenous blood was colleted by the staff nurse and the hemoglobin level and malaria infection were measured in the field. The blood specimens were processed and transferred to the District Public Health Offices (DPHO) for storage until the end of data collection. At the end of the survey, all specimens from the DPHO were then transferred to the National Public Health Laboratory (NPHL) for storage. The specimens from NPHL were sent to the pre-identified laboratories outside the country for analyses.

Results

Household Population and Housing Characteristics

A total of 1,288 children in Kapilvastu and 1,261 children in Achham participated in the survey. The mean age of participating children was 14.1 months in Kapilvastu and 14.5 months in Achham; in both districts, 47% of the selected children were girls. In Achham, 66% of the selected children were ethnically from the Upper Caste and 32% of the children in Kapilvastu were from the disadvantaged Non-Dalit terai caste. In both districts, approximately 50% of mothers had no education, while close to 40% of fathers had received a secondary education.

Among the survey households, half of the households had 6 to 10 members, with an average of 8.2 persons in Kapilvaastu and 6.3 persons in Achham. Agriculture was the main source of household income in 80% household in Achham and 63% in Kapilvastu.

Among households in Kapilvastu, 77% had electricity, 95% had a bed, and 41% had a television. In Achham, 45% had electricity, 46% had a bed and 5% had a television. Eighty five percent had a mobile phone and 26% had a radio in Kapilvastu, as did 62% and 32%, respectively, in Achham.

In Kapilvastu, the main source of drinking water was tube well, and in Achham, it was piped water from a public or neighbor's tap. Almost seven in ten households in Kapilvastu and around one quarter in Achham did not have a toilet facility in their households. In Kapilvastu, soap was available in 68% and water in hand washing areas was observed in 86% of households; in Achham, soap was available in 62% and water in hand washing areas was observed in 37% of households. Bed-nets are essential in the terai where malaria is endemic; 81% of households in Kapilvastu had a bed-net and 9% of the households had one in Achham.

In Kapilvastu, 51% of households were food secure, as were 36% in Achham. The prevalence of severe food insecurity was 13% in Achham and 3% in Kapilvastu.

Community Programs and Interventions

In the last vitamin A/deworming campaign during the previous six months, 86% of children 6 to 59 months received a vitamin A supplement in Kapilvastu and 91% did so in Achham. The deworming coverage among children 12 to 59 months was 71% in Kapilvastu and 86% in Achham.

The participation in other community programs in the past 12 months in both districts was low. In Kapilvastu less than 10% and in Achham less then 15% of the households reported participating in community programs such as purchasing "two child" logo iodized salt, or participating in the child protection grant for disadvantaged families, community management for acute malnutrition (CMAM) using ready to use therapeutic foods (RUTFs, such as Plumpy Nut™), or nutritious flour for children. The participation in the open defecation free campaign (ODF) was 35% in Achham and 16% in Kapilvastu.

Prior to launching the IYCF/MNP program in Kapilvastu and Achham districts, 6% in Kapilvastu and 13% in Achham had heard of Baal Vita MNP. In Kapilvastu, mothers reported that 8 children had ever consumed Baal Vita, and in Achham, mothers reported 48 children had ever consumed it. Upon hearing about Baal Vita, over 99% of mothers in both districts said they would be willing to give it to their children.

Knowledge and Practice of Infant and Young Child Feeding

Fifty percent of the respondents in Kapilvastu and 64% in Achham reported the appropriate age to start complementary foods is at 6 months. The mean age reported by mothers that they introduced complementary foods to the selected child was 7.2 months in Kapilvastu and 5.8 months in Achham.

In both districts, a total of 44% of children were breastfed within one hour of birth. Early initiation of breastfeeding within one hour of birth was higher in Achham than Kapilvastu (54% vs 39%). Continued breastfeeding at 1 year was very high in both districts (96% in Kapilvastu and 99% in Achham) while continued breastfeeding at 2 year was 84% in Kapilvastu and 88% in Achham.

Among children 6 to 8 months of age, 81% in Achham and 64% in Kapilvastu achieved the World Health Organization (2008) indicator of timely introduction of complementary foods. Among the children 6-23 months, approximately one quarter received the minimum dietary diversity in both districts; 47% in Kapilvastu and 63% in Achham received the minimum meal frequency; and 15% in Kapilvastu and 19% in Achham received the minimum acceptable diet.

Knowledge about Micronutrients

In both Kapilvastu and Achham, the most commonly reported reason for the importance of dietary diversification was to get strength or to make the body strong. Eighty-three percent in Achham and 52% in Kapilvastu did not know any specific types of vitamins or minerals important for health. The most frequently reported sources of vitamin and minerals in both Kapilvastu and Achham were fruits, meat/fish/eggs and vegetables.

In Kapilvastu, 29% of mothers had heard of anemia, as did 16% in Achham. Among those who had heard of anemia, 73% in Kapilvastu and 88% in Achham knew that anemia is a disorder of the blood or lack of blood. About one-third of the respondents in both districts reported that a negative consequence of anemia is a decreased ability to learn. A higher proportion of respondents in Kapilvastu (87%) had heard of iron than compared to Achham (63%).

Early Childhood Development

In Kapilvastu, in 67% of the households both the mother and father were present in the three days prior to the interview and in the remaining one-third only the mother was present. In Achham, both mother and father were present in 49% of households, and in another half only the mother was present.

During the three days prior to the interview, no family members had told the selected child any stories in 72% of households in Kapilvastu and in 97% of households in Achham. In Kapilvastu, 42%, and in Achham, 57%, reported no one sang songs to the child; and over 90% in both districts reported no one named, counted or drew with the child. Among the early childhood development activities done by the household members in both districts combined, the most common was taking the child outside (93% by mother, father or other family member) and playing with the child (82% by mother, father or other family member).

Child Health

Mothers reported on recent morbidity among the selected children during the previous two weeks. In Kapilvastu, 41% of the children suffered from diarrhea, 31% had fever, and 40% had an illness with a cough in the two weeks preceding the survey. In Achham, 35% of children had diarrhea, 39% had fever and 41% had an illness with a cough in the two weeks preceding the survey.

Nutritional and Micronutrient Status of Children

Overall, 43% of children were anemic; 30% were mildly anemic, 13% moderately anemic and less than one percent severely anemic (Table 1.1). Prevalence of anemia was higher among children in Kapilvastu (49%) than Achham (33%) and the mean hemoglobin concentration was 10.9 g/dL in Kapilvastu and 11.4 g/dL in Achham. Overall, anemia was higher among male children and those who were stunted in both districts combined.

Almost four out of ten children (39%) were iron deficient (serum ferritin level <12 µg/L). The prevalence of iron deficiency was 42% in Kapilvastu and 36% in Achham, but not statistically different. Overall, iron deficiency was higher among male children, and those who were stunted in both districts combined.

Overall, almost a quarter (24%) of the children suffered from iron deficiency anemia (IDA), and the prevalence was higher among male children in both districts combined. The prevalence of IDA was higher in Kapilvastu (28%) than compared with Achham (18%).

The prevalence of vitamin A deficiency assessed by retinol binding protein <0.84 µmol/L (comparable to a retinol cut off of <0.7 µmol/L) was 30% among children overall. Higher levels of deficiency were noted among children of Kapilvastu (34%) than Achham (25%). Overall, male children and children who suffered from wasting in both districts combined were more likely to be deficient. Vitamin A liver stores were also assessed using modified relative dose response (MRDR). Overall in both districts, a total of 18% of children were vitamin A deficient as indicated by a MRDR of >0.060. The prevalence of deficiency based on liver stores was 20% among children in Kapilvastu and 15% in Achham.

There was no evidence of folate deficiency assessed by red blood cell (RBC) folate. Overall, mean (+/- SD) RBC folate levels among the children were 1356±605 nmol/L. In Kapilvastu the mean RBC folate levels were 1277±603 nmol/L and in Achham 1491±585 nmol/L.

Overall, 30% of children had vitamin B_{12} deficiency. Children in both districts had a similar rate of vitamin B_{12} deficiency (30%). Overall, higher prevalence of vitamin B_{12} deficiency was seen among children age between 6 to 11 months compared to children 19 to 23 months, in both districts combined.

Twenty percent of children suffered from zinc deficiency. The prevalence of zinc deficiency was higher among children in Achham (28%) than children in Kapilvastu (16%). In both districts combined, zinc deficiency was higher among children age above 12 months of age.

In general, of the children in the age group of 6-23 months in both districts; 42%, 12% and 30% were stunted, wasted and underweight respectively (Table 1.2). According to WHO classifications for assessing the severity of malnutrition by prevalence ranges for children less than five years of age, stunting, wasting and underweight are either high (wasting) or very high (stunting, underweight) in these two districts (WHO, 1995). The prevalence of stunting was 39% in Kapilvastu and 47% in Achham, and underweight was approximately 30% in each district. There was significantly higher wasting among children in Kapilvastu (14%) compared to Achham (9%). Overall, 16%, 3%, and 10% were *severely* stunted, wasted and underweight in both districts combined.

Table 1.1: Prevalence of Various Indicators of Micronutrient Deficiency in Kapilvastu and Achham Districts among Children 6-23 months of Age, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

District	Anemia %	Iron Deficiency %	Iron Deficiency Anemia %	Vitamin A Deficiency %	Vitamin A Deficiency %	Folate Deficiency %	Vitamin B_{12} Deficiency %	Zinc Deficiency %
	Hemoglobin <11.0 g/dL[1]	Ferritin <12 µg/l[2]	Ferritin <12 µg/l & Hemoglobin <11.0 g/dL1[2]	Retinol binding protein (RBP) <0.84 µmol/L[3]	Modified Relative Dose Response (MRDR) >0.060[4]	Red blood cell (RBC) folate <226.5 nmol/L[5]	Serum B12 <203 pg/mL[6]	Serum zinc < 65 or 57 µg/ [7]
Kapilvastu	49	42	28	34	20	0	30	16
Achham	33	36	17	25	15	0	30	28
Total	**43**	**39**	**24**	**30**	**18**	**0**	**30**	**20**

Note: Total % and 95% CI are weighted
[1] WHO 2011. Adjusted for altitude.
[2] UNICEF, United Nations University, WHO 2001.
[3] Vitamin A deficiency RBP <0.84 µmol/L (comparable to a retinol cut off of <0.7 µmol/L);
[4] Tanumihardjo 2011
[5] WHO 2015
[6] WHO 2008
[7] IZiNCG 2007. Zinc deficiency was defined as less than 65 or 57 µg/dL depending on the time of day: Morning (until noon), non-fasting: 65µg/dL; Afternoon, non-fasting: 57 µg/dL

Table 1.2: Prevalence of Stunting, Wasting and Underweight by Severity in Kapilvastu and Achham Districts among Children 6-23 months of age, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

District	Stunting[1] %		Wasting[2] %		Underweight[3] %	
	Length-for-age Z-score <-2 SD	Length--for-age Z-score <-3 SD	Weight-for- Length-Z-score <-2 SD	Weight-for- Length-Z-score <-3 SD	Weight-for-age Z-score <-2 SD	Weight-for-age Z-score <-3 SD
Kapilvastu	39	15	14	3	30	11
Accham	47	17	9	2	32	7
Total	**42**	**16**	**12**	**3**	**30**	**10**

Note: Total % and 95% CI are weighted

[1]Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD. Severe stunting length-for-age Z-score <-3 standard deviations (-3 SD).

[2]Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD. Severe wasting weight-for-length Z-score <-3 standard deviations (-32 SD).

[3]Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD. Severe underweight weight-for-age Z-score <-3 standard deviations (-3 SD).

WHO 1995.

1.0 Introduction

1.1 Background

The period from birth to two years of age is a critical period in early childhood development including the promotion of optimal growth, health, and development (Stemberg, 1997). Suboptimal care and feeding practices, and inadequate access to nutrient rich foods, as well as frequent infections, are the primary causes of malnutrition and mortality among children under 2 years of age (Shrimpton, 2001 and Black et. al., 2008). Micronutrient malnutrition in infants and young children results primarily from diets lacking essential vitamins and minerals, such as iron, vitamin A, and zinc and causes significant morbidity and mortality with one million children dying before the age of five. While significant progress has been made in reducing the prevalence and consquences of iodine and vitamin A deficiencies through improved household use of iodized salt and the periodic provision of high-dose vitamin A supplements to young children, there has been limited success in reducing the burden of other micronutrient deficiencies and iron deficiency anemia in particular.

In the light of this fact, micronutrient powders (MNP) were developed in 1996, in single-dose sachets for household use (Nestle et. al., 1996). MNP are easy to use, require no literacy and the sachets are light-weight, easy to transport and store. Any semi-solid food can be instantly fortified by mixing in MNP, which is virtually tasteless and should not change the color, smell, or taste of the food if prepared and used correctly. MNP are appropriate for vulnerable populations at risk of deficiency, especially young children 6 to 23 months of age starting complementary feeding.

WHO recommends the use of MNP for children 6 to 23 months of age to prevent anemia and iron deficiency (WHO, 2011). The efficacy, safety, and acceptability of MNP for infants and young children have been demonstrated through randomized control trials in multiple countries across the world, and MNP have proven to be as effective as the standard iron drops in treating and preventing anemia in young children, with cure rates ranging from 55-90% (WHO 2011). Additionally, MNP may have advantages over iron drops and syrups in terms of convenience, acceptability, and incorporation of other micronutrients, (WHO, 2011 and HF-TAG, 2011).

1.2 Overview of Integrated Infant and Young Child Feeding (IYCF) and Micronutrient Powder (MNP) Project in Nepal

Malnutrition is a public health emergency in Nepal. According to Nepal Demographic and Health Survey 2011, it is estimated that 41% of children below five years are stunted, 29% are underweight, and 46% are anemic (MoHP, 2011). The prevalance of malnutrition is higher in rural areas, particularly in the mountains and the terai region (MoHP, 2011). Food insecurity, inadequate access to nutrient rich foods, and inappropriate infant and young child feeding (IYCF) practices are important contributors to malnutrition in the country. In Nepal, 29% of children 6-23 months consumed diets of a minimum dietary diversity and 24% consumed the minimum acceptable diet in the previous day (MoHP, 2011). As part of a strategy to address these problems, the Nepal Government in collaboration with UNICEF and an implementing organization designed and launched an intervention project of an "Integrated IYCF and MNP project" among children 6-23 months. In Nepal, the MNP product has been locally branded as "Baal Vita," and packaging has been developed specifically for the local context.

Contents of Micronutrient Powder – Baal Vita (in One Gram Sachet)

Micronutrient	Amount	Micronutrient	Amount
Vitamin A	400 µg	Vitamin B_{12}	0.5 mg
Vitamin C	60.0 mg	Folic acid	150 µg
Vitamin D	5.0 µg	Iron	10.0 mg
Vitamin E	5.0 mg	Zinc	4.1 mg
Vitamin B_1	0.5 mg	Copper	0.56 mg
Vitamin B_2	0.5 mg	Selenium	17.0 mg
Niacin	6.0 mg	Iodine	90.0 µg
Vitamin B_6	0.9 µg		

The IYCF/MNP intervention includes the distribution of 60 sachets of Baal Vita to all children aged 6-23 months of age every six months. The suggested intake regimen of feeding is to give the child one sachet of Baal Vita every day mixed into food for two months (60 days of daily intake). Every six months the families should come back and pick up a new batch of 60 sachets so that the child should consume 180 sachets over the eligible period of 18 months. Baal Vita is provided free of charge to families with children 6-23 months through local health institutions or through female community health volunteers (FCHVs).

UNICEF and the European Union (EU) have partnered in a project to improve nutrition security of women and young children in Asia. The 4-year Maternal and Young Child Nutrition Security Initiative in Asia (MYCNSIA) was implemented in five countries, including Nepal. The initiative aimed to reduce stunting and anemia in pregnant women and children. A key component of MYCNSIA was to support the scale up the IYCF/MNP Baal Vita intervention, including implementing an impact evaluation in two of the nine new IYCF/MNP districts.

1.3 Objectives

The overall objective of this survey was to assess the baseline micronutrient and nutritional status of children 6-23 months of age, as well as infant and young child feeding and early childhood development practices of families prior to the start of the intervention in Kapilvastu and Achham districts.

The overall goal of the survey was accomplished by the following objectives:

1. Using questionnaires to describe:
   - Sociodemographic characteristics of selected households
   - Baseline sanitation and hygiene of selected households
   - Food security in households
   - Existing infant and young child feeding (IYCF) practices
   - Baseline knowledge of IYCF
   - Baseline knowledge about micronutrients
   - Baseline early childhood development (ECD) practices

2. Obtaining anthropometric measurements to assess the conditions of:
   - Stunting
   - Underweight
   - Wasting

3. Drawing blood samples to assess the condition and status of:
   - Anemia
   - Iron
   - Folic acid
   - Vitamin A

- Vitamin B_{12}
- Zinc
- Malaria
- Inflammation

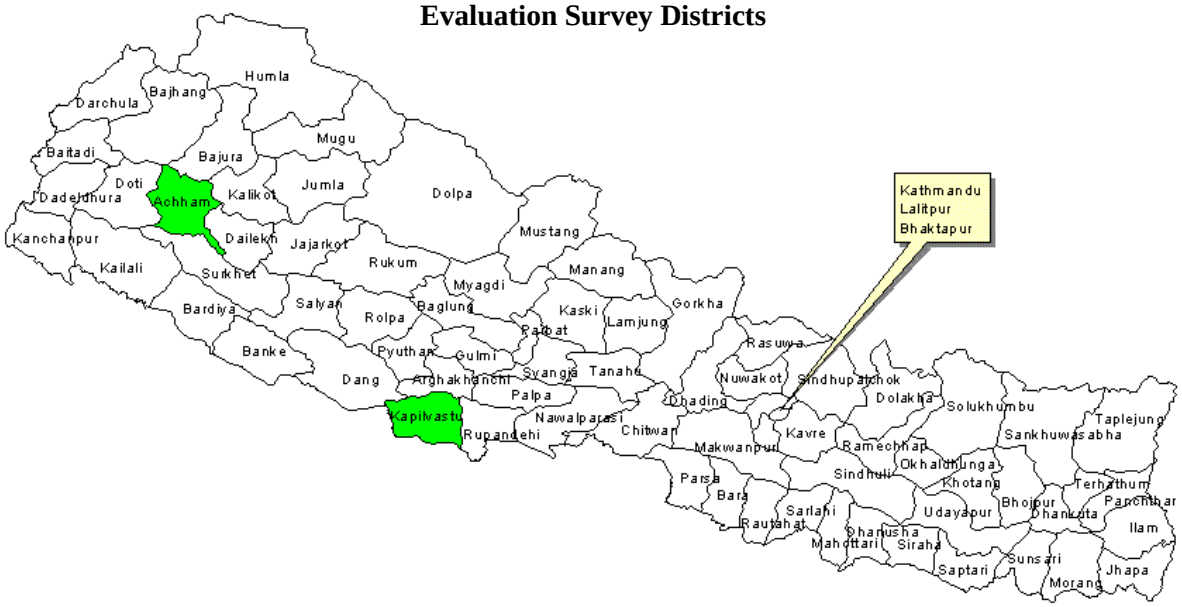
2.0 Survey Design and Implementation

2.1 Survey Sites and Populations

The evaluation design includes a baseline survey collected in 2012-2013 and a follow-up survey (planned for 2015) which are cross-sectional population based household surveys of children 6 to 23 months of age. The surveys were carried out in each of two districts: Kapilvastu in western terai region and Achham in far-western hill region.

The target population to assess the situation of nutritional and micronutrient status were children 6-23 months of age. The respondents were their mothers or caregivers, since they were ususally mothers they are here on referred to as mothers.

Evaluation Survey Districts



2.2 Sample Size Estimation

Sample size calculations for the baseline survey are based on estimated changes in selected micronutrient indicators between baseline and follow-up surveys.

NDHS 2011 reports the anemia prevalence for children 6-8 mo, 9-11 mo, 12-17 mo and 18-23 mo. The prevalence of anemia was 57-78% among children 6-23 months in NDHS 2011 (MoHP, 2011), so a baseline prevalence of 65% was assumed for the calculation of sample size. There are no recent data on the prevalence of iron, vitamin A, zinc, folic acid, or vitamin B_{12} deficiency among young children in Nepal, a baseline prevalence of 50% for iron deficiency, 40% for vitamin A deficiency and 40% for zinc deficiency was assumed, as these deficiencies were expected to be the most prevalent and thus the basis of the final sample size. The assumed decrease in anemia and deficiencies from baseline to follow up was 15% for anemia and 10% for other deficiencies.

The parameters selected for estimating the sample size were confidence level at 95% ($Z_{1.\alpha}$) =1.96; Power at 80% ($Z_{1-\beta}$) = 0.84, design effect (D) =2. The actual design effects from this report for select biological indicators are reported in Annex A. Under the given criteria, the required sample size (n) was thus calculated based on following formula:

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Where:

n = required sample size of a target group
D = design effect
P_1 = initial level of indicator estimated at the time of the first survey
P_2 = expected level of the indicator in the subsequent round of the survey
P_2-P_1 = magnitude of change in the indicator during the period between the first and subsequent round of the survey
Error! Objects cannot be created from editing field codes. = P_{1+} P_2 /2
$Z_{1-\alpha}$ = the z-score corresponding to desired level of significance
$Z_{1-\beta}$ = the z-score corresponding to the desired level of power

Inflammation influences the interpretation of iron indicators (ferritin) and vitamin A indicators (retinol binding protein (RBP) and retinol); the survey also collected indicators of inflammation (C-reactive protein (CRP) and alpha I-acid glycoprotein (AGP)) to help in the interpretation of these data. The assumed prevalence of inflammation was 30% in the hills and 40% in the terai (higher because of the presence of malaria) and the sample sizes were increased by 30% and 40%, respectively. Modified relative-dose-response (MRDR) is a vitamin A indicator that is not influenced by inflammation, so the sample size for MRDR was not increased to account for inflammation.

With the above mentioned criteria, the sample size estimates for the baseline survey are shown in Table 2.1.

Table 2.1: Sample Size Estimation for Biological Indicators, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Indicators	Sample size	+30% inflammation in Achham (hill)	40% inflammation in Kapilvastu (terai)	Sample size Achham (hill)	Sample size Kapilvastu (terai)	Total sample
Anemia	424	127	170	551	594	1145
Iron Deficiency	969	291	388	1249	1357	2606
Vitamin A deficiency	891	267	356	1158	1247	2405
Zinc Deficiency	891	NA	NA	891	891	1782

Sample Size for Modified Relative Dose Response (MRDR)

Nepal has a long standing, successful biannual vitamin A supplementation program for children 6-59 months of age that has achieved >80% coverage for many years (MoHP 2008; MoHP 2011); thus, it was expected that vitamin A deficiency was likely no longer a significant public health problem in Nepal among children 6-59 months, but this had not yet been verified with biochemical data. In addition, vegetable ghee is fortified with vitamin A (≥25 IU/g) (animal ghee is not fortified). Both vegetable ghee and vegetable oil have been/are distributed by the World Food Program (WFP) in food insecure areas, predominantly in the mid- and far-west. According to WFP standards, when these products are distributed they must be fortified with both vitamins A and D. Some of the clusters in the baseline districts might have been exposed to these fortified products, which would also be expected to improve vitamin A status and liver stores of children living in these communities.

A cut-off of MRDR >0.060 is recommended to reflect vitamin A deficiency based on several human and rat studies (Tanumihardjo, 2011). Taking into consideration the expected baseline vitamin A status in the two study districts, we have conservatively assumed mean vitamin A liver stores of 0.054 for children in the baseline survey, which is close to the cut-off but not deficient. With a sample size of 50

children, we can identify a mean change in liver stores of 0.033 (0.022-0.044, 95% confidence interval), which reflects a biologically important improvement in vitamin A status.

Because vitamin A status and risk of mortality is highest in younger children, MRDR data will be collected from the first eligible child in each cluster 6-11 months, 12-17 months and 18-23 months in each cluster (total of 3 children per cluster). This will allow for stratification by age in the analysis of MRDR and result in a sample size of 120 children per district and 240 children total.

2.3 Sample Design

The evaluation design for the baseline survey included stratified two-stage cluster sampling with the selection of children 6 to 23 months through random sampling at the final stage.

First Stage: Selection of Clusters
The first stage of sampling included the selection of clusters. In rural areas, wards are organized under village development committees (VDC) and are the smallest administrative unit in Nepal; wards were used as cluster units in rural areas. In urban areas, municipalities were used as cluster units.

A recent survey conducted by the implememting survey organization for UNICEF showed that around 8.0 households should be visited to find a household with any children 6-23 months in hill areas and around 5.0 households should be visited in terai areas (New ERA, 2013). Consequently, around 200-250 households should be visited in a cluster to find 32 to 34 children between 6 to 23 months of age in each cluster. Wards/municipalities with less than 250 households were combined with adjoining wards/municipalities and treated as a single cluster during the selection of clusters. Using population data from the Bureau of Central Statistics (CBS, 2011), probability proportion to size (PPS) methods were used to select 40 clusters from each district for a total of 80 clusters overall.

Second Stage: Selection of Children 6 – 23 months of age
After selecting the clusters, a household census was conducted in all of the selected clusters in order to identify all eligible children 6 to 23 months of age in the cluster. A line-listing of the children 6-23 months (completed age) was made from the census of the clusters and the required number of children (32 in Achham (hill) and 34 in Kapilvastu (terai)) were selected randomly. It was possible for more than one eligible child to be randomly selected per household to participate in the survey. Mothers of the selected children in each cluster were recruited as main respondents for the survey; their children participated in the biological testing. The household census form and the line listing form are in Annex B1 and B2 respectively.

In each cluster, the first eligible child 6-11 months, 12-17 months and 18-23 months selected (total of 3 children per cluster) were invited to participate in the assessment of MRDR for a total of 120 children per district and 240 children total invited from the 80 clusters.

There was no replacement of respondents for clusters with less than 32 eligible children in Achham and 34 in Kapilvastu or if an invited mother declined to participate.

2.4 Methods of Data Collection

Questionnaire: The questionnaire collected information on the characteristics of the respondents (mothers or caregivers); household assets; water, sanitation and hygiene; household food security, childhood illness, IYCF practices; baseline experiences and use of Baal Vita MNP, knowledge of micronutrients; ECD practices; and the communication and gross motor development modules from Ages and Stages®, Third Edition (ASQ-3™). The communication and gross motor development modules were slightly modified to be appropriate for the Nepali context.

The questionnaire was written in English and then translated to Nepali. The Nepali version of the questionnaire underwent review and was finalized after pretesting. The final Nepali questionnaire was then back translated to English. The questionnaire (Annex C) was administered to the mothers of the selected children.

Anthropometric Measurements: Anthropometric measurements were collected to assess nutritional status of children, including length-for-weight, weight-for-age, and length-for-age. Recumbent length was measured using a standard height/length-measuring board (Shorr board) for the selected children. Weight of the children was measured using a lightweight electronic SECA digital scale (UNICEF Electronic Scale or Uniscale). The scale allows for the weighing of very young children through an automatic mother-child adjustment that eliminates the mother's weight while she is standing on the scale with her child. The results of anthropometric measurement were recorded on the questionnaire.

Global Positioning System (GPS): Information on altitude, latitude, and longitude of all sampled households, households of female community health volunteers (FCHV) in the selected clusters, and the location of the nearest health facilities to the selected clusters were collected using GPS. Longitude, latitude and altitude data of the households were recorded on the questionnaire, while that of FCHV and health facilities were collected in separate forms (Annex D).

Blood Collection: After obtaining informed consent for blood collection, a total of 8 ml of intravenous blood from the sample child was collected by the staff nurses in two different blood collection tubes (5 ml in a blue top tube and 3 ml in a purple top tube). The staff nurses were allowed two attempts to collect the blood from the child. There was no replacement for refusals or unsuccessful attempts to collect blood. Hemoglobin levels were measured and malaria rapid test kits (RTKs) were tested at the household from the collected blood specimens in the field. The blood collection tubes were labeled with the corresponding child's label and stored in a rack inside the cold box until they were processed by the laboratory technician.

For the subsample of children selected for MRDR, an oral dose of vitamin A_2 with ½ teaspoon olive oil was administered to the child with the aid of syringes. The olive oil was given with the dose to help with vitamin A absorption. The participants for MRDR were also instructed not to consume rich source of vitamin A during the 4 hours after administering the dose. The staff nurse returned to the child's home approximately 4 hours after dosing and collected a second blood sample (3 ml in a second purple top tube), labeled it and transferred it to the laboratory technician for processing.

Blood Sample Processing and Storage: The laboratory technician processed the collected blood specimen in the field. For this, all the equipment and supplies needed for specimen processing and storing were set up in an appropriate location in each cluster. The blood collection tubes were centrifuged within the specified time of specimen collection per analyte. The processed specimen including the serum, whole blood hemolysate and plasma were placed in cryovial tubes and PCR tubes. The processed specimens were then consolidated and stored in cryovial boxes and placed into a portable freezer until they were transferred to the laboratory. All specimens at the end of each day were transferred from each cluster to the district public health offices (DPHO) laboratories freezers to be stored at -20º C. At the end of the survey, the specimens were then transferred to the National Public Health Laboratory (NPHL) at Kathmandu to be stored in a -70°C freezer. The DPHO laboratories and the NPHL have back-up generators to provide continuous energy supply during scheduled or unscheduled power outages. The specimens from NPHL were then shipped to Germany, Jordan, Guatemala, and China for analysis.

Test for Anemia: Anemia was tested in the household by measuring the hemoglobin level in children using HemoCue® Hb-301 photometer (HemoCue® Ltd., Anglhom Swden). The intravenous blood specimen was used to measure the hemoglobin level of the sample children. The cap from the purple top tube was removed, and using a disposable transfer pipette, a drop of blood was drawn up and placed onto a piece of parafilm for hemoglobin and malaria RTK measurements. Blood was collected into the microcuvette from the drop of blood on the parafilm. The microcuvette was then inserted into the

HemoCue® photometer where the results were displayed. The results were recorded on the questionnaire, as well as on a brochure given to the mother explaining what the result meant. Children whose results indicated severe anemia (<7.0 g/dl) were provided a card referring them to the nearest health facility (they were not excluded from the analysis). See Tables 2.3 and 2.4 for a summary of the biological indicators and recommended cut-offs to define deficiency or status and hemoglobin adjustments for altitude.

Test for Malaria: Malaria was tested in the household using a malaria antigen (HRP2/pLDH) combo rapid test kit (RTK) for *Plasmodium falciparum* and *P. vivax.* The test contains a membrane pre-coated with two monoclonal antibodies as two separate lines across the test strip: one monoclonal antibody for *P. falciparum* and one monoclonal antibody for *P. vivax*. As mentioned above, the cap from the purple top tube was removed, and using a disposable transfer pipette, a drop of blood was drawn up and placed onto a piece of parafilm for hemoglobin and malaria RTK measurement. A small pipette provided with the kit was used to transfer 5µL blood from the drop of blood on the parafilm to the sample well of the RTK. A buffer was provided with the RTK; two drops of assay buffer were then applied to the RTK into the buffer well. A timer was set for 20 minutes and then the result was read. Once the result was displayed, it was recorded on the questionnaire and on a brochure given to each mother explaining what the result meant. Children whose results indicated malaria were provided with a card referring them to the nearest health facility (they were not excluded from the analysis).

Other Biological Indicators: Other biological indicators included assessing the condition or status of iron, vitamin A, folic acid, vitamin B_{12}, zinc, and inflammation. These tests were performed in the pre-identified laboratories in Germany, Jordan, Guatemala, and China. The external and internal quality assurance and control for blood specimen analysis from each pre-identified laboratory is described in Annex E. The indicators and methods for these biological tests are shown in the Table 2.2.

Table 2.2: Indicators and Methods for the Biological Tests, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Nutrient or Condition	Tests	Method
Iron status	Ferritin	ELISA[1]
Vitamin A	Retinol binding protein MRDR† & retinol (subsample)	ELISA[1] HPLC[2]
Folic acid	Red blood cell (RBC) folate	Microbiological Assay[3]
Vitamin B_{12}	Serum B_{12}	IMMULITE® 1000 (Chemiluminescence) [4]
Zinc	Serum zinc	Atomic absorption flame emission spectroscopy [5]
Malaria	Differential diagnosis of P.falciparum and P.vivax species	Malaria rapid test [5]
Inflammation	C-reactive protein (CRP) Alpha-l-acid glycoprotein (AGP)	ELISA[1]

[1] Erhardt JG, et al., 2004. ELISA includes indicators of iron, Vitamin A, and inflammation: ferritin, retinol binding protein (RBP), C-reactive protein (CRP), and alpha l-acid glycoprotein (AGP).
[2] MRDR, modified relative-does-response test. This test requires consuming a small challenge does of a retinol analog along with a fatty snack, and collecting a blood sample 4 to 6 hours later (Tanumihardjo, 2011).
[3] O'Broin S and Kelleher B, 1992; Pfeiffer et al., 2011.
[4] Wentworth S, McBride JA, and Walker WH, 1994.
[5] Dipeitro ES, et al., 1988.
[6] WHO 2014.

2.5 Pre-test

After finalizing the draft survey questionnaire, it was pre-tested. This pre-test examined the adequacy of the questions; clarity/wording of questions; adequacy of possible responses (pre-coded); sequence/flow of questions; and skip patterns. The pre-test was done in Kavre district by four supervisors. In total, 30 completed questionnaires were brought to the central office. The core evaluation survey members examined the completed questionnaires and sat with the pre-test team to discuss the adequacy of each question. In light of the experience gained in the pre-test, the questionnaire was finalized and then translated back to English.

2.6 Survey Team and Training

A total of 52 field staff including 8 supervisors, 16 interviewers, 16 staff nurse, 8 laboratory technicians and 4 lab coordinators were recruited to carry out the field work. There were a total of 8 teams. Each team consisted of one supervisor, two enumerators, two staff nurses and one lab technician. Two teams were assigned in one cluster and each of these two teams had one lab coordinator.

The supervisors and enumerators were responsible for household interviews, anthropometric measurements and altitude measurements. The staff nurses were responsible for drawing the venous blood sample from the selected children and testing the hemoglobin and malaria at field level. The lab technicians were responsible for processing the collected blood samples and maintaining the cold chain in the field. The laboratory coordinators were responsible for quality control oversight and transportation of processed specimens to the district hospital for storage at the end of the each day.

All the field staff were selected from the pool of field researchers used by the implementing survey organization and who have already worked in other similar surveys. The guiding principles in the selection of field staff were work experience in the relevant area; caste and ethnic diversity; work experience in rural communities; academic qualifications; language known/spoken; and rapport building capacity. Both male and female surveyors were recruited.

A 10 day long intensive training for field enumerators and supervisors was conducted from November 1-12, 2012 by core survey team members of the implementing survey organization in order to familiarize the trainees with the survey objectives, procedures, and instruments. Role playing and mock interviews were carried out during the training and the instruments were further checked for content, consistency and flow as well as validity and reliability. During the period, the practical classes measuring recumbent length and weight for the children and using GPS were also conducted. Interviewers also went through a standardization exercise for anthropometric measurements of children 6-23 months. During the standardization, each interviewer made 2 measurements on 14 subjects. Practical sessions on observational assessment of ECD were also conducted; each enumerator and supervisor practiced assessing gross motor and communication skills of volunteer children from each of the developmental age groups (ranging from 6-23 months). Resource persons from UNICEF and Ministry of Health and Population (MoHP)/Child Health Division (CHD) were also invited to the training.

Laboratory personnel on the teams were trained by the CDC laboratory personnel on the correct technique for venous blood collection into blood collection tubes, use of field instruments for analysis of hemoglobin and malaria, processing and storage of blood samples at the field levels, and transport of the samples at the district cold chain offices.

The 10 days training included:

- Detailed explanation of the objectives of the survey.
- Concept of using a multistage cluster survey (methods of selection of sampling units at different levels).
- Selection of children 6 to 23 months of age.
- Process to obtain informed consent and maintaining confidentiality.
- Eligibility criteria –filling out the initial screening form.
- Structure of the data collection questionnaire.
- Detailed explanation of the questionnaire, question by question, including skipping and filtering and comprehensive discussion on probing techniques.
- The purpose of each item included in the questionnaire.
- Practice interview (each interviewer did role play as both interviewer and respondent)
- Data recording.
- Anthropometric measurements (measuring recumbent length and weight).
- Early childhood development (ECD) survey questions and observational assessment

- Hemoglobin level measurements.
- Altitude, latitude and longitude measurements.
- Quality control by interviewers and supervisors.
- Intravenous blood sample collection by staff nurses.
- Laboratory processing of the biological specimen.
- Cold chain maintenance at different levels.
- Quality control by laboratory coordinator.
- Roles and responsibilities of the field team members.

The first six days were classroom instruction with a focus on conducting the survey, including explaining the survey to household participants, identifying eligible respondents, requesting participation, informed consent, interviewing with appropriate probing, and correct recording of the responses, as well as discussion of each question, practice reading, and role playing. Simultaneously, there was training on anthropometric measurements; ECD questioning and assessment; altitude measurements; hemoglobin level and malaria RTK measurements; and venous blood collection, processing, and cold chain maintenance. On the seventh and eighth day, all the field staff conducted a real field practice pilot on all survey tools and methods near Kathmandu Valley.

The issues encountered during the pilot were discussed on the ninth day and any other questions faced were clarified. Based on the experience of the field practice, further training and practice were conducted in areas which required further attention on the same day. A session on administrative matters, team formation and field work schedule was discussed on the last day.

2.7 Fieldwork

Field work commenced December 1, 2012 and continued until February 23, 2013. Since there were a few days gap between the training and the field work, a one day refresher training was given to the field team on the previous day before departure to the field. There were four teams assigned to Kapilvastu and four to Achham Districts. Two teams were assigned together in one cluster, and each two team unit was responsible for completing data collection in 20 clusters. Each field team was provided with a field schedule before their departure to the assigned districts. Once the teams were in the sampled district, they contacted the concerned authorities in the districts. After consultation with district level authorities, the field team then moved to the assigned clusters.

2.8 Quality Control

During the data collection period, measures were taken by the field teams, supervisors, the implementing survey organization's core team members and personnel from UNICEF to ensure the gathering of valid and reliable data including that:

- Field teams correctly identified the households with the randomly selected children from the census list and administered the questionnaire.
- Field teams checked whether the questionnaire was filled in completely and correctly before terminating each interview.
- Field teams checked at the end of each day whether the questionnaires were filled in completely and correctly.
- Analysts reviewed the data during the data analysis stage to check whether data were complete and consistent.
- Interviewers wrote their names on the questionnaires so that others could ask for clarification from the interviewer if certain information was not clear.
- Supervisors assured whether the length and weight were collected correctly following the training procedures.
- Cold boxes used to store specimens in the field always remained <8°C. Staff nurses and laboratory coordinators monitored the temperature of refrigeratures and freezers in the districts used for the survey daily. Staff were trained to change their thawing gel packs with new frozen gel packs when

the temperature reached ~6°C. They were to only open their cold boxes after blood collection to store the specimens or take them out for processing, and at that time they recorded the temperature of the cold box on the control form.

- Liquid controls for the HemoCue 301 analyzers and the vitamin A2 for MRDR dosing were stored in refrigerators with temperature 1°C - 6°C that were monitored throughout field work.
- In addition to the HemoCue 301 self-check, everyday prior to specimen collection liquid controls were also used to check the quality control of the HemoCue 301s.
- Lab coordinators oversaw the performance of the staff nurse and lab technicians while collecting and processing the blood samples.

Apart from this, in addition to training the field teams, CDC also provided technical assistance as needed during the fieldwork. With the aim of monitoring the task and further strengthening the data quality, the implementing survey organization's core team members and personnel from UNICEF carried out several phases of fieldwork supervision over the data collection period between December 2012 and February 2013. This involved visiting all teams and conducting group meetings and interactions with the team to discuss the survey process and provide feedback.

2.9 Research Ethics

The survey was conducted in compliance with both ethical and human rights standards. Survey procedures were designed to protect participants' privacy and confidentiliaty, and allow for voluntary participation. Ethical and technical approvals were obtained from the Nepal Health Research Council (NHRC) preceding the fieldwork.

Prior to conducting the interview at each household, a letter from MoHP/CHD was presented and the purpose of the survey was explained to each mother. An informed consent form was also read to the mothers that summarized the purpose of the survey, procedures to be used, and the potential benefits and risks. In addition to the formal informed consent statement, respondents were given an opportunity to ask any questions about the survey that help them decide whether or not they want to participate. If the mother and or responsible adult in the households agreed to participate, then the interviewer signed a statement, in front of the witness, that s/he has read the informed consent statement to the respondent and that the respondent had agreed, as per ethical committee approval. Caregivers were informed if the child had severe anemia or a positive malaria test and given referrals to the nearest health facility or treatment. All survey data were kep confidential by field teams and supervisors, and when transferred to the implementing partner the completed questionnaires and consent forms were stored in locked cabinets in locked rooms. Only members of the survey team assigned to data management and analysis had access to the dataset stored on password protected computers.

2.10 Data Entry, Cleaning, Processing and Analysis

There was a three-stage procedure for reviewing the completed survey questionnaires. Two stages occurred while still in the cluster; this involved that every evening the interviewers checked the completed questionaires. Once they ensured the consistency from their level, they signed and submitted them to the supervisors. The supervisors then reviewed the questionnaires thoroughly in order to ensure the consistency of the information/data collected. The supervisors, in consultation with the concerned interviewers, corrected minor errors, if any. However, if they detected any serious error, they asked the interviewers to re-visit the concerned respondents and correct the error, or to re-interview.

A software package for data entry was developed by the data manager in the central office. The computer programming for data entry and analysis was based on questionnaires and expected outputs. A number of quality check mechanisms such as range checks and skip instructions were developed to help detect or prevent errors during the data entry stage.

Double data entry was completed directly from the questionnaires. At the central level, however, before entering data into the computer, data coders thoroughly checked all completed questionnaires and data coding for open ended questions was done. In addition, the data programmer closely monitored the data entry activities.

The data management, analysis and report writing was carried out in close consultation with CHD, UNICEF and CDC. The complex design of the stratified multi-stage cluster survey was taken into account for all analysis. The data were analysed using the SPSS statistical package with the complex sample module. All analyses account for the clustered sample design of the survey. Combined analyses of the two districts additionally account for the stratification by district, and are weighted for the district populations. Analyses included frequencies with 95% confidence intervals. The geometric mean is reported for biological indicators not normally distributed.

WHO defines vitamin A deficiency as serum retinol <0.70 µmol/L. A standard cut-off to categorize vitamin A deficiency using RBP is not defined. Linear regression was used to analyze the retinol-RBP relationship among a sub-sample of 175 children with both RBP and serum retinol values in order to define a vitamin A deficiency cut-off for RBP. A retinol cut-off of 0.70 µmol/L corresponded to an RBP cut-off 0.84 µmol/L. See Tables 2.3 and 2.4 for a summary of the biological indicators and recommended cut-offs to define deficiency or status and hemoglobin adjustments for altitude.

Table 2.3. Biological Indicators of Micronutrient Status and Recommended Cut-Off Values, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Indicators/Laboratory Tests	Recommended cut-off values and definitions of a public health problem, where applicable
Anemia/Hemoglobin	Children 6-59 mo: <11.0 g/dL[a] Hemoglobin values were adjusted for altitude (see Tables 2.4) Public health problem: Anemia prevalence: ≤4.9% - normal 5.0 - 19.9 % - mild 20.0 - 39.9 % - moderate ≥40 % - severe
Iron Deficiency/Ferritin	Children <5 y: <12 ug/L[b]
Vitamin A deficiency/Retinol binding protein (RBP)	RBP <0.84 µmol/L for this population Linear regression was used to analyze the retinol-RBP relationship among a sub-sample with both RBP and serum retinol values. A retinol cut-off of 0.70 µmol/L corresponded to an RBP cut-off 0.84 µmol/L.
Vitamin A deficiency/Serum retinol	For all age groups: Mild <0.70 µmol/L Moderate 0.35 - 0.69 µmol/L Severe < 0.35 µmol/L[c] Definition of a public health problem: prevalence of vitamin A deficiency (based on low serum retinol and unadjusted for inflammation) 2-9% - mild 10-19% - moderate ≥20% - severe
Vitamin A status/Modified relative dose response (MRDR) [d]	For all age groups: ≥ 0.060 are indicative of insufficient vitamin A liver reserves[e]
Folic acid/ RBC folate	Children 6-59 mo: <100 ng/mL (<226.5 nmol/L)[f]
Vitamin B_{12}/Serum B_{12}	For all age groups: <150 pmol/L (203 pg/mL)[g]
Zinc/Serum zinc	Children 6-59 mo.: Morning, non-fasting: <65µg/dL Afternoon, non-fasting: <57 µg/dL Morning is defined as sample collected before 1200 hours and afternoon as after 1200 hours. To convert to µmol/L divide by 6.54[h] Zinc deficiency is of public health concern when the prevalence of low serum zinc concentration is greater than 20%[i]
Inflammation AGP (α1-acid glycoprotein) and CRP (C-reactive protein)	For all age groups: [j] AGP >1.0 g/L CRP >5.0 mg/L
Malaria/ First Response ® Malaria HRP2 Test kit	For all age groups: Test provides a dichotomous result – positive or negative for malaria antibodies. It distinguishes falciparum and vivax.

[a] WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011

Indicators/Laboratory Tests	Recommended cut-off values and definitions of a public health problem, where applicable
(http://www.who.int/vmnis/indicators/haemoglobin. pdf, accessed October 11, 2011.) [b] UNICEF, United Nations University, WHO. Iron deficiency anemia, assessment, prevention, and control: a guide for programme managers. WHO/NUT/96.10. 2001. Geneva, WHO. [c]WHO. Indicators for assessing vitamin A deficiency and their application in monitoring and evaluating intervention programmes. 1996. Geneva, WHO. [d]MRDR also provides value for serum retinol [e]Tanumihardjo, S.A. Vitamin A: biomarkers of nutrition for development. Am J Clin Nutr 2011;94(suppl):658S-664S. [f]WHO. Serum and red blood cell folate concentrations for assessing folate status in populations. Vitamin and Mineral Nutrition Information System. Geneva: World Health Organization; 2015. Cut-offs for RBC folate for children are based on macrocytic anemia. [g]WHO Technical Consultation. Conclusions of a WHO Technical Consultation on folate and vitamin B12 deficiencies. Food and Nutrition Bulletin 2008; 29(2 (Supplement)):S238-S244. [h]IZiNCG Technical Brief. No. 2, 2007. Assessing population zinc status with serum zinc concentration. Accessed at: http://www.izincg.org/pdf/English_brief2.pdf. [i]deBenoist B, Darnton-Hill I, Davidsson L, Fonataine O, Hotz C. Conclusions of the Joint WHO/UNICEF/IAEA/IZiNCG intragency meeting on zinc status indicators. Food and Nutrition Bulletin 2007;28(3):S480-S485. [j]Thurnham DI, McCabe GP, Northrop-Clewes CA, Nestel P. Effect of subclinical infection on plasma retinol concentrations and assessment of prevalence of vitamin A deficiency: meta-analysis. Lancet 2003;362:2052–8.	

Table 2.4: Hemoglobin Adjustments for Altitude[a], Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Altitude in Meters	Adjustment factor for individual values of hemoglobin (g/dL)
<1000	No adjustment
≥1000 <1500	+0.2
≥1500 <2000	+0.5
≥2000 <2500	+0.8
≥2500 <3000	+1.3
≥3000 <3500	+1.9
≥3500 <4000	+2.7
≥4000 <4500	+3.5
>4500	+4.5
[a]WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011	

To assess growth and malnutrition for children and adolescents, growth reference standards are used to calculate z-scores for various anthropometric indicators. For children, WHO recommends a z-score cut-off point of <-2 to define low length-for-age (stunting), low weight-for-age (underweight), and low weight-for-length (wasting); z-score cut-off point of <-3 defines severe undernutrition (severe stunting, underweight, and wasting); a z-score cut-off of >+2 SD classifies high weight-for-height as overweight in children (WHO 1995).

WHO classification for assessing severity of malnutrition by prevalence ranges of stunting, underweight, and wasting among children under 5 years of age

Indicator	Severity of malnutrition by prevalence ranges (%)			
	Low	Medium	High	Very high
Stunting	<20	20-29	30-39	>=40
Underweight	<10	10-19	20-29	>=30
Wasting	< 5	5-9	10-14	>=15

Source: WHO. Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee. WHO Technical Report Series No. 854. Geneva: World Health Organization, 1995.

2.11 Responses Rates

Table 2.5 shows the response rate for the interview and venous blood collection. A total of 2,640 children 6-23 months were selected and the interview was completed with mothers of 2,549 children, yielding a response rate for completing the questionnaire of 97%.

Among the 2,549 mothers agreeing to participate in an interview, 47 declined to have their children participate in blood sample collection. Thus, among the 2,640 initially invited to participate in the survey, 2,502 completed both the questionnaire and agreed to the biological data collection, and there was successful blood sample collection among 2,266 children, yielding full data collection among 86%

of those initially invited to participate. The response rates were slightly higher in Achham than Kapilvastu district

Table 2.5: Results of the Interview and Blood Sample Collection, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu	Achham	Total
	n	n	n
Interview with mother			
Child randomly selected	1360	1280	2640
Interview Completed	1288	1261	2549
Interview Refused	5	2	7
Respondent not at home after three attempts	67	17	84
Interview response rate for completed interview	94.7	98.5	96.6
Blood Sample Collection			
Refused to provide the blood sample	34	13	47
Complete sample collection	1148	1118	2266
Partial sample collection	88	113	201
Unsuccessful collecting the sample	18	17	35
Response rate on complete blood sample collection among entire sample[1]	84.4	87.3	85.8
Response rate on complete blood sample collection among those with completed questionnaire[2]	89.1	88.7	88.9
Response rate on MRDR[3]	90.8	90.0	90.4

[1]Complete blood collection among those who were invited for interview
[2]Complete blood collection among those who completed interview
[3]Among the subset of children selected for modified relative dose response (MRDR) with successful completion of MRDR data collection

3.0 Household Population and Housing Characteristics

This chapter provides basic information on the demographic and socio-economic characteristics of the surveyed populations in Kapilvastu and Achham Districts. It also provides information on household structures, facilities and assets. A household in this survey is defined as a group of related or unrelated persons living together in the same dwelling with one adult member as head of the household and sharing a common kitchen. The respondents of the questionnaire were mothers (or caregivers) of the selected children 6-23 months residing in the households.

3.1 Socio-demographic Characteristics of the Children

Table 3.1 shows the distribution of the sample children by their age, sex and ethnicity. In both Kapilvastu and Achham District, slightly higher proportions of children were in the age group of 12-17 months compared to 6-11 months or 18-23 months. There were slightly more boys than girls in both districts (53% vs 47%). In Achham, 66% of children were of the Upper caste; while in Kapilvastu 32% were from the Disadvantaged Non-Dalit terai caste. Since the religious minorities reside mostly in the terai districts, their representation in hill districts, such as Achham, is very low.

Table 3.1: Age, Sex and Ethnicity of the Children, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
Age									
6 – 11 months	439	34.1	(31.6-36.7)	403	32.0	(29.6-34.4)	842	33.3	(31.5-35.2)
12 – 17 months	519	40.3	(37.7-42.9)	469	37.2	(34.5-40.0)	988	39.2	(37.2-41.1)
18 – 23 months	330	25.6	(23.5-27.9)	389	30.8	(28.3-33.5)	719	27.5	(25.9-29.2)
Mean age in months		*14.08*			*14.54*			*14.24*	
Sex									
Female	611	47.4	(45.0-49.8)	590	46.8	(43.8-49.8)	1201	47.2	(45.3-49.1)
Male	677	52.6	(50.2-55.0)	671	53.2	(50.2-56.2)	1348	52.8	(50.9-54.7)
Ethnicity[1]									
Upper Caste	187	14.5	(10.0-20.7)	830	65.8	(59.9-71.3)	1017	33.1	(29.3-37.2)
Dalit hill/ terai	217	16.8	(13.9-20.3)	419	33.2	(27.8-39.1)	636	22.8	(20.0-25.8)
Disadvantage Non-Dalit terai caste	411	31.9	(25.2-39.5)	2	0.2	(0.0-1.2)	413	20.4	(16.2-25.4)
Disadvantaged Janajati hill/terai	243	18.9	(12.3-27.9)	6	0.5	(0.1-1.6)	249	12.2	(8.0-18.1)
Religious minorities	227	17.6	(13.0-23.5)	1	0.1	(0.0-0.6)	228	11.3	(8.3-15.0)
Relatively Advantaged Janjati	3	0.2	(0.1-0.7)	3	0.2	(0.1-1.0)	6	0.2	(0.1-0.6)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[1]Children in the survey were broadly categorized into six subgroups according to the standard stratification of the country's total population by Central Bureau of Statistics in 2001

3.2 Education Level of Mothers and Fathers of the Children

The education level of mothers (or caregivers) and the father of the selected children are shown in Table 3.2. Approximately half of the mothers in Kapilvastu and Achham had no education and few (5% and 7%, respectively) had completed the higher secondary or above. Overall, about one in five fathers had no education, a quarter had completed primary education, and two in five fathers had achieved secondary education. Compared to Achham (16%), a higher proportion of fathers in Kapilvastu (24%) had no education.

Table 3.2: Education of Mothers or Caregivers and Fathers, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Education of mother/caretaker									
None[1]	678	52.6	(45.0-60.1)	600	47.6	(42.5-52.7)	1278	50.8	(45.6-56.0)
Adult class/Informal education[2]	75	5.8	(4.5-7.5)	267	21.2	(18.6-24.0)	342	11.4	(10.1-12.8)
Primary[3]	219	17.0	(15.1-19.1)	143	11.3	(9.6-13.4)	362	15.0	(13.5-16.5)
Secondary[4]	246	19.1	(14.3-25.1)	163	12.9	(9.8-16.9)	409	16.9	(13.5-20.9)
Higher secondary and above[7]	70	5.4	(3.6-8.2)	88	7.0	(5.4-9.0)	158	6.0	(4.6-7.8)
Education of father									
None[1]	312	24.2	(20.5-28.4)	201	15.9	(13.4-18.9)	513	21.2	(18.6-24.1)
Adult class/Informal education[2]	23	1.8	(1.1-2.9)	66	5.2	(3.9-7.1)	89	3.0	(2.3-3.9)
Primary[3]	334	25.9	(22.7-29.4)	292	23.2	(20.5-26.0)	626	24.9	(22.6-27.4)
Secondary[4]	503	39.1	(34.0-44.4)	465	36.9	(33.0-40.9)	968	38.3	(34.7-41.9)
Higher secondary[5]	78	6.1	(4.7-7.8)	165	13.1	(10.9-15.7)	243	8.6	(7.4-10.0)
Bachelor and above[6]	35	2.7	(1.7-4.2)	65	5.2	(4.1-6.5)	100	3.6	(2.8-4.6)
Don't have father/Dead	2	0.2	(0.0-0.6)	5	0.4	(0.2-0.9)	7	0.2	(0.1-0.5)
Don't know	1	0.1	(0.0-0.6)	2	0.2	(0.0-0.6)	3	0.1	(0.0-0.4)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[1]Includes those who have never attended school.
[2]Includes those who have attended the adult class or have attended the informal classes.
[3]Includes those who have completed 1-5 years of school.
[4]Includes those who have completed 6-10 years of school.
[5]Includes those who have completed 11-12 years of school.
[6]Includes those who have completed more than 12 years of school.
[7]Includes those who have completed 11 or more years of school.

3.3 Household Population

Table 3.3 presents the distribution of the households with selected children by the number of family members and family size. In aggregate, half of the households had 6 to 10 members. In Kapilvastu, 22% of households included 10 or more people compared to 6% of households in Achham. The average household member size in Kapilvastu was 8.3 persons and in Achham was 6.3 persons.

Table 3.3: Household Population, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
No of persons eating in the same kitchen	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
2-3 persons	76	5.9	(4.1 -8.4)	146	11.6	(10.0-13.3)	222	8.0	(6.6-9.6)
4 persons	119	9.2	(7.5-11.4)	177	14.0	(12.3-16.0)	296	11.0	(9.6-12.5)
5 persons	178	13.8	(11.7-16.3)	218	17.3	(15.4-19.4)	396	15.1	(13.5-16.8)
6 persons	165	12.8	(11.0-14.9)	202	16.0	(14.1-18.2)	367	14.0	(12.6-15.5)
7-10 persons	462	35.9	(33.0-38.8)	448	35.5	(33.0-38.1)	910	35.7	(33.7-37.8)
More than 10 persons	288	22.4	(18.3-27.0)	70	5.6	(4.2-7.3)	358	16.3	(13.6-19.3)
Mean number of persons		*8.3*			*6.3*			*7.5*	
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.

3.4 Main Source of Household Income

Mothers reported the main source of the household's income and the results are presented in Table 3.4. Agriculture was the main source of income in the majority of the households, including 80% of households in Achham and 63% of households in Kapilvastu. Casual wage labor was the second main source of income in Kapilvastu (18%) while it was remittance in Achham (11%).

Table 3.4: Major Source of Income in the Household, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
Main source of income	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
Agriculture	812	63.0	(55.7-69.8)	1002	79.5	(74.5-83.6)	1814	69.0	(64.0-73.6)
Casual wage labor	233	18.1	(14.6-22.2)	42	3.3	(2.3-4.7)	275	12.7	(10.5-15.4)
Remittance	94	7.3	(5.4-9.9)	143	11.3	(8.8-14.4)	237	8.8	(7.2-10.7)
Trade/business	96	7.5	(4.7-11.6)	33	2.6	(1.2-5.6)	129	5.7	(3.8-8.4)
Others[1]	53	4.1	(2.6-6.4)	41	3.3	(2.1-5.0)	94	3.8	(2.7-5.3)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[1]Others include: animal husbandry, assistance program, and government or private services.

3.5 Household Assets

To understand the economic characteristics of households, information on the possession of certain fixed assets was recorded. As shown in Table 3.5, in Kapilvastu 77% of households had electricity, 85% had a mobile phone, and 26% had a radio. In Achham 45% had electricity, 62% had a mobile phone and 32% had a radio. Other household assets such as television, table, bed, fan, and chair were also more common in Kapilvastu compared to Achham.

Table 3.5: Households Assets, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Types of Assets[a]	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Electricity	986	76.6	(71.6-80.9)	563	44.6	(35.2-54.5)	1549	65.0	(60.3-69.4)
Mobile phone	1099	85.3	(82.0-88.2)	779	61.8	(56.3-66.9)	1878	76.8	(73.9-79.4)
Radio	333	25.9	(22.2-29.8)	407	32.3	(29.2-35.5)	740	28.2	(25.6-30.9)
Television	517	41.1	(35.0-45.5)	57	4.5	(2.8-8.3)	694	27.2	(23.9-30.9)
Table	494	38.4	(33.0-44.0)	129	10.2	(7.4-14.0)	623	28.2	(24.6-32.0)
Bed	1218	94.6	(92.6-96.0)	583	46.2	(42.0-50.6)	1801	77.0	(75.1-78.9)
Fan	736	57.1	(51.9-62.2)	5	0.4	(0.1-1.1)	741	36.6	(33.4-39.9)
Chair	516	40.1	(34.8-45.5)	127	10.1	(7.7-13.1)	643	29.2	(25.8-32.9)
Refrigerator	65	5.0	(3.4-7.5)	6	0.5	(0.1-1.9)	71	3.4	(2.3-4.9)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[a] Each response option was read to the participants.

3.6 Materials used to construct the House

The materials used to construct the house, including the main materials of the floor, roof, and external walls are also indicators of economic status, and as such were observed in the surveys. As shown in Table 3.6, a large number of the households in both districts had earth or mud flooring (Kapilvastu, 79% and Achham 99%) and were mostly roofed with galvanized steel, asbestos or ceramic tiles (72% in Kapilvastu and 81% in Achham). In terms of the structure of the walls, in Kapilvastu 45% were made with brick and 27% with cement, while in Achham 88% of the walls were made of mud stone.

Table 3.6: Household Structure, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Main materials used on floor									
Earth/Mud/Dung	1019	79.1	(73.2-84.0)	1247	98.9	(96.4-99.7)	2266	86.3	(82.5-89.4)
Cement	265	20.6	(15.8-26.4)	12	1.0	(0.3-2.8)	277	13.5	(10.4-17.2)
Others[1]	4	0.3	(0.1-0.8)	2	0.2	(0.0-1.2)	6	0.3	(0.1-0.6)
Main materials used on roof									
Galvanized steel, asbestos, ceramic tiles/slate, cement, roofing shingles	927	72.0	(66.9-76.5)	1021	81.0	(74.7-85.9)	1948	75.2	(71.4-78.7)
Thatch/straw/wheat straw	341	26.5	(21.8-31.7)	233	18.5	(13.6-24.6)	574	23.6	(20.0-27.5)
Others[2]	20	1.6	(1.0-2.4)	7	0.6	(0.2-1.5)	27	1.2	(0.8-1.8)
Main materials used for the walls									
Mud stone	206	16.0	(12.7-19.9)	1106	87.7	(83.1-91.2)	1312	42.0	(39.2-44.8)
Brick	583	45.3	(39.3-51.4)	2	0.2	(0.0-0.6)	585	28.9	(25.2-33.0)
Cement	341	26.5	(22.4-31.0)	11	0.9	(0.2-3.2)	352	17.2	(14.6-20.1)
Bamboo with mud	124	9.6	(7.4-12.4)	1	0.1	(0.0-0.6)	125	6.2	(4.8-8.0)
Others[3]	34	2.6	(1.7-4.1)	141	11.2	(8.1-15.2)	175	5.7	(4.4-7.4)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[1]Others include: linoleum/carpet, ceramic tiles, and marble chips.
[2]Others include: wood planks, cardboard/rustic mate/ bamboo, and mud with bamboo/fire wood/plastics.
[3]Others include: straw with mud (adobe), wood/wood planks, cement blocks, stone, tin, thatch with bamboo, and no walls.

3.7 Source of Drinking Water

A clean and safe drinking water supply is one of the major indicators of good health status and prosperity. Information on the primary source of drinking water is shown in Table 3.7. In Kapilvastu, the main source of drinking water was tube well in the household's yard or plot (62%) and in Achham it was piped water from a public or neighbor's tap (71%).

Table 3.7: Source of Drinking Water, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Main source of drinking water	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Piped water into house/yard/plot	31	2.4	(1.0-5.8)	88	7.0	(4.6-10.5)	119	4.1	(2.6-6.2)
Piped water from public/neighbor's tap	6	0.5	(0.1-1.6)	895	71.0	(64.8-76.5)	901	26.0	(23.9-28.3)
Tube well in yard/plot	796	61.8	(57.1-66.3)	0	-	-	796	39.4	(36.5-42.4)
Public/neighbor's tube well	434	33.7	(28.9-38.9)	0	-	-	434	21.5	(18.5-24.9)
Spring/Kuwa	4	0.3	(0.1-1.0)	231	18.3	(13.7-24.1)	235	6.8	(5.2-9.0)
Others[1]	17	1.3	(0.7-2.5)	47	3.7	(1.9-7.2)	64	2.2	(1.4-3.5)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95% CI are weighted.
[1]Others include: dug well in house/yard/plot**,** public/neighbor's dugwell, river/stream/pond/lake, and stone tap.

3.8 Types of Toilet Facility

Unsanitary practices regarding disposal of human waste is one of the major causes of water and foodborne diseases. Information on household sanitation facilities is presented in Table 3.8. Results show that the majority of households in Kapilvastu (69%) had no toilet facility. Similarly, a quarter of the households (24%) in Achham had no toilet facility, while 59% had a flush toilet.

Table 3.8: Household Toilet Facility, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Type of toilet facility[#]	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Flush toilet	363	28.2	(20.2-37.8)	741	58.8	(50.1-66.9)	1104	39.3	(33.0-45.9)
Traditional pit toilet	13	1.0	(0.5-1.9)	189	15.0	(12.4-18.1)	202	6.1	(5.1-7.3)
Ventilated improved pit latrine	27	2.1	(1.1-3.8)	25	2.0	(0.7-5.6)	52	2.1	(1.2-3.5)
No toilet facility	885	68.7	(58.2-77.6)	306	24.3	(16.8-33.7)	1191	52.6	(45.6-59.5)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[#]Toilet facility was observed.

3.9 Availability of Water and Soap in the Hand Washing Area

Good hand washing practices are a major preventive measure against fecal-orally transmitted diseases. The availability of water in the hand washing area was observed during the survey. Among those observed, 86% of households in Kapilvastu had water available in the hand washing area whereas only 37% of households in Achham had it available at the time of observation (Table 3.9).

Field teams observed that almost three-quarters of the households in total had soap available in the households (68% in Kapilvastu and 62% in Achham), but actual hand washing was not observed. Among all mothers, a little over one in ten in Kapilvastu (11%) and over one-third in Achham (36%) reported that they did not use soap either on the day of the survey or on the previous day. In Kapilvastu, the most frequently mentioned reasons to use soap today or yesterday was to wash hands after defecation (62%), wash clothes (60%), take a bath (39%) and to wash hands after cleaning the children's stool (38%). In Achham, the most common responses were to wash clothes (46%), clean hands after defecating (38%), to take a bath (28%), and to wash hands after cleaning the children's stools (17%). Other reported reasons for using soap are shown in Table 3.9.

Table 3.9: Availability of Water and Soap in the Hand Washing Area and Use of Soap, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Observation of the hand washing area									
Observed	1234	95.8	(94.0-97.1)	1215	96.4	(92.5-98.3)	2449	96.0	(94.4-97.2)
Not observed, not in dwelling/ yard/plot	54	4.2	(2.9-6.0)	46	3.6	(1.7-7.5)	100	4.0	(2.8-5.6)
Availability of water at the place for hand washing[#]									
Yes	1106	85.9	(82.7-88.6)	467	37.0	(32.3-42.0)	1573	68.2	(65.5-70.7)
No	128	9.9	(7.6-12.9)	748	59.3	(53.6-64.8)	876	27.8	(25.3-30.5)
Couldn't observe the hand washing area	54	4.2	(2.9-6.0)	46	3.6	(1.7-7.5)	100	4.0	(2.8-5.6)
Availability of soap or other cleansing agent at the household[#]									
Soap bar or powder	870	67.5	(60.2-74.1)	783	62.1	(56.0-67.8)	1653	65.6	(60.4-70.4)
Ash, Mud, Sand	103	8.0	(5.9-10.7)	209	16.6	(13.7-19.9)	312	11.1	(9.4-13.1)
None	315	24.5	(18.6-31.4)	269	21.3	(17.0-26.4)	584	23.3	(19.2-28.1)
Purpose of using soap today or yesterday[a]									
Did not use soap yesterday or today	139	10.8	(8.5-13.6)	450	35.7	(30.4-41.4)	589	19.8	(17.4-22.5)
Wash clothes	771	59.9	(56.4-63.2)	584	46.3	(40.6-52.1)	1355	54.9	(51.9-57.9)
Take bath	507	39.4	(34.4-44.5)	358	28.4	(23.8-33.5)	865	35.4	(31.8-39.2)
Bathe the children	89	6.9	(4.7-10.0)	89	7.1	(5.6-8.8)	178	7.0	(5.4-8.9)
Wash hands after cleaning the children's stool	488	37.9	(33.7-42.3)	220	17.4	(13.5-22.2)	708	30.5	(27.4-33.7)
Wash hands after defecating	803	62.3	(56.7-67.7)	477	37.8	(33.5-42.3)	1280	53.5	(49.6-57.3)
Wash hands after cleaning utensils	180	14.0	(10.2-18.9)	58	4.6	(3.2-6.6)	238	10.6	(8.1-13.8)
Wash hands after cleaning cowshed/farm work	87	6.8	(4.5-10.0)	43	3.4	(2.4-4.9)	130	5.5	(4.0-7.6)
Others[1]	273	21.2	(17.6-25.3)	156	12.4	(9.8-15.4)	429	18.0	(15.5-20.8)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[#]Availability of the water at the hand washing area was observed.
[a]Multiple responses: The response options were not read to the participants.
[1]Others include: wash the children's hands, wash hands after cleaning child, wash hands before feeding child, wash hands before preparing food, wash hands before eating, clean utensils, and wash face.

3.10 Availability of a Bednet and a Nail Clipper

Mothers were asked about the availability of a bednet and a nail clipper (Table 3.10) (bednets were not observed by the field teams). Bednets are essential in the terai where malaria is endemic and as a result more than eight in ten households (81%) in Kapilvastu had a bednet whereas only 9% of the households in Achham had it. Less than six in ten households in Achham (58%) and less than five in ten households in Kapilvastu (44%) had a nail clipper.

Table 3.10: Availability of Bednet and Nail Clipper at the Household, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Availability of bednet[#]									
Yes	1047	81.3	(77.1-84.8)	113	9.0	(6.1-12.9)	1160	55.1	(52.3-57.8)
No	241	18.7	(15.2-22.9)	1147	91.0	(87.0-93.8)	1388	44.9	(42.1-47.7)
Don't know	0	-	-	1	0.1	(0.0-0.6)	1	0.0	(0.0-0.2)
Availability of nail clipper									
Yes (observed)	567	44.0	(37.6-50.6)	735	58.3	(54.0-62.4)	1302	49.2	(44.8-53.6)
Yes (not Observed)	122	9.5	(7.4-12.1)	48	3.8	(2.7-5.4)	170	7.4	(6.0-9.1)
No	599	46.5	(40.2-53.0)	478	37.9	(34.0-42.0)	1077	43.4	(39.1-47.8)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[#]Bednet availability was self-reported.

3.11 Household Food Insecurity

In 1996, the World Food Summit defined food security as "the situation when all people at all times have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 1996). The series of questions on household food insecurity included in this survey were adopted from the Nepal Demographic and Health Survey, 2011 (MoHP, 2011).

Table 3.11 shows that compared to Kapilvastu (44%), more households in Achham (65%) reported that they worried (rarely, sometimes, or often) about not having enough food in the previous year. Similarly,

higher proportions of households in Achham than Kapilvastu reported different effects such as not eating preferred food, eating a more monotonous diet, reducing the size of or number of meals, running out of any food in the household, or a household member going to bed hungry for lack of food.

Table 3.11: Maternal or Caregiver Report of Household Food Insecurity during the Last 12 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
In the past 12 months, frequency of worry that the household would not have enough food									
Never	717	55.7	(49.4-61.7)	446	35.4	(30.8-40.2)	1163	48.3	(44.0-52.6)
Rarely	100	7.8	(6.1-9.8)	168	13.3	(10.8-16.3)	268	9.8	(8.4-11.4)
Sometimes	391	30.4	(25.7-35.4)	385	30.5	(26.1-35.4)	776	30.4	(27.0-34.1)
Often	80	6.2	(4.8-8.0)	262	20.8	(16.8-25.4)	342	11.5	(9.8-13.5)
In the past 12 months, how often any household member was not able to eat preferred kinds of foods because of a lack of resources									
Never	720	55.9	(48.2-63.3)	489	38.8	(33.9-43.9)	1209	49.7	(44.5-54.9)
Rarely	132	10.2	(8.7-12.0)	274	21.7	(18.9-24.9)	406	14.4	(13.0-16.0)
Sometimes	394	30.6	(24.8-37.1)	421	33.4	(29.4-37.6)	815	31.6	(27.5-36.0)
Often	42	3.3	(2.1-5.0)	77	6.1	(4.3-8.7)	119	4.3	(3.3-5.6)
In the past 12 months, how often did any household members have to eat a limited variety of foods because of lack of resources									
Never	797	61.9	(54.1-69.1)	586	46.5	(41.2-51.8)	1383	56.3	(51.1-61.4)
Rarely	119	9.2	(7.7-11.1)	335	26.6	(23.4-30.0)	454	15.5	(14.0-17.2)
Sometimes	338	26.2	(20.2-33.3)	283	22.4	(19.3-25.9)	621	24.9	(20.8-29.5)
Often	34	2.6	(1.7-4.0)	57	4.5	(3.1-6.5)	91	3.3	(2.5-4.4)
In the past 12 months, how often did any household members eat smaller meals with less food than required because of scarcity of food									
Never	1122	87.1	(84.6-89.2)	908	72.0	(67.6-76.0)	2030	81.6	(79.5-83.6)
Rarely	87	6.8	(5.5-8.3)	259	20.5	(17.9-23.5)	346	11.8	(10.5-13.2)
Sometimes	76	5.9	(4.6-7.6)	90	7.1	(5.0-10.0)	166	6.3	(5.2-7.8)
Often	3	0.2	(0.1-0.7)	4	0.3	(0.1-0.8)	7	0.3	(0.1-0.6)
In the past 12 months, how often did any household member skip meals in a day because of lack of resources to get food									
Never	1191	92.5	(90.4-94.1)	1028	81.5	(77.4-85.0)	2219	88.5	(86.6-90.2)
Rarely	68	5.3	(3.9-7.1)	194	15.4	(12.7-18.6)	262	8.9	(7.6-10.5)
Sometimes	28	2.2	(1.5-3.2)	38	3.0	(1.8-5.0)	66	2.5	(1.8-3.4)
Often	1	0.1	(0.0-0.6)	1	0.1	(0.0-0.6)	2	0.1	(0.0-0.3)
In the past 12 months, how often was there no food to eat any kind in the household because of lack of resources to get food									
Never	1259	97.7	(96.8-98.4)	1156	91.7	(88.8-93.9)	2415	95.5	(94.4-96.5)
Rarely	23	1.8	(1.1-2.8)	96	7.6	(5.6-10.3)	119	3.9	(3.0-5.0)
Sometimes	6	0.5	(0.2-1.0)	8	0.6	(0.3-1.3)	14	0.5	(0.3-0.9)
Often	0	-	-	1	0.1	(0.0-0.6)	1	0.0	(0.0-0.2)
In the past 12 months, how often did any household member go to sleep at night hungry because of food scarcity									
Never	1274	98.9	(98.3-99.3)	1104	87.5	(84.0-90.4)	2378	94.8	(93.5-95.9)
Rarely	13	1.0	(0.6-1.6)	141	11.2	(8.6-14.4)	154	4.7	(3.7-5.9)
Sometimes	1	0.1	(0.0-0.6)	15	1.2	(0.7-2.0)	16	0.5	(0.3-0.8)
Often	0	-	-	1	0.1	(0.0-0.6)	1	0.0	(0.0-0.2)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.

Following the methods of the 2011 Nepal Demographic and Health Survey (MoHP 2011), the questions of household food insecurity were arranged in order of degree of severity and frequency of occurrence in order to capture the household's perception of food vulnerability or stress and behavioral response to food insecurity. Based on the response of respondents, four food insecurity categories were created (MoHP 2011):

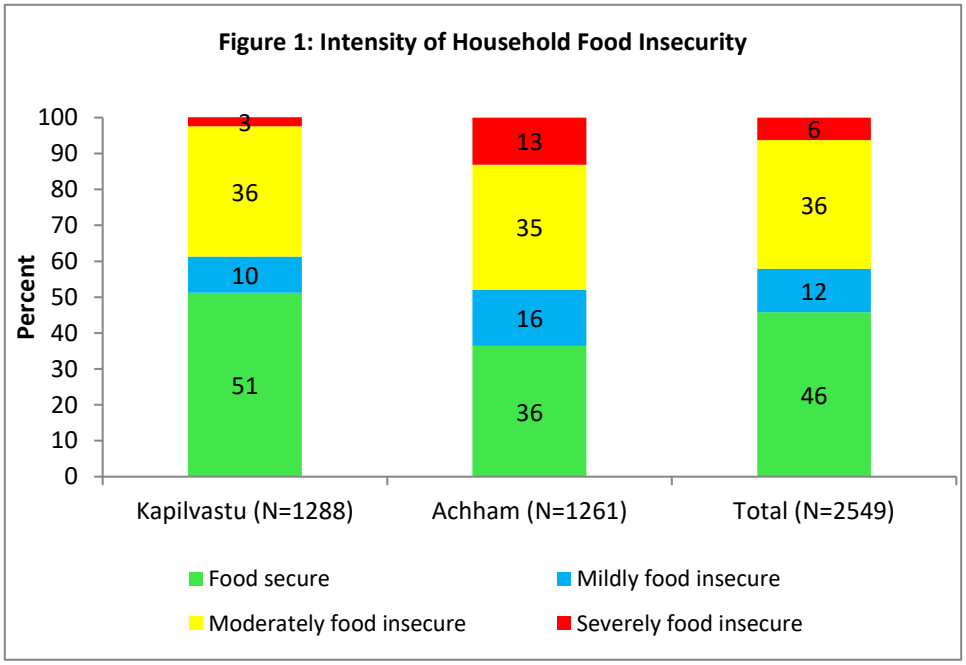
1. Food secure households: These households do not experience any food insecurity conditions and rarely worry about such conditions.
2. Mildly food insecure households: These households worry about not having enough food sometimes or often, and/or are unable to eat preferred foods, and/or eat a more monotonous diet

than desired and/or some foods considered undesirable but do so only rarely. They do not cut back on quantity or experience any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating).

3. Moderately food insecure households: These households sacrifice quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or have rarely or sometimes started to cut back on quantity by reducing the size of meals or number of meals. However, they do not experience any of the three most severe conditions.

4. Severely food insecure households: These households have cut back on meal size or number of meals often and/or have experienced any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even if only rarely. In other words, any household that has experienced one of these three conditions even once in the last 12 months is considered severely food insecure.

Figure 1 shows that 46% of the households in total were food secure, 12% of households were mildly food insecure, 36% were moderately food insecure, and 6% were severely food insecure. In Kapilvastu, 51% of households were food secure and 36% in Achham. Furthermore, 13% of households were severely food insecure in Achham and 3% were severely food insecure in Kapilvastu.



3.12 Coping Strategies of Households with Food Insecurity

Families were asked additional questions if they gave a response other than "never" to the food security questions. Table 3.12 provides information on strategies adopted to cope with food insecurity. Among households that suffered from food insecurity, approximately six in ten households (58%) in Kapilvastu and seven in ten households (72%) in Achham took a loan to meet their food needs. In Achham, other coping strategies such as consuming seed stock that were meant for the next planting season (29%), selling livestock/poultry (22%), and collecting wild foods (11%) were also reported, while in Kapilvastu very few reported these strategies.

Table 3.12: Maternal or Caretaker Report of Coping Strategies to Meet the Household Food Needs during the Last 12 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
Solution used to meet household food needs[a,1]	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
Took loan	366	57.5	(51.4-63.5)	602	72.0	(67.4-76.2)	968	63.8	(59.7-67.7)
Collected wild food	0	-	-	91	10.9	(7.3-16.0)	91	4.7	(3.1-7.1)
Consumed seed stock for next season	5	0.8	(0.4-1.7)	242	28.9	(23.4-35.2)	247	13.0	(10.4-16.1)
Sold household assets	5	0.8	(0.3-2.2)	11	1.3	(0.7-2.5)	16	1.0	(0.6-1.8)
Sold livestock/poultry	12	1.9	(1.0-3.5)	181	21.7	(18.5-25.2)	193	10.4	(8.8-12.4)
Sold land	2	0.3	(0.1-1.3)	5	0.6	(0.2-1.6)	7	0.4	(0.2-1.0)
Others[2]	38	6.0	(3.3-10.5)	80	9.6	(6.1-14.6)	118	7.5	(5.3-10.7)
Total (N)	**636**			**836**			**1472**		

Note: Total % and 95%CI are weighted.
[a] Multiple responses. The responses options were read to the participants.
[1]Includes only food insecure households.
[2]Others include: borrowed goods from neighbors, sold gold ornaments, worked on daily wages, involved in work for food program and used the remittance received from family members.

3.13 Causes of Household Food Insecurity

Among those suffering food insecurity, almost nine in ten households in total reported financial problems as the major cause of their food insecurity. In Achham, a third also reported drought (33%), and 16% said not having enough land to cultivate were causes of their household food insecurity (Table 3.13).

Table 3.13: Maternal or Caretaker Report of Causes of Food Deficiency in the Household during the Last 12 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
Cause of Food Deficiency in the Household[a, 1]	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
Financial problems	584	91.8	(87.6-94.7)	703	84.1	(79.5-87.8)	1287	88.5	(85.4-91.0)
Drought	5	0.8	(0.3-1.8)	278	33.3	(26.0-41.4)	283	14.8	(11.5-19.0)
Do not have enough land	21	3.3	(1.7-6.5)	132	15.8	(11.9-20.6)	153	8.7	(6.5-11.6)
Only worried but have not faced food deficiency	44	6.9	(4.4-10.7)	35	4.2	(2.6-6.8)	79	5.7	(4.1-8.0)
Others[2]	14	2.2	(1.1-4.5)	140	16.7	(14.0-20.0)	154	8.5	(6.9-10.4)
Total (N)	**636**			**836**			**1472**		

Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were not read to the participants.
[1]Includes only food insecure households.
[2]Others include: crop failure, low food production, no irrigation facility, and no worker to cultivate the land/lack of time, flood, and landslide, unavailability of food in market, large family size, and unemployment.

4.0 Community Programs/Interventions

This chapter describes participation in ongoing community programs or government interventions, and in some cases mother's knowledge of such programs. The ongoing government programs included the biannual supplementation of vitamin A and deworming tablets to children 6-59 months at national level, micronutrient powders distribution to children 6-23 months in some selected districts, child protection grants for disadvantaged family, nutritious flour distribution for pregnant women and children in some selected districts, promotion of two-child logo iodized salt and campaigns to make villages free of open defecation.

4.1 Iron, Vitamin A, and Deworming Tablet Supplementation to Children

In 1997, the government of Nepal initiated a National Vitamin A Supplementation Program (NVAP) under which children 6-59 months of age are supplemented with vitamin A capsules every six months. By 2002, program coverage had expanded to all districts in the country. Under NVAP, children 6-11 months receive 100,000 international units (IU) and children 12-59 months receive 200,000 IU of vitamin A biannually. MoHP has since integrated the distribution of deworming tablets to children aged 12 to 59 months into NVAP in all districts.

Table 4.1 shows recent iron syrup intake and coverage of vitamin A and deworming tablets among the selected children. Almost all children in both districts were not currently taking iron syrup. A total of 88% of children 6-59 months received a vitamin A supplement and a total of 77% of children 12-59 months received a deworming tablet during the last mass distribution. Compared to Kapilvastu, coverage of vitamin A and deworming tablets were slightly higher in Achham (Achham: 91% vitamin A and 86% deworming tablets; Kapilvastu: 86% vitamin A and 71% deworming tablets).

Table 4.1: Intake of Iron Syrup, and Vitamin A capsule Supplementation and Deworming Tablets among Children, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Child took iron syrup in the past 7 week									
Yes (Bottle observed)	3	0.2	(0.1-7.0)	0	-	-	3	0.1	(0.0-0.5)
Yes (Bottle not observed)	4	0.3	(0.1-1.0)	6	0.5	(0.1-1.9)	10	0.4	(0.1-0.9)
No	1280	99.4	(98.7-99.7)	1253	99.4	(98.1-99.8)	2533	99.4	(98.8-99.7)
Do not know	1	0.1	(0.0-0.6)	2	0.2	(0.0-0.6)	3	0.1	(0.0-0.3)
Total (N)		**1288**			**1261**			**2549**	
Child received vitamin A capsule in the last 6 months									
Yes	1104	85.7	(82.0-88.8)	1148	91.0	(89.0-92.8)	2252	87.6	(85.2-89.7)
No	179	13.9	(10.9-17.5)	108	8.6	(6.9-10.6)	287	12.0	(9.9-14.3)
Don't know	5	0.4	(0.2-0.9)	5	0.4	(0.2-0.9)	10	0.4	(0.2-0.7)
Total (N)		**1288**			**1261**			**2549**	
Child received deworming tablet in the last 6 months[1]									
Yes	605	71.3	(67.2-75.0)	741	86.4	(82.8-89.3)	1346	76.8	(74.0-79.4)
No	239	28.2	(24.5-32.1)	114	13.3	(10.4-16.9)	353	22.7	(20.1-25.4)
Don't know	5	0.6	(0.2-1.6)	3	0.3	(0.1-1.1)	8	0.5	(0.2-1.1)
Total (N)		**849**			**858**			**1707**	

Note: Total % and 95%CI are weighted.
[1]Includes only those children who are ≥12 months of age.

4.2 Awareness and Knowledge of Baal Vita Micronutrient Powder

Table 4.2 presents mothers' awareness and knowledge of a micronutrient powder called 'Baal Vita' for children aged 6-23 months. Respondents were asked whether they had heard of Baal Vita and what they know about Baal Vita. The program had been implemented in six pilot districts starting in 2010. Since the program was not launched in either of the two baseline districts, very few reported that they have ever heard of Baal Vita (6% in Kapilvastu and 13% in Achham). Among those who had heard of Baal Vita, the majority in both districts (69% in Achham and 55% in Kapilvastu) reported that Baal Vita is something to add to the food of young children, while over two in ten in both districts said that it is a sachet of vitamins and minerals.

Table 4.2: Knowledge of Baal Vita among Mothers or Caretakers, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Ever heard of Baal Vita									
Yes	76	5.9	(4.6-7.6)	165	13.1	(7.0-23.1)	241	8.5	(5.9-12.0)
No	1205	93.6	(91.9-94.9)	1092	86.6	(76.4-92.8)	2297	91.0	(87.5-93.7)
Don't know	7	0.5	(0.2-1.6)	4	0.3	(0.0-2.3)	11	0.5	(0.2-1.2)
Total (N)		**1288**			**1261**			**2549**	
Respondent's description of Baal Vita[a, 1]									
Sachet of vitamins and minerals	21	27.6	(17.0-41.7)	36	21.8	(11.6-37.3)	57	24.4	(16.5-34.6)
Something added to the food of young children	42	55.3	(42.4-67.5)	114	69.1	(60.1-76.9)	156	63.0	(54.6-70.7)
Vitamin	0	-	-	15	9.1	(4.7-16.8)	15	5.1	(2.6-9.5)
Don't know	17	22.4	(15.2-31.7)	10	6.1	(2.7-13.1)	27	13.3	(8.6-20.0)
Total (N)		**76**			**165**			**241**	

Note: Total % and 95%CI are weighted.
[a]Multiple responses.
[1]Includes only those respondents who have ever heard of Baal Vita.

4.3 Consumption of Baal Vita Micronutrient Powder by the Children

Information on consumption of Baal Vita by the sample children is presented in Table 4.3. Although Baal Vita was not distributed in the survey districts it was being distributed in some districts in the country; some of the mothers reported that they visited other districts and their children received Baal Vita sachets during those visits. Among mothers who had heard of Baal Vita, 48 (29%) in Accham and 8 (11%) in Kapilvastu said their child ever consumed it. Few mothers reported their children consumed Baal Vita during the last seven days (n=8 total across both districts). Among the children who were reported to have ever consumed Baal Vita, in Kapilvastu, 4 children consumed less than 30 sachets and 4 children consumed 30 – 60 sachets. In Achham, 31 (65%) children consumed 30 or more sachets.

Table 4.3: Consumption of Baal Vita by the Children, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Child ever consumed any Baal Vita[1]									
Yes	8	10.5	(4.7-22.0)	48	29.1	(20.3-39.8)	56	20.9	(14.2-29.5)
No	67	88.2	(77.0-94.3)	117	70.9	(60.2-79.7)	184	78.5	(70.0-85.2)
Don't know	1	1.3	(0.2-9.0)	0	-	-	1	0.6	(0.1-4.2)
Total (N)		**76**			**165**			**241**	
Child consumed Baal Vita in the past 7 days[2]									
Yes	2	25.0	(3.5-75.6)	6	12.5	(5.2-27.3)	8	15.3	(6.3-32.5)
No	6	75.0	(24.4-96.5)	41	85.4	(69.7-93.7)	47	83.1	(65.9-92.6)
Don't know	0	-	-	1	2.1	(0.4-10.2)	1	1.6	(0.3-8.5)
Total (N)		**8**			**48**			**56**	
No. of Sachets child ever consumed[2]									
Less than 30 sachets	4	50.0	(14.9-85.1)	16	33.3	(15.5-57.7)	20	37.0	(19.6-58.6)
30-60 sachets	4	50.0	(14.9-85.1)	17	35.4	(25.3-47.1)	21	38.7	(26.5-52.5)
More than 60 sachets	0	-	-	14	29.2	(13.8-51.5)	14	22.7	(9.9-43.9)
Don't know	0	-	-	1	2.1	(0.3-14.8)	1	1.6	(0.2-11.4)
Total (N)		**8**			**48**			**56**	
Willing to give Baal Vita to the Child									
Yes	1283	99.6	(99.1-99.8)	1255	99.5	(98.8-99.8)	2538	99.6	(99.2-99.8)
No	1	0.1	(0.0-0.6)	5	0.4	(0.1-1.1)	6	0.2	(0.1-0.5)
Refuse to answer	1	0.1	(0.0-0.6)	0	-	-	1	0.0	(0.0-0.4)
Don't know	3	0.2	(0.1-0.7)	1	0.1	(0.0-0.6)	4	0.2	(0.1-0.5)
Total (N)		**1288**			**1261**			**2549**	

Note: Total % and 95%CI are weighted.
[1]Includes only those mothers or caretakers who had heard of Baal Vita
[2]Includes only those children who had ever consumed Baal Vita

4.4 Household Participation in Community Programs

Mothers were asked a series of questions about whether any household members had participated in or benefitted from any of the government led community programs in the past 12 months. Table 4.4 shows that in Kapilvastu, 16% of the households had participated in the open defecation free (ODF) campaign and 8% purchased "two child" logo iodized salt; there was little participation in any other programs in the district. In Achham, 35% participated in the ODF campaign; 12% purchased "two child logo" iodized salt; 14% participated in the child protection grant for disadvantaged families; and 8% participated in community management of acute malnutrition (CMAM).

Table 4.4: Participation in Community Programs in the Past 12 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Household members participated or received benefits from the community program	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Purchased "two child logo" iodized salt	104	8.1	(4.3-14.7)	156	12.4	(6.7-21.8)	260	9.6	(6.2-14.7)
Child protection grant for disadvantaged families	19	1.5	(0.9-2.5)	181	14.4	(10.9-18.7)	200	6.1	(4.8-7.8)
CMAM using Plumpy Nut	0	-	-	96	7.6	(5.2-11.0)	96	2.8	(1.9-4.0)
Nutritious flour (for children)	18	1.4	(0.5-4.0)	32	2.5	(0.9-7.2)	50	1.8	(0.8-3.8)
Nutritious flour (for pregnant women)	4	0.3	(0.1-1.5)	0	-	-	4	0.2	(0.0-0.9)
Open defecation free (ODF) campaign	201	15.6	(9.7-24.1)	441	35.0	(28.1-42.6)	642	22.6	(17.8-28.3)
Others[1]	2	0.2	(0.0-0.6)	14	1.1	(0.2-6.0)	16	0.5	(0.1-2.0)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[1] Others include: poverty alleviation, diarrhea campaign, hand washing campaign, and food for work program

5.0 Knowledge and Practice of Infant and Young Child Feeding

Optimal infant feeding, as recommended by WHO (2008), includes exclusive breastfeeding of children under 6 months of age, and then continued breastfeeding in addition to appropriate complementary feeding practices until two years of age and beyond. Feeding practices during infancy and early childhood are critical for optimal growth, development and health of a child, as well as the early prevention of chronic diseases. Recommended IYCF practices include timely initiation of breastfeeding (within one hour of birth), exclusive breastfeeding until 6 months of age, appropriate and timely introduction of complementary foods and adequate meal frequency and dietary diversity (WHO 2008).

A major focus of the behavior change component of the integrated IYCF/Baal Vita intervention packages is the optimal IYCF practices, as well as rationales and explanations for why they are important. The survey assessed baseline IYCF knowledge and practice among mothers of the selected children in the two districts.

5.1 Reasons to Feed Nutritious Foods to Children Less than 2 years of age

Respondents were asked about reasons to feed nutritious foods to children less than two years of age. Almost eight in ten mothers in both Kapilvastu and Achham said that nutritious foods are necessary for children for strength and a strong body (Table 5.1). Thirty-nine percent of respondents in Kapilvastu and 51% in Achham reported that they are necessary for physical growth. Likewise, 31% of mothers in Kapilvastu and 50% in Achham stated that nutritious foods are needed to make children active and playful. Other reported reasons for feeding nutritious foods to children were for developing strong immunity, for mental development and for overall development.

Table 5.1: Reasons to Feed Nutritious Foods to Children Less than Two Years of Age, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Reasons[a]	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
For strength/strong body	1033	80.2	(77.0-83.1)	996	79.0	(76.3-81.4)	2029	79.8	(77.5-81.8)
For physical growth	507	39.4	(34.4-44.6)	637	50.5	(45.8-55.2)	1144	43.4	(39.8-47.1)
For activeness/playfulness	403	31.3	(28.4-34.3)	636	50.4	(45.2-55.7)	1039	38.2	(35.6-41.0)
For developing strong immunity	242	18.8	(14.8-23.6)	409	32.4	(28.3-36.8)	651	23.7	(20.7-27.1)
For mental development	177	13.7	(10.7-17.4)	176	14.0	(11.3-17.2)	353	13.8	(11.6-16.4)
For overall development	85	6.6	(4.9-8.9)	131	10.4	(7.7-13.8)	216	8.0	(6.4-9.8)
Others[1]	57	4.4	(3.2-6.0)	83	6.6	(4.8-9.0)	140	5.2	(4.2-6.5)
Don't Know	36	2.8	(1.7-4.7)	64	5.1	(4.1-6.3)	100	3.6	(2.7-4.8)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were not read to the participants.
[1]Others include: for increasing appetite, for increasing blood, to gain weight, and to protect from malnutrition.

5.2 Reasons to Breastfeed

The respondents were further asked why they think that the mother should breastfeed her child. Table 5.2 shows that eight in ten respondents in Achham and 54% in Kapilvastu knew that breast milk contains all nutrients that a baby needs. Further, 45% of the respondents in Kapilvastu and 35% in Achham reported that breast milk protects the baby against infection and that 29% in Kapilvastu and 14% in Achham also stated that breastmilk is easily digested. Other reported reasons to breastfeed include that a child does not need other types of food for the first six months of life; breastmilk costs less than artificial feeding, and breastfeeding makes the child healthy.

Table 5.2: Reasons to Breastfeed, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Reasons on need to breastfeed[a]	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Breast milk has all the nutrients that a baby needs	691	53.6	(48.4-58.8)	1011	80.2	(76.5-83.4)	1702	63.3	(59.6-66.7)
Breast milk protects a baby against infection	579	45.0	(38.2-51.9)	439	34.8	(30.1-39.9)	1018	41.3	(36.6-46.1)
Breast milk is easily digested	377	29.3	(23.6-35.6)	179	14.2	(11.5-17.3)	556	23.8	(20.0-28.0)
Child does not need other types of food for the first 6 months after birth	126	9.8	(7.3-13.1)	150	11.9	(8.0-17.3)	276	10.5	(8.3-13.3)
Breast milk costs less than artificial feeding	112	8.7	(6.9-10.9)	22	1.7	(0.9-3.2)	134	6.2	(5.0-7.7)
Child will be healthy	96	7.5	(5.2-10.5)	42	3.3	(2.2-5.1)	138	6.0	(4.4-7.9)
Others[1]	85	6.6	(5.1-8.4)	167	13.2	(10.7-16.2)	252	9.0	(7.7-10.6)
Don't know	29	2.3	(1.2-4.3)	53	4.2	(3.0-5.9)	82	3.0	(2.1-4.2)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were not read to the participants.
[1]Others include: mother will become healthy, strong bond between mother and child, for child's overall development, for child's growth, to live/relieve from hunger, to improve health, easy to feed/no need to prepare.

5.3 Appropriate Age to Start Complementary Feeding

WHO recommends the introduction of complementary foods (solid/semi-solid) to children after six months of age (WHO, 2008). Respondents were asked what they considered to be the correct age for introducing complementary foods, and their responses are shown in Table 5.3. Only half of the respondents in Kapilvastu (50%) and 64% in Achham knew the appropriate age to start complementary foods is at 6 months. In Kapilvastu 42% of mothers or caretakers reported that the appropriate age to start complementary foods was later than 6 months while in Achham 28% of mothers or caretakers reported that complementary foods should be given to children who are less than six months of age. The reported mean age of introduction of complementary foods was 7.2 months in Kapilvastu while that of Achham was 5.8 months.

Table 5.3: Knowledge of the Appropriate Age to Start Complementary Feeding, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Reported appropriate age for introduction of complementary foods	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
≤4 months	12	0.9	(0.5-1.7)	68	5.4	(4.1-7.0)	80	2.5	(2.0-3.3)
5 months	82	6.4	(4.3-9.3)	282	22.4	(19.0-26.1)	364	12.2	(10.3-14.3)
6 months	649	50.4	(45.1-55.6)	801	63.5	(59.0-67.8)	1450	55.1	(51.4-58.8)
≥7 months	543	42.2	(35.6-49.0)	108	8.6	(6.4-11.3)	651	30.0	(25.8-34.5)
Don't know	2	0.2	(0.0-0.6)	2	0.2	(0.0-0.6)	4	0.2	(0.1-0.4)
Mean age in months	*7.2*			*5.8*			*6.7*		
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.

5.4 Knowledge of the Recommended Frequency to Feed Solid and Semi-solid Foods

The WHO minimum meal frequency indicator assesses whether the child received solid, semi-solid, or soft foods a minimum number of times per day (WHO, 2008). The guidelines define 'minimum' differently for breastfed and non-breastfed children, as well as by age. According to the guidelines, daily 'minimum frequency' is defined as two or more times for a breastfed child aged 6-8 months, three or more times for a breastfed child aged 9-23 months and four or more times for non-breastfed children aged 6-23 months. Meals include both meals and snacks, and feeding frequency for non-breastfed children includes both milk feeds and solid and semi-solid foods (WHO, 2008).

Respondents were asked how frequently the target child should be fed in 24 hours. Table 5.4 shows that almost all respondents in both Kapilvastu and Achham reported at least the recommended minimum number of times breastfed children 6-8 months of age should be fed. The reported mean values in Kapilvastu and Achham were 2.7 and 3.5, respectively; greater than the minimum recommendation in both districts.
For breastfed children 9-23 months of age, 81% in Kapilvastu and 96% in Achham reported at least the recommended minimum number of times a child should be fed daily. The reported mean number of times children should be fed daily were 3.1 in Kapilvastu and 3.7 in Achham, both were greater than the recommendation.

For non-breastfed children 6-23 months of age, the percentage of mothers who reported the recommended minimum or more numbers of times daily to feed children varied by district; 19% in Kapilvastu and 53% in Achham. Almost eight in ten of respondents in Kapilvastu and half in Achham reported that they should feed their children less than the minimum recommended number of times daily. The reported mean number of times children should be fed daily was 3.1 in Kapilvastu and 3.6 in Achham, both are lower than the recommendation of four or more times per day for non-breastfed children.

Table 5.4: Mother's Knowledge of How Many Times in a Day Her Child Should be Fed Complementary Foods, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Frequency of feeding	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
6-8 months breastfed children									
Minimum or more recommended feeding frequency	186	95.4	(90.4-97.8)	185	97.9	(94.6-99.2)	371	96.3	(93.1-98.0)
Less than minimum feeding frequency	9	4.6	(2.2-9.6)	3	1.6	(0.5-4.7)	12	3.5	(1.8-6.8)
Do not know	0	0.0	-	1	0.5	(0.1-3.9)	1	0.2	(0.0-1.4)
Total (n)		**195**			**189**			**384**	
Mean times		**2.7**			**3.5**			**3.0**	
Total (n)		**195**			**188**			**383**	
9-23 months breastfed children									
Minimum or more recommended feeding frequency	822	80.8	(76.9-84.2)	991	96.0	(94.5-97.1)	1813	86.5	(84.0-88.6)
Less than minimum feeding frequency	194	19.1	(15.7-23.0)	40	3.9	(2.8-5.4)	234	13.4	(11.3-15.6)
Do not know	1	0.1	(0.0-0.7)	1	0.1	(0.0-0.7)	2	0.1	(0.0-0.4)
Total (n)		**1017**			**1032**			**2049**	
Mean times		**3.1**			**3.7**			**3.3**	
Total (n)		**1016**			**1031**			**2047**	
6-23 months non-breastfed children									
Minimum or more recommended feeding frequency	14	18.9	(11.5-29.6)	21	52.5	(38.7-65.9)	35	26.9	(19.4-36.2)
Less than minimum feeding frequency	60	81.1	(70.4-88.5)	19	47.5	(34.1-61.3)	79	73.1	(63.8-80.6)
Total (n)		**74**			**40**			**114**	
Mean times		**3.1**			**3.6**			**3.2**	
Total (n)		**74**			**40**			**114**	

Note: Total % and 95%CI are weighted.

5.5 Knowledge of How to Prepare "Sarbottom Lito/Pitho"

Homemade Super-Flour, called "Sarbottom Lito/Pitho" in Nepali, is promoted by the government as a complementary food for children to start consuming at 6 months of age. Sarbottom Lito/Pitho is prepared by mixing two parts of pulse (such as soybean), one part whole grain cereal (such as maize or rice), and one part of another whole grain cereal (such as wheat, millet or buckwheat). The pulses and grains need to be cleaned, roasted well (separately) and ground into a fine flour (separately or together). Once ground into flour, it can be stored in an airtight container for one to three months. The flour makes use of the readily available local foods and any pulse and combinations of any two cereal grains can be used in the recipe. To prepare for feeding, the flour is stirred into boiling water and cooked for a short time.

The respondents were asked the ingredients mixed to make Sarbottom Lito/Pitho and if they know how to prepare it. In Kapilvastu and Achham, 57% and 45%, respectively, reported that the main ingredients are cereals and legumes, while 43% and 55%, respectively, said they did not know the answer. Among those who know the main ingredients over 90% in both districts reported they knew how to prepare it at home (Table 5.5).

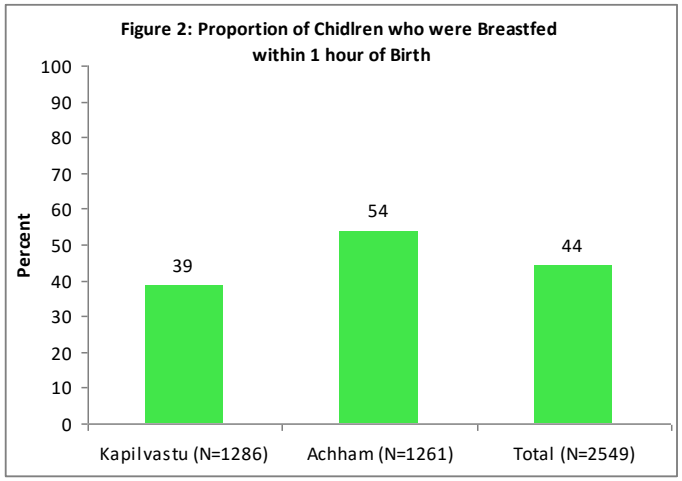
Table 5.5: Knowledge of Homemade Sarbottom Lito/Pitho, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Main ingredients of Sarbottom Lito/Pitho[a]									
Cereals and legumes	730	56.7	(48.6-64.4)	562	44.6	(39.5-49.7)	1292	52.3	(46.9-57.6)
Others[1]	2	0.2	(0.0-0.6)	26	2.1	(1.3-3.4)	28	0.8	(0.5-1.4)
Don't know	558	43.3	(35.6-51.4)	699	55.4	(50.3-60.5)	1257	47.7	(42.4-53.1)
	1288			**1261**			**2549**		
Respondent reported she knows how to prepare Sarbottom Lito/Pitho									
Yes	658	90.1	(86.8-92.7)	539	95.9	(93.3-97.5)	1197	91.9	(89.6-93.7)
No	69	9.5	(7.1-12.5)	21	3.7	(2.2-6.3)	90	7.7	(6.0-9.8)
Don't know	3	0.4	(0.1-1.8)	2	0.4	(0.1-1.4)	5	4.4	(0.1-1.2)
Total (N)	**730**			**562**			**1292**		

Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were not read to the participants. Sarbottom lito/pitho is the Nepali name for Super-Flour.
[1]Others include: Milk, Oil, Ghee and Sugar.

5.6 Breastfeeding Practices

Breastfeeding is nearly universal in Nepal and almost all children in this survey were breastfed at some time (Table 5.6). All mothers were asked how soon after delivery they initiated breastfeeding of their child. A total of 44% of children were breastfed within one hour of birth. Early initiation of breastfeeding within one hour of birth was higher in Achham than compared to Kapilvastu (54% vs 39%) (Figure 2 and Table 5.6). Roughly half of the children in Kapilvastu (47%) received breast milk after one hour but within one day of birth, while 14% of children did not receive breast milk until the day after birth. In Achham, four in ten children received breastmilk after one hour but within the day of birth, while four percent received it the day after birth (Table 5.6).



More than nine in ten children aged 6-23 months were currently breastfeeding (94% in Kapilvastu and 97% in Achham). Almost all children continued to breastfeed at 1 year in both districts (96% in Kapilvastu and 99% in Achham), while continued breastfeeding at 2 years of age was lower in both districts (84% in Kapilvastu and 88% in Achham). Mothers reported that the children in Kapilvastu were breastfed on average 10 times or more in a day while in Achham children were breastfed an average of 8 times per day (Table 5.6).

Table 5.6: Breastfeeding Practices, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Ever breastfed the child									
Yes	1286	99.8	(99.4-100.0)	1261	100.0	(100.0-100.0)	2547	99.9	(99.6-100.0)
No	2	0.2	(0.0-0.6)	0	-	-	2	0.1	(0.0-0.4)
Total (N)	**1288**			**1261**			**2549**		
Early initiation of breastfeeding[1,2]									
Immediately or within one hour of birth	496	38.5	(34.3-42.9)	681	54.0	(50.4-57.6)	1177	44.1	(41.1-47.2)
After one hour but within a day	604	47.0	(42.6-51.4)	521	41.3	(38.0-44.7)	1125	44.9	(41.9-48.0)
After one day	185	14.4	(11.1-18.4)	54	4.3	(3.0-6.2)	239	10.7	(8.6-13.4)
Don't know	1	0.1	(0.0-0.6)	5	0.4	(0.1-1.3)	6	0.2	(0.1-0.5)
Total (N)	**1286**			**1261**			**2547**		
Currently breastfeeding the child[2]									
Yes	1212	94.2	(92.5-95.6)	1221	96.8	(95.6-97.7)	2433	95.2	(94.0-96.1)
No	74	5.8	(4.4-7.5)	40	3.2	(2.3-4.4)	114	4.8	(3.9-6.0)
Total (N)	**1286**			**1261**			**2547**		

Continued breastfeeding at 1 year[3]									
Yes	331	95.7	(92.2-97.6)	295	99.3	(97.2-99.8)	626	96.9	(94.7-98.2)
No	15	4.3	(2.4-7.6)	2	0.7	(0.2-2.8)	17	3.1	(1.8-5.3)
Total (N)		**346**			**297**			**643**	
Continued breastfeeding at 2 year[4]									
Yes	189	84.0	(78.3-88.4)	237	87.5	(83.2-90.7)	426	85.4	(81.7-88.5)
No	36	16.0	(11.6-21.7)	34	12.5	(9.3-16.8)	70	14.6	(11.5-18.3)
Total (N)		**225**			**271**			**496**	
Frequency of breastfeeding during the last 24 hours									
None	76	5.9	(4.5-7.6)	51	4.0	(2.9-5.6)	127	5.2	(4.2-6.4)
1-4 times	29	2.3	(1.5-3.3)	65	5.2	(4.0-6.7)	94	3.3	(2.6-4.1)
5-9 times	412	32.0	(29.6-34.5)	787	62.4	(58.2-66.4)	1199	43.0	(40.9-45.2)
10 and more times	771	59.9	(57.2-62.4)	358	28.4	(24.3-32.9)	1129	48.5	(46.1-50.8)
Mean no of times breastfed		*10.4*			*8.3*			*9.6*	
Total (N)		**1288**			**1261**			**2549**	

Note: Total % and 95%CI are weighted.
[1]The responses options were read to the participants.
[2]Includes only those children who were ever breastfed.
[3]Includes only those children who were 12-15 months of age.
[4]Includes only those children who were 20-23 months of age.

5.7 Reasons for Not Currently Breastfeeding the Child

The respondents who reported that their children were not currently breastfeeding were further asked about the reason for not breastfeeding. Half of respondents in Kapilvastu and 60% in Achham reported the child was not breastfeeding because she (the mother) was pregnant. Twenty-two percent in Kapilvastu and 30% in Achham said the child was not breastfeeding because she (the mother) had recently given birth to another child. Almost two in ten in Kapilvastu and one in ten in Achham reported the child did not currently breastfeed because the mother did not produce enough breastmilk (Table 5.7).

Table 5.7: Reasons for Not Currently Breastfeeding the Child, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Reasons for not currently breastfeeding the child [a, 1]	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
New pregnancy	37	50.0	(39.4-60.6)	24	60.0	(39.7-77.4)	61	52.4	(43.0-61.6)
New baby born	16	21.6	(14.8-30.4)	12	30.0	(0.5-1.9)	28	1.1	(0.8-1.6)
Not having enough breast milk	14	18.9	(11.4-28.9)	4	10.0	(3.9-23.4)	18	16.8	(11.0-24.7)
Others[2]	11	14.9	(8.1-25.8)	1	2.5	(0.4-15.5)	12	11.9	(6.6-20.5)
Total (N)		**74**			**40**			**114**	

Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were not read to the participants.
[1]Includes only those respondents whose children were not currently breastfed.
[2]Others include: mother ill/weak, nipple/breast problem, child refused, weaning age/age to stop breast feed, child ill/weak, and mother's death.

5.8 Use of a Bottle with a Nipple

All the respondents were asked if the child drank anything from a bottle with a nipple in the last 24 hours. The use of a bottle with a nipple to feed the child was rare in Achham where less than one percent reported use; in Kapilvastu almost 7% reported their child drank liquid from a bottle with a nipple (Table 5.8).

Table 5.8: Use of a Bottle with a Nipple in the Last 24 Hours, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

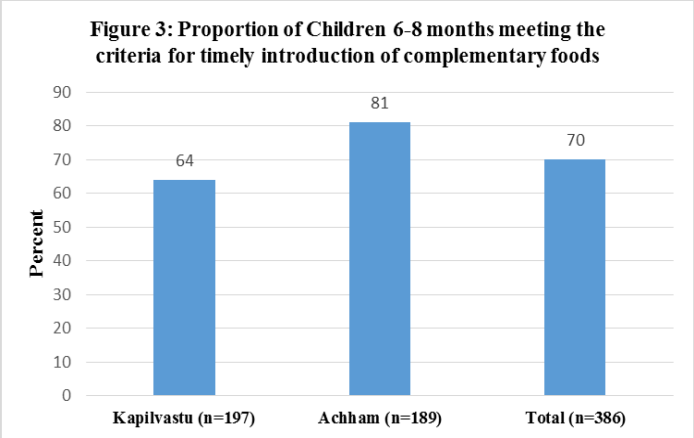
	Kapilvastu			Achham			Total		
Child drank anything from a bottle with a nipple	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
Yes	87	6.8	(5.3-8.5)	10	0.8	(0.4-1.5)	97	4.6	(3.7-5.7)
No	1201	93.2	(91.5-94.7)	1251	99.2	(98.5-99.6)	2452	95.4	(94.3-96.3)
Total (N)		**1288**			**1261**			**2549**	

Note: Total % and 95%CI are weighted.

5.9 Practices Related to Complementary Feeding

WHO recommends the introduction of complementary foods (solid/semi-solid) to children at six months of age (WHO, 2008). Respondents were asked the age of the child when complementary foods were first introduced (Table 5.9). Approximately one third (34%) of the respondents in Kapilvastu and about half (48%) in Achham reported they introduced complementary foods at the recommended age of 6 months. In Kapilvastu, more than half of the mothers (54%) reported that complementary foods were started later than 6 months, as did 13% in Achham. On the other hand, four in ten (40%) respondents in Achham reported they introduced complementary foods earlier than six months, as did 12% in Kapilvastu.

The WHO indicator for timely introduction of complementary foods is assessed among children 6-8 months of age (WHO 2008). Figure 3 shows that a total of seven in ten children aged 6-8 months had received solid or semi-solid foods in the last 24 hours. The percent meeting the criteria for timely introduction of complementary foods was higher in Achham than Kapilvastu (81% vs 64%).



The respondents who reported ever introducing complementary foods to their child aged 6-23 months were further asked whether they have given the child any food in the previous day; almost all reported that the child was fed with complementary foods in the previous day (Table 5.9).

Table 5.9: Practices Related to Complementary Feeding, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
Age of the child when complementary foods were introduced									
>1 month	0	-	-	5	0.4	(0.2-0.9)	5	0.1	(0.1-0.3)
1-4 months	36	2.8	(1.8-4.2)	142	11.3	(9.1-13.8)	178	5.9	(4.8-7.1)
5 months	121	9.4	(6.9-12.6)	350	27.8	(24.9-30.9)	471	16.0	(14.1-18.3)
6 months	433	33.6	(28.2-39.5)	604	47.9	(43.6-52.2)	1037	38.8	(35.0-42.8)
7 and more months	613	47.6	(40.9-54.3)	143	11.3	(9.2-13.9)	756	34.5	(30.2-38.9)
Not yet introduced	83	6.4	(4.8-8.6)	16	1.3	(0.7-2.2)	99	4.6	(3.5-6.0)
Don't know	2	0.2	(0.0-0.6)	1	0.1	(0.0-0.6)	3	0.1	(0.0-0.4)
Mean age		*7.2*			*5.6*			*6.6*	
Total (N)		**1288**			**1261**			**2549**	
Timely introduction of complementary foods, among children 6-8 months of age meeting the criteria for the international indicator (WHO 2008)[1]									
Yes	126	64.0	(54.3-72.6)	153	81.0	(75.1-85.7)	279	70.0	(63.4-75.9)
No	71	36.0	(27.4-45.7)	36	19.0	(14.3-24.9)	107	30.0	(24.1-36.6)
Total (N)		**197**			**189**			**386**	
Child given solid/semi-solid foods yesterday[2]									
Yes	1174	97.4	(96.1-98.3)	1208	97.0	(95.8-97.9)	2382	97.3	(96.4-98.0)
No	31	2.6	(1.7-3.9)	37	3.0	(2.1-4.2)	68	2.7	(2.0-3.6)
Total (N)		**1205**			**1245**			**2450**	

Note: Total % and 95%CI are weighted.
[1]Timely introduction of complementary food: Proportion of children 6-8 months of age who receive solid, semisolid or soft food during the previous day (WHO 2008).
[2]Excludes those children who have not yet started eating complementary foods.

5.10 Children Consuming Minimum Dietary Diversity, Meal Frequency and Acceptable Diet

WHO recommends indicators to assess minimum dietary diversity, minimum meal frequency and minimum acceptable diet for children aged 6-23 months (WHO, 2008). The minimum dietary diversity is defined as intake from at least four of the seven main food groups in the previous day. The seven food groups include grains, roots and tubers, legumes and nuts, dairy products (milk, yogurt, and cheese), flesh foods (meat, fish, poultry and liver/organ meats), eggs, vitamin A rich fruits and vegetables, and other fruits and vegetables.

Minimum meal frequency is defined as the child consuming the minimum number of solid, semi-solid or soft food snacks/meals the previous day. The indicator defines 'minimum' differently for breastfed and non-breastfed children, as well as by age. 'Minimum frequency' is defined as two or more times per day for a breastfed child aged 6-8 months, three or more times for a breastfed child aged 9-23 months and four or more times for non-breastfed children aged 6-23 months. Meals include both meals and snacks, and feeding frequency for non-breastfed children includes both milk feeds and solid/semi-solid foods.

Minimum acceptable diet is the composite of the minimum meal frequency and minimum dietary diversity consumed by the child in the previous day.

Figure 4 shows the proportion of children consuming the minimum dietary diversity, minimum meal frequency and minimum acceptable diet. Among the children 6-23 months, about a quarter (24%) in total had received the minimum dietary diversity, almost half (53%) had received the minimum meal frequency and 16% had received the minimum acceptable diet the previous day. In Kapilvastu, 22% of children received the minimum dietary diversity, 47% the minimum meal frequency and 15% the minimum acceptable diet the previous day. In Achham, 26% of children received the minimum dietary diversity, 63% the minimum meal frequency, and 19% the minimum acceptable diet the previous day.

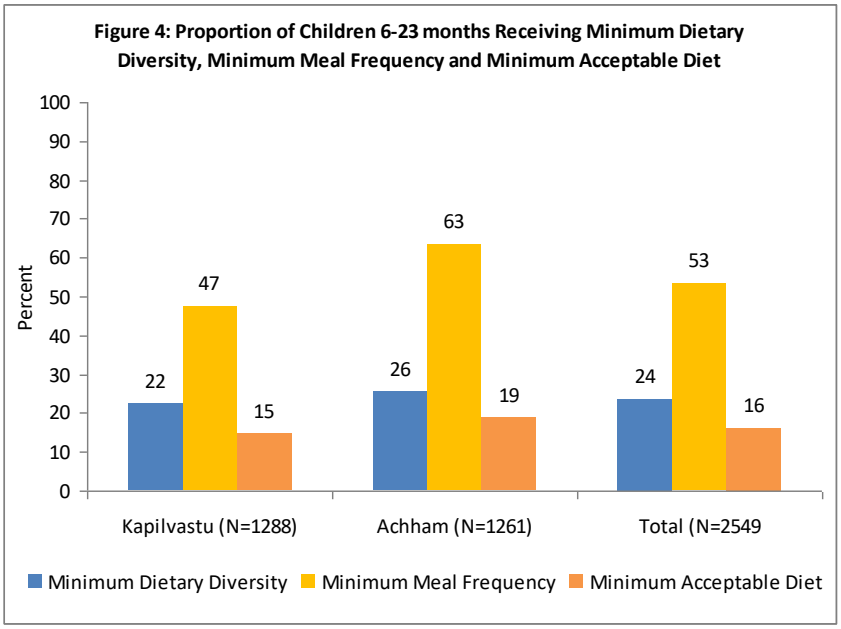


Table 5.10 shows the proportion of children receiving the recommended dietary diversity, meal frequency and acceptable diet the previous day by age group.

Table 5.10: Children Consuming the Minimum Dietary Diversity, Minimum Meal Frequency and Minimum Acceptable Diet the Previous Day, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Children consuming minimum dietary diversity[1]									
6-8 months	197	9.1	(5.5-14.8)	189	9.0	(5.2-15.1)	386	9.1	(6.2-13.1)
9-11 months	242	12.8	(8.6-18.6)	214	22.0	(16.1-29.2)	456	15.9	(12.3-20.3)
12-17 months	519	27.4	(22.2-33.2)	469	28.4	(23.3-34.1)	988	27.7	(23.8-31.9)
18-23 months	330	29.7	(24.0-36.1)	389	32.1	(26.9-37.9)	719	30.7	(26.6-35.1)
6-23 months	**1288**	**22.4**	**(18.7-26.7)**	**1261**	**25.5**	**(22.1-29.3)**	**2549**	**23.6**	**(20.8-26.6)**
Children consuming minimum meal frequency[2]									
6-8 months	197	43.1	(33.6-53.3)	189	60.8	(52.7-68.4)	386	49.5	(42.5-56.5)
9-11 months	242	31.0	(22.9-40.5)	214	50.5	(43.5-57.5)	456	37.6	(31.4-44.2)
12-17 months	519	40.8	(41.7-54.3)	469	63.1	(59.3-66.8)	988	53.2	(48.8-57.5)
18-23 months	330	61.2	(54.0-67.9)	389	72.0	(67.5-76.1)	719	65.6	(61.0-69.9)
6-23 months	**1288**	**47.4**	**(41.5-53.5)**	**1261**	**63.4**	**(60.6-66.0)**	**2549**	**53.2**	**(49.2-57.2)**
Children consuming minimum acceptable diet[3]									
6-8 months	197	8.6	(5.2-13.9)	189	7.4	(4.2-12.9)	386	8.2	(5.6-11.9)
9-11 months	242	8.3	(5.2-13.0)	214	11.2	(7.9-15.6)	456	9.3	(6.8-12.5)
12-17 months	519	16.4	(12.2-21.6)	469	21.7	(17.4-26.9)	988	18.2	(15.0-21.9)
18-23 months	330	20.0	(14.9-26.3)	389	24.4	(20.3-29.1)	719	21.8	(18.2-25.9)
6-23 months	**1288**	**14.6**	**(11.3-18.6)**	**1261**	**18.6**	**(15.9-21.7)**	**2549**	**16.1**	**(13.7-18.8)**

Note: Total % and 95%CI are weighted.

[1]Minimum dietary diversity: proportion of children who receive foods from 4 or more food groups during the previous day. The seven food groups were: (i) grains, roots and tubers; (ii) legumes and nuts; (iii) dairy products (yogurt, cheese); (iv) flesh foods (meat, fish, poultry and liver/organ meats); (v) eggs; (vi) Vitamin A rich fruits and vegetables; and (vii) other fruits and vegetables.

[2]Minimum meal frequency: proportion of children who receive solid, semi-solid, or soft foods the minimum number of times or more (minimum is defined as: 2 times for breastfed infants 6-8 months, 3 times for breastfed children 9-23 months and 4 times for non-breastfed children 6-23 months) in the previous day. Meals include both meals and snacks; and feeding frequency for non-breastfeed children includes both milk feeds and solid/semi-solid foods.

[3]Minimum acceptable diet: proportion of children who had at least the minimum dietary diversity and the minimum meal frequency during the previous day.

5.11 Types of Foods Consumed by Children in the Previous Day

Table 5.11 provides information on types of foods given to children 6-23 months in the day preceding the survey. In both Kapilvastu and Achham, more than nine in ten children (91% in Kapilvastu and 96% in Achham) received food made from grain/roots and tubers and seven in ten (75% in Kapilvastu and 70% in Achham) received legumes. Compared to Achham, a lower proportion of children in Kapilvastu received dairy products (47% vs 29%) or vitamin A rich fruits and vegetables (53% vs 19%). A higher proportion of children in Kapilvastu received other fruits and vegetables compared to children in Achham (29% vs 11%).

Table 5.11: Types of Foods Consumed by Children during the Preceding Day, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Food Items[a]									
Food made from grains, roots and tubers	1169	99.6	(99.2-99.8)	1208	100.0	—	2377	99.7	(99.5-99.9)
Legumes and nuts	968	84.5	(78.5-86.4)	882	73.0	(69.1-76.9)	1850	78.9	(75.9-81.9)
Dairy products	370	31.5	(26.7-36.4)	597	49.4	(45.0-53.8)	967	38.2	(34.3-42.1)
Meat/fish	145	12.4	(9.6-15.1)	72	6.0	(4.2-7.8)	217	10.0	(8.0-11.9)
Eggs	69	5.9	(4.1-7.6)	31	2.0	(1.4-3.8)	100	4.6	(3.4-5.9)
Vitamin A rich fruits and vegetables	245	20.9	(17.9-23.9)	668	55.3	(51.0-59.6)	913	33.7	(29.4-38.1)
Other fruits and vegetables	372	31.7	(28.6-34.8)	139	11.5	(6.5-16.5)	511	24.1	(20.7-27.6)
Fortified complementary food	46	3.9	(2.2-5.6)	8	0.7	(0.2-1.1)	54	2.7	(1.6-3.8)
Total (N)	**1174**			**1208**			**2382**		

Note: Total % and 95%CI are weighted.

[a]Multiple responses. The responses options were not read to the participants. Excluding those not yet introduced to complementary foods.

5.12 Feeding Practices of Sarbottom Lito/Pitho

All the respondents were asked whether their child was fed Sarbottom Lito/Pitho during the previous day. Few mothers in both districts (5% in Kapilvastu and 3% in Achham) reported that the child was fed Sarbottom Lito/Pitho yesterday (Table 5.12).

Table 5.12: Child Fed Sarbottom Lito/Pitho during the Preceding Day, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Respondent reported giving Sarbottom Lito/Pitho to the child yesterday[1]	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Yes	64	5.0	(3.1-8.0)	34	2.7	(1.9-3.7)	98	4.1	(2.8-6.0)
No	1223	95.0	(92.0-96.9)	1227	97.3	(96.3-98.1)	2450	95.8	(94.0-97.1)
Don't know	1	0.1	(0.0-0.6)	0	-	-	1	0.0	(0.0-0.4)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[1]Sarbottom Lito/Pitho is the Nepali name for Super-Flour.

5.13 Frequency of Plate Sharing during Meals by Children

During meals, some children eat from the same plate with other children or with the mother/caregiver in both Kapilvastu and Achham (Table 5.13). In Kapilvastu, 24% of children shared a plate for all or most of their meals with another child; this was reported for 7% of children in Achham. The majority of the children in both districts do not share their plate with another child (52% in Kapilvastu and 70% in Achham). In Kapilvastu, 37% of children eat from the same plate as their mother or cargiver for all or most of their meals, while 8% did so in Achham. Around four in ten (41%) children in Kapilvastu and almost half (48%) in Achham do not share a plate while eating with their mother or caregiver.

Table 5.13: Frequency of Plate Sharing by Children 6-23 months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Child eats from the same plate along with another child[1]									
All of the meals	153	12.7	(9.0-17.5)	7	0.6	(0.2-1.6)	160	8.1	(5.9-11.2)
Most of the meals but not all the meals	131	10.9	(8.5-13.8)	77	6.2	(4.6-8.3)	208	9.1	(7.5-11.0)
A few meals but not often	295	24.5	(21.7-27.5)	285	22.9	(20.6-25.4)	580	23.9	(21.9-26.0)
None of the meals	626	52.0	(46.5-57.4)	876	70.4	(67.4-73.2)	1502	58.9	(55.2-62.4)
Child eats from the same plate along with the mother or caregiver[1]									
All of the meals	192	15.9	(11.9-21.1)	6	0.5	(0.2-1.0)	198	10.1	(7.6-13.4)
Most of the meals but not all the meals	255	21.2	(18.2-24.5)	89	7.1	(5.6-9.1)	344	15.9	(13.9-18.1)
A few meals but not often	269	22.3	(19.8-25.1)	554	44.5	(41.6-47.5)	823	30.6	(28.7-32.7)
None of the meals	489	40.6	(34.2-47.3)	596	47.9	(44.4-51.3)	1085	43.3	(39.1-47.7)
Total (N)	**1205**			**1245**			**2450**		

Note: Total % and 95%CI are weighted.
[1]Excludes those children who were not yet introduced with the complementary foods.

6.0 Knowledge about Micronutrients

The IYCF/Baal Vita intervention package includes a behavior change component that provided information to mothers and families about the need for diverse diets and specific vitamins and minerals for good health and development of children. The survey assessed baseline knowledge about these topics among mothers of the selected children in the two districts. This chapter describes respondents' knowledge of various micronutrients, particularly vitamin A, iron and iodine.

6.1 Importance of Dietary Diversification for the Human Body

Table 6.1 presents knowledge among mothers of the importance of dietary diversification for good health. In both Kapilvastu and Achham, the most commonly reported reason for dietary diversification was for strength and to have a strong body (83% in Kapilvastu and 79% in Achham), followed by supporting physical growth (44% in Kapilvastu and 50% in Achham). The other reported reasons for dietary diversification were to improve immunity or to prevent disease, for taste, to consume sufficient vitamins and minerals for health, for mental development, and for taste.

Table 6.1: Knowledge of the Importance of Eating a Variety of Foods, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Reasons for eating a variety of food[a]	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Strength/strong body	1069	83.0	(80.6-85.1)	1001	79.4	(76.5-82.0)	2070	81.7	(79.9-83.4)
Physical growth	566	43.9	(39.4-48.6)	627	49.7	(46.5-52.9)	1193	46.0	(42.9-49.2)
Improve immunity/prevent disease	179	13.9	(10.5-18.2)	455	36.1	(31.5-40.9)	634	21.9	(19.1-25.1)
For taste	344	26.7	(21.7-32.4)	216	17.1	(14.3-20.4)	560	23.2	(19.8-27.0)
To get sufficient vitamins and minerals for health/balanced diet	171	13.3	(9.8-17.7)	281	22.3	(19.4-25.5)	452	16.5	(14.0-19.4)
Mental development	133	10.3	(7.9-13.4)	148	11.7	(8.9-15.3)	281	10.8	(8.9-13.1)
Others[1]	0	-	-	76	6.0	(4.2-8.6)	76	2.2	(1.5-3.1)
Don't know	3	0.2	(0.1 -1.0)	20	1.6	(0.8-3.0)	23	0.7	(0.4-1.3)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were not read to the participants.
[1]Others include: to survive, and to increase blood.

6.2 Main Types of Vitamins and Minerals Important for Health

The respondents were asked what vitamins and minerals they thought are important for health, and the reported responses are shown in Table 6.2. More than eight in ten (83%) in Achham and around half (52%) in Kapilvastu did not know any types of vitamins and minerals important for health. Around a quarter (26%) in Kapilvastu and 14% in Achham reported vitamin A is important for health. Likewise, 13% in Kapilvastu and 4% in Achham stated iron is important. Further, another 13% in Kapilvastu and 3% in Achham said that "vitamin" is important for health but could not specify the types of vitamin.

Table 6.2: Knowledge of the Main Types of Vitamins and Minerals Important for Health, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Reported vitamins and minerals that are important for health[a]	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Vitamin A	338	26.2	(21.4-31.7)	171	13.6	(10.8-16.9)	509	21.6	(18.4-25.3)
Iron	163	12.7	(9.9-16.1)	50	4.0	(2.7-5.7)	213	9.5	(7.6-11.8)
Vitamin (Not specified)	174	13.5	(10.5-17.2)	39	3.1	(2.0-4.8)	213	9.7	(7.8-12.1)
Others[1]	108	8.4	(5.7-12.1)	58	4.6	(3.2-6.5)	166	7.0	(5.2-9.4)
Don't know	668	51.9	(47.0-56.7)	1048	83.1	(79.6-86.1)	1716	63.2	(59.8-66.5)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were not read to the participants.
[1]Others include: vitamin B, vitamin C, vitamin D, vitamin E, iodine, calcium, zinc, folic acid, carbohydrate and protein

6.3 Source of Vitamins and Minerals

Respondents' where asked to name the main sources of vitamins and minerals (Table 6.3). The most frequently reported sources of vitamin and minerals in both Kapilvastu and Achham were fruits (65% in Kapilvastu and 73% in Achham), meat/fish/eggs (54% in Kapilvastu and 74% in Achham) and vegetables (54% in Kapilvastu and 39% in Achham). The other reported sources of vitamins and minerals were milk, legumes soup and green leafy vegetables.

Table 6.3: Knowledge on Sources of Vitamin and Minerals, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
Sources of Vitamin and Minerals[a]	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
Fruits	842	65.4	(59.0-71.2)	914	72.5	(66.8-77.5)	1756	67.9	(63.4-72.1)
Vegetables	701	54.4	(51.5-57.3)	492	39.0	(35.6-42.6)	1193	48.8	(46.6-51.1)
Meat, fish, egg	690	53.6	(49.9-57.2)	935	74.1	(71.1-77.0)	1625	61.0	(58.4-63.6)
Milk	40	3.1	(2.1-4.5)	173	13.7	(10.4-18.0)	213	7.0	(5.5-8.7)
Dal/Legumes soup	25	1.9	(1.0-3.7)	179	14.2	(11.6-17.3)	204	6.4	(5.2-7.8)
Green leafy vegetables	28	2.2	(1.2-4.1)	192	15.2	(12.7-18.1)	220	6.9	(5.7-8.4)
Others[1]	109	8.5	(6.2-11.4)	302	23.9	(21.3-26.9)	411	14.1	(12.3-16.1)
Don't know	176	13.7	(10.0-18.4)	64	5.1	(3.8-6.8)	240	10.6	(8.1-13.6)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were not read to the participants.
[1]Others include: food fortified with vitamins and minerals, vitamin and mineral supplements (tablets or liquids), ghee, yoghurt/curd, nettle, rice, honey, oil, and dry fruits (cashew/almond/coconut).

6.4 Knowledge of Anemia

Anemia is a common nutritional problem in Nepal, where almost half the children and a little over one-third of women are anemic (MoHP, 2011). The respondents were asked whether they had heard of anemia. Of those who reported hearing of it, they were asked where they learned about anemia, the meaning of anemia, causes and negative consequences of anemia. Table 6.4 shows that in Kapilvastu, 29% had heard of anemia, as had 16% in Achham. Among those who have heard of anemia, the majority in both districts had heard about it from health facility staff or health workers; others had heard about it at school from teachers or students, or from female community health volunteers (FCHVs).

As shown in Table 6.4, 73% of respondents in Kapilvastu and 88% in Achham stated that anemia is a disorder of the blood or lack of blood. Likewise, 48% in Kapilvastu and 17% in Achham said that anemia is paleness. About one-third of the respondents in both districts (32% in Kapilvastu and 33% in Achham) knew a negative consequence of anemia is a decreased ability to learn, and 27% in Kapilvastu and 35% in Achham said the brain does not develop well. Other reported negative consequences of anemia were decreased ability to read and write, and feeling weak, tired, or lazy.

Table 6.4: Knowledge about Anemia, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Ever heard of anemia									
Yes	370	28.7	(25.2-32.5)	199	15.8	(12.9-19.2)	569	24.0	(21.5-26.7)
No	896	69.6	(65.5-73.3)	1027	81.4	(77.6-84.7)	1923	73.9	(71.0-76.6)
Don't Know	22	1.7	(0.8-3.6)	35	2.8	(1.7-4.4)	57	2.1	(1.3-3.3)
Total (N)	**1288**			**1261**			**2549**		
Sources of knowledge about anemia[a,b]									
Health facility/health workers	239	64.6	(58.2-70.5)	132	66.3	(59.2-72.8)	371	65.0	(59.9-69.8)
School/teacher/students	95	25.7	(18.4-34.6)	51	25.6	(17.5-35.9)	146	25.7	(19.6-32.8)
Radio	45	12.2	(8.6-17.0)	55	27.6	(21.4-34.9)	100	15.8	(12.7-19.6)
Friends/neighbors	65	17.6	(13.3-22.8)	12	6.0	(3.3-10.7)	77	14.8	(11.5-18.9)
FCHV	60	16.2	(11.6-22.3)	55	27.6	(19.5-37.6)	115	18.9	(14.7-24.1)
Television	29	7.8	(4.9-12.3)	8	4.0	(1.5-10.6)	37	6.9	(4.5-10.5)
Others[1]	49	13.2	(9.1-18.9)	32	16.1	(11.2-22.5)	81	13.9	(10.4-18.3)
Meaning of anemia[a,b]									
Paleness	178	48.1	(39.4-56.9)	34	17.1	(10.9-25.8)	212	40.7	(33.6-48.2)
Disorder of the blood/lack of blood	269	72.7	(65.9-78.6)	176	88.4	(82.4-92.6)	445	76.4	(71.2-81.0)
Others[2]	28	7.6	(4.6-12.1)	7	3.5	(1.6-7.7)	35	6.6	(4.3-10.1)
Don't know	16	4.3	(2.4 -7.7)	15	7.5	(4.4-12.7)	31	5.1	(3.3-7.8)
Negative consequences of anemia in children[a,b]									
Decreased ability to learn	119	32.2	(26.6-38.2)	66	33.2	(26.0-41.2)	185	32.4	(27.8-37.4)
Decreased ability to read and write	53	14.3	(9.5-21.0)	41	20.6	(15.3-27.2)	94	15.8	(11.8-20.9)
Brain does not develop well	101	27.3	(20.3-35.6)	70	35.2	(26.4-45.1)	171	29.2	(23.3-35.8)
Feeling weak/tired/lazy	68	18.4	(13.9-24.0)	39	19.6	(13.3-28.0)	107	18.7	14.8-23.3)
Weight loss	37	10.0	(6.1-15.9)	14	7.0	(3.7-12.8)	51	9.3	(6.1-13.8)
Others[3]	25	6.8	(4.4-10.3)	33	16.6	(11.6-23.2)	58	9.1	(6.8-12.1)
Don't know	71	19.2	(14.9-24.4)	24	12.1	(7.8-18.2)	95	17.5	(14.0-21.6)
Total (N)	**370**			**199**			**569**		

Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were not read to the participants.
[b]Includes those who have heard of anemia.
[1]Others include: implementing organization/field worker, mother's group meeting, husband, other family members/relatives, social mobilizers, flipchart, pamphlet/brochure, poster, book, training/FCHV training, and magazine/newspaper.
[2]Others include: weakness, swelling, night blindness, beriberi, jaundice, marasmus, and giddiness/dizziness.
[3]Others include: decrease immunity, giddiness, malnutrition, death, and disability/poliomyelitis.

6.5 Knowledge of Iron

Iron deficiency is one of the most important causes of anemia worldwide (Stevens et al. 2013). Consequences of iron deficiency include symptoms such as lack of energy, pallor and blood loss; severe consequences include impaired cognitive development, growth impairment and immune deficiencies (Viteri, 1998). According to the Ministry of Health Policy, iron and folic acid tablets are to be routinely distributed to pregnant and postpartum mothers through health facilities including outreach clinics and through FCHV (MoHP, 2008). Respondents were asked if they had heard of iron, why the body needs iron, and food sources of iron.

A higher proportion of mothers or caretakers in Kapilvastu had heard of iron than in Achham (87% vs 63%). Among those who had heard of iron, the most common response in both districts as to why iron is required by the body was to make blood (89% in Kapilvastu and 86% in Accham). In Kapilvastu, reported food sources of iron included green leafy vegetables (66%); meat, fish, or eggs (50%); and fruits (34%). Respondents in Achham reported that iron food sources were meat, fish or egg (63%); green leafy vegetables (52%); and pulses (48%) (Table 6.5).

Table 6.5: Knowledge about Iron, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
Ever heard of iron									
Yes	1118	86.8	(83.0-89.9)	793	62.9	(59.1-66.5)	1911	78.1	(75.4-80.6)
No	170	13.2	(10.1-17.0)	468	37.1	(33.5-40.9)	638	21.9	(19.4-24.6)
Total (N)		**1288**			**1261**			**2549**	
Why the body needs iron[a,b]									
To make/increase blood	995	89.0	(85.3-91.9)	681	85.9	(82.2-88.9)	1676	88.1	(85.3-90.4)
For brain development	80	7.2	(5.0-10.1)	33	4.2	(3.1-5.6)	113	6.3	(4.7-8.4)
To be strong	151	13.5	(10.4-17.4)	35	4.4	(3.0-6.5)	186	10.9	(8.6-13.7)
Others[1]	42	3.8	(2.7-5.2)	54	6.8	(5.0-9.1)	96	4.6	(3.7-5.8)
Don't know	50	4.5	(2.9-6.9)	82	10.3	(7.6-13.9)	132	6.2	(4.7-8.1)
Food sources of iron[a,b]									
Meat, fish, egg	559	50.0	(44.6-55.4)	500	63.1	(59.0-66.9)	1059	53.8	(49.7-57.8)
Pulses	334	29.9	(26.3-33.7)	382	48.2	(44.1-52.2)	716	35.2	(32.4-38.1)
Green leafy vegetables	738	66.0	(61.9-69.9)	412	52.0	(47.4-56.5)	1150	61.9	(58.7-65.0)
Fruits	379	33.9	(30.1-37.9)	257	32.4	(27.7-37.5)	636	33.5	(30.4-36.7)
Others[2]	102	9.1	(7.4-11.2)	181	22.8	(19.6-26.4)	283	13.1	(11.5-14.9)
Don't know	182	16.3	(13.1-20.0)	119	15.0	(12.4-18.0)	301	15.9	(13.5-18.6)
Total (N)		**1118**			**793**			**1911**	

Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were not read to the participants.
[b]Includes those who have heard of iron.
[1]Others include: transport oxygen in the body, improves ability to learn/read and write, for development of fetus, increase immune power, gain weight, and for keeping healthy.
[2]Others include: liver, food fortified with iron, milk, yoghurt/curd, ghee, food cooked in iron vessels, millet, rice, and honey.

7.0 Early Childhood Development

Early childhood is a time of physical, cognitive, social and emotional development and early child development programs aim to address the total wellbeing and development of the child by addressing risk factors and improving the development, growth, and survival of young children (Engle et al. 2007). Early care can focus on educating children about links to family, home culture, and home language and parents play a critical role in children's early learning process (Anning et. al., 2004). This chapter describes the various activities of early childhood development that the respondents and their family members did with the child during the previous three days, as well as assessed age specific development of the child in gross motor and communication skills.

7.1 Child Play with Toys or Other Objects

Early childhood education focuses on children's learning through play (Tassoni, 2000). Table 7.1 shows that almost all children aged 6-23 months in both districts play with toys or other objects including bowls or pots or objects found outside such as stick, animal shells, or leaves. The prevalence of children playing with toys or other objectives by background characteristics is shown in Table F10 in Annex F.

Table 7.1: Early Childhood Development: Child Plays with Toys or Other Objects, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
Child play with toys or other objects[1]	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
Yes	1277	99.1	(98.4-99.5)	1249	99.0	(98.1-99.5)	2526	99.1	(98.6-99.4)
No	11	0.9	(0.5-1.6)	12	1.0	(0.5-1.9)	23	0.9	(0.6-1.4)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[1]Example of other objects includes bowls or pots or object found outside such as stick, animal shells or leaves.

7.2 Presence of Child's Mother and Father in the Household and Early Childhood Development Activities

Early childhood development is influenced by interaction with family members. It is recognized that positive and stimulating maternal interactions with infants are related to optimal child development (Poehlmann and Fiese, 2001; Tamis-LeMonda et. al., 2001), as well as sensitive, responsive father-infant interactions (Magill-Evans and Harrison, 2001; Shannon et. al., 2002).

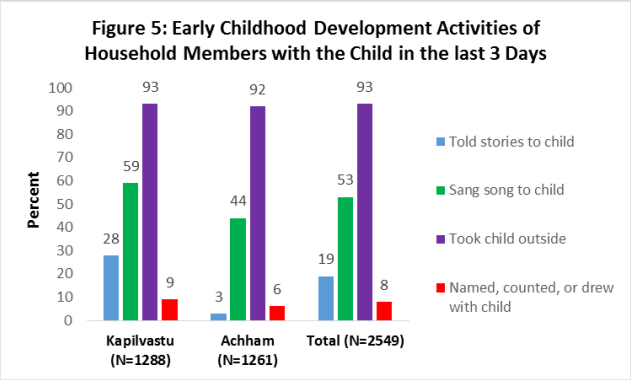
Table 7.2 describes the presence of the child's mother and father in the household in the last 3 days and the early childhood development activities carried out by the mother, father and other family members during those 3 days. In Kapilvastu, in about two-thirds of the households (67%) both the mother and father were present and in the remaining one-third (33%) only the mother was present. In Achham, in about half of the households (49%) both the mother and father were present, and in the other half (51%) only the mother was present. In both districts, it was uncommon in the households for both the mother and father to be absent, or for only the father to be present.

Table 7.2: Presence of Child's Mother and Father in the Household during the Last 3 days and Early Childhood Development Activities, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
Children's mother and father present in the household									
Mother and father both	862	66.9	(63.1-70.5)	622	49.3	(44.9-53.8)	1484	60.5	(57.6-63.4)
Only mother	423	32.8	(29.1-36.8)	637	50.5	(46.0-55.0)	1060	39.2	(36.4-42.2)
Only father	2	0.2	(0.0-0.6)	1	0.1	(0.0-0.6)	3	0.1	(0.0-0.4)
None of them	1	0.1	(0.0-0.6)	1	0.1	(0.0-0.6)	2	0.1	(0.0-0.3)
Household members told stories to child[a]									
Mother	212	16.5	(11.9-22.3)	24	1.9	(1.0-3.5)	236	11.2	(8.3-15.0)
Father	68	5.3	(3.8-7.3)	11	0.9	(0.4-2.1)	79	3.7	(2.7-5.0)
Other family member	213	16.5	(12.1-22.1)	17	1.3	(0.8-2.3)	230	11.0	(8.2-14.7)
No one	927	72.0	(63.4-79.2)	1227	97.3	(95.5-98.4)	2154	81.2	(75.5-85.7)
Household members sang songs to child[a]									
Mother	672	52.2	(47.3-57.0)	493	39.1	(33.4-45.1)	1165	47.4	(43.7-51.2)
Father	99	7.7	(6.2-9.6)	140	11.1	(8.8-13.9)	239	8.9	(7.6-10.4)
Other family member	388	30.1	(26.1-34.5)	214	17.0	(14.3-20)	602	25.4	(22.6-28.4)
No one	535	41.5	(36.8-46.4)	712	56.5	(50.3-62.4)	1247	46.9	(43.2-50.7)
Household members took child outside[a]									
Mother	739	57.4	(49.3-65.1)	971	77.0	(72.2-81.3)	1710	64.5	(59.0-69.9)
Father	455	35.3	(30.3-40.7)	422	33.5	(28.6-38.7)	877	34.7	(31.0-38.5)
Other family member	834	64.8	(61.0-68.3)	456	36.2	(31.9-40.7)	1290	54.4	(51.5-57.2)
No one	85	6.6	(5.2-8.4)	104	8.2	(6.2-11.0)	189	7.2	(6.0-8.7)
Household members played with child[a]									
Mother	584	45.3	(36.6-54.4)	902	71.5	(68.1-74.7)	1486	54.8	(48.9-60.6)
Father	299	23.2	(17.8-29.7)	355	28.2	(24.4-32.3)	654	25.0	(21.1-29.3)
Other family member	758	58.9	(55.1-62.5)	417	33.1	(29.9-36.5)	1175	49.5	(46.8-52.2)
No one	245	19.0	(16.0-22.5)	212	16.8	(13.6-20.6)	457	18.2	(15.9-20.8)
Household members named, counted or drew with the child[a]									
Mother	32	2.5	(1.6-3.7)	52	4.1	(3.1-5.5)	84	3.1	(2.4-4.0)
Father	12	0.9	(0.5-1.8)	31	2.5	(1.7-3.6)	43	1.5	(1.1-2.1)
Other family member	73	5.7	(3.7-8.6)	17	1.3	(0.7-2.5)	90	4.1	(2.8-5.9)
No one	1179	91.5	(88.7-93.7)	1187	94.1	(92.5-95.4)	2366	92.5	(90.6-94.0)
Total (N)	**1288**			**1261**			**2549**		

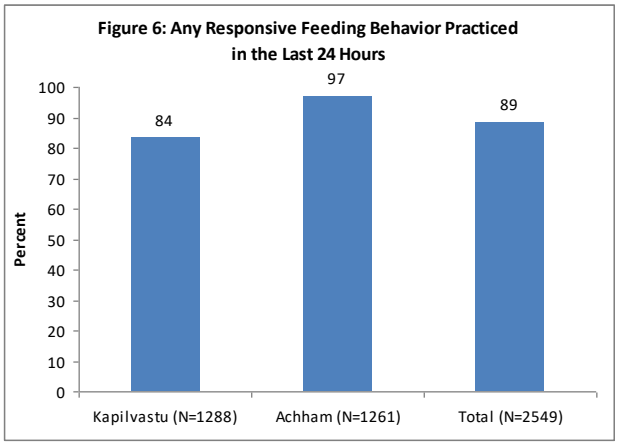
Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were read to the participants.

Among the early childhood development activities carried out by a household member (mother, father, or other) during the previous three days, in both districts the most common was taking the child outside (93% in Kapilvastu and 92% in Achham) (Figure 5). In Kapilvastu, in almost three in ten households (28%) a family member had told stories to the child during the last 3 days; in almost six in ten households, a family member had sang a song to the child; while in 9% of households a family member named, counted or drew with the child. In Achham, during the previous three days, in 3% of households any household member had told stories to the child; in 44% any household member had sang a song to the child; and in 6% any household member had named, counted or drew with the child. In both districts, with a few exceptions mothers carried out the early childhood development activities with the child most often compared to other family members (Table 7.2). Few in either district reported any family member named, counted or drew with the child. Approximately one-third of fathers took the child outside in both districts, while few participated in telling the child stories or singing songs to the child.



7.3 Responsive Feeding

Responsive or active feeding of infants and young children requires active care and stimulation, where the caregiver is responsive to the child clues for hunger and also encourages the child to eat (PAHO, 2003). It also involves talking to the child during feeding and engaging in eye to eye contact.



Responsive feeding is a complex set of behaviors. Through participant self-report, this survey captured several key elements of responsive feeding (keeping eye contact with the child, singing to the child, or talking to the child while feeding), but note that not all elements of responsive feeding were assessed. Figure 6 shows that 84% of mothers in Kapilvastu and 97% of mothers in Achham reported using at least one responsive feeding behavior assessed with the child during the previous 24 hours. Table 7.3 describes responsive feeding behaviors of mothers during the last 24 hours. The respondents were asked if they had practiced any of the responsive feeding behaviors, such as eye contact, singing, or talking to the child while feeding in the last 24 hours. In Kapilvastu, around six in ten (59%) reported eye contact while feeding, four in ten (43%) sang to the child, and eight in ten (80%) talked to the child while feeding. In Achham, over eight in ten (81%) reported eye contact, three in ten (29%) sang and more than nine in ten (93%) talked to the child.

Table 7.3: Early Childhood Development: Responsive Feeding Practices, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Types of responsive feeding practiced in last 24 hours[a]	Kapilvastu			Achham			Total		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
Eye contact with the child	755	58.6	(55.1-62.0)	1015	80.5	(74.1-85.6)	1770	66.5	(63.5-69.5)
Singing to the child	553	42.9	(37.3-48.7)	362	28.7	(24.8-33.0)	915	37.8	(33.9-41.8)
Talking to the Child	1028	79.8	(76.4-82.8)	1171	92.9	(90.6-94.6)	2199	84.5	(82.3-86.6)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.
[a]Multiple responses. The responses options were read to the participants.

7.4 Perceived Importance of Communication with Child during Feeding

The respondents were asked about the importance of talking with the child during feeding. Almost all mothers in Achham and 95% in Kapilvastu reported it is important to talk with the child while feeding (Table 7.4).

Table 7.4: Early Childhood Development: Perceived Importance of Communication with Child during Feeding, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Activities	Kapilvastu			Achham			Total		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
Reported communication with child during feeding was important									
Yes	1225	95.1	(92.3-96.9)	1259	99.8	(99.4-100.0)	2484	96.8	(95.0-98.0)
No	63	4.9	(3.1-7.7)	2	0.2	(0.0-0.6)	65	3.2	(2.0-5.0)
Total (N)	**1288**			**1261**			**2549**		

Note: Total % and 95%CI are weighted.

7.5 Communication Module

To monitor the child's early development, the Ages & Stages Questionnaire (ASQ), an assessment tool that provides information about the developmental status of young children across five areas was used: communication, gross motor, fine motor, problem solving and personal-social (Squires and Bricker, 2009). However, for this survey, only the communication and gross motor module was used. The modules had questions that were age specific and asked for specific age categories grouped into one or two month age groups.

Table 7.5 describes the results of the communication module by children's age and sex. The mothers or caretakers were asked whether the child does the specific activities in the communication module specific to the child's age group. The child received one point if the mother reported the child does the activity; there were six activities in the module and a child could receive up to a total of six points. At 6 months old the mean score for the communication module in Kapilvastu was 4.0 while that for Achham was 4.5. At 7-8 months, the mean score for the communication module was 3.5 for Kapilvastu and 4.3 for Achham. At 9-10 months, the mean was 3.2 in Kapilvastu and 4.0 in Achham.

Table 7.5: Distribution of Age Specific Response Score to Communication Module by Sex of the Child, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	Mean Score	SD	n	Mean Score	SD	n	Mean Score	SD
6 months Child									
Male	25	3.96	1.43	38	4.05	1.79	63	4.00	1.59
Female	21	4.10	1.14	29	5.14	1.13	50	4.56	1.24
Total (N)	**46**	**4.02**	**1.29**	**67**	**4.52**	**1.62**	**113**	**4.25**	**1.47**
7-8 months Child									
Male	79	3.54	1.08	66	4.30	1.45	145	3.79	1.26
Female	72	3.40	1.34	56	4.25	1.46	128	3.67	1.43
Total (N)	**151**	**3.48**	**1.21**	**122**	**4.28**	**1.45**	**273**	**3.73**	**1.34**
9-10 months Child									
Male	85	2.95	1.46	67	4.16	1.81	152	3.33	1.67
Female	92	3.35	1.29	65	3.72	1.82	157	3.46	1.47
Total (N)	**177**	**3.16**	**1.39**	**132**	**3.95**	**1.83**	**309**	**3.40**	**1.57**
11-12 months Child									
Male	68	3.62	1.56	77	3.97	1.70	145	3.76	1.62
Female	71	3.77	1.73	87	4.30	1.64	158	3.99	1.70
Total (N)	**139**	**3.70**	**1.64**	**164**	**4.15**	**1.67**	**303**	**3.88**	**1.66**
13-14 months Child									
Male	95	3.05	1.59	81	4.22	1.84	176	4.44	1.76
Female	81	2.84	1.71	68	4.15	1.86	149	3.27	1.86
Total (N)	**176**	**2.95**	**1.64**	**149**	**4.19**	**1.84**	**325**	**3.36**	**1.80**
15-16 months Child									
Male	107	2.69	1.43	91	4.07	1.60	198	3.15	1.62
Female	88	3.24	1.60	70	3.94	1.68	158	3.46	1.65
Total (N)	**195**	**2.94**	**1.53**	**161**	**4.01**	**1.63**	**356**	**3.29**	**1.64**
17-18 months Child									
Male	73	2.77	1.37	88	3.23	1.79	161	2.96	1.57
Female	64	2.64	1.55	52	3.69	1.79	116	2.98	1.69
Total (N)	**137**	**2.71**	**1.45**	**140**	**3.04**	**1.79**	**277**	**2.97**	**1.62**
19-20 months Child									
Male	59	2.05	1.73	54	3.39	1.75	113	2.69	1.86
Female	43	2.47	1.88	62	3.60	1.82	105	3.13	1.92
Total (N)	**102**	**2.27**	**1.76**	**116**	**3.48**	**1.81**	**218**	**2.76**	**1.87**
21-22 months Child									
Male	56	3.52	1.55	69	3.90	1.62	125	3.73	1.59
Female	56	2.86	1.73	59	4.10	1.99	115	3.50	1.96
Total (N)	**112**	**3.19**	**1.17**	**128**	**3.99**	**1.79**	**240**	**3.51**	**1.76**
23 months Child									
Male	30	4.10	1.95	40	4.65	1.53	70	4.41	1.73
Female	23	4.39	1.73	42	4.48	1.58	65	4.45	1.62
Total (N)	**53**	**4.23**	**1.85**	**82**	**4.56**	**1.55**	**135**	**4.38**	**1.71**

Note: Total % and 95%CI are weighted.
The score of 1 was given to the response if the child does so
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At 11-12 months, the score was 3.7 in Kapilvastu and 4.2 in Achham. At 13-14 months, it was 3.0 in Kapilvastu and 4.2 in Achham. At 15-16 months, it was 2.9 in Kapilvastu and 4.0 in Achham. At 17-18 months, it was 2.7 in Kapilvastu and 3.0 in Achham. At 19-20 months, it was 2.3 in Kapilvastu and 3.5 in Achham. At 21-22 months, it was 3.2 in Kapilvastu and 4.0 in Achham. At 23 months, it was 4.2

in Kapilvastu and 4.6 in Achham. There was little variation in the mean score of the communication module by sex of the children in either district (Table 7.5).

7.6 Gross Motor Module

Table 7.6 presents the results of the gross motor module by children's age and sex. The mothers or caretakers were asked whether the child does the specific activities of the gross motor module for the child's specific age group. The child received one point if the mother reported the child does the activity; there were six activities in the module and a child could receive up to a total of six points. At 6 months old the mean score for the gross motor module in Kapilvastu was 3.0 while that for Achham was 4.3. At 7-8 months, the mean score was 3.3 in Kapilvastu and 4.4 in Achham. At 9-10 months, it was 2.9 in Kapilvastu and 4.4 in Achham.

Table 7.6: Distribution of Age Specific Response Score to Gross Motor Module by Sex of the Child, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	N	Mean Score	SD	N	Mean Score	SD	N	Mean Score	SD
6 months Child									
Male	25	3.20	1.00	38	4.21	1.55	63	3.67	1.37
Female	21	2.67	1.35	29	4.45	1.40	50	3.46	1.63
Total (N)	**46**	**2.96**	**1.19**	**67**	**4.31**	**1.48**	**113**	**3.58**	**1.49**
7-8 months Child									
Male	79	3.49	1.46	66	4.32	1.60	145	3.76	1.55
Female	72	3.11	1.48	56	4.59	1.37	128	3.57	1.60
Total (N)	**151**	**3.31**	**1.48**	**122**	**4.44**	**1.50**	**273**	**3.67**	**1.57**
9-10 months Child									
Male	85	2.75	1.73	67	4.49	1.56	152	3.33	1.67
Female	92	3.09	1.86	65	3.77	2.01	157	3.30	1.86
Total (N)	**177**	**2.93**	**1.80**	**132**	**4.41**	**1.83**	**309**	**3.29**	**1.89**
11-12 months Child									
Male	68	2.99	1.92	77	4.01	1.85	145	3.39	1.95
Female	71	2.94	2.13	87	4.23	1.90	158	3.48	2.13
Total (N)	**139**	**2.96**	**2.02**	**164**	**4.13**	**1.87**	**303**	**3.44**	**2.04**
13-14 months Child									
Male	95	3.22	2.25	81	4.51	1.70	176	3.65	2.17
Female	81	2.95	2.10	68	4.40	1.75	149	3.42	2.10
Total (N)	**176**	**3.10**	**2.18**	**149**	**4.46**	**1.71**	**325**	**3.54**	**2.13**
15-16 months Child									
Male	107	3.26	2.47	91	4.79	1.85	198	3.77	2.39
Female	88	3.92	2.33	70	4.63	2.02	158	4.14	2.25
Total (N)	**195**	**3.56**	**2.42**	**161**	**4.72**	**1.92**	**356**	**3.94**	**2.33**
17-18 months Child									
Male	73	4.53	1.84	88	5.06	1.53	161	4.75	1.73
Female	64	4.02	2.25	52	5.31	1.34	116	4.43	2.09
Total (N)	**137**	**4.29**	**2.05**	**140**	**5.15**	**1.46**	**277**	**4.61**	**1.90**
19-20 months Child									
Male	59	4.02	2.06	54	5.01	1.40	113	4.37	1.91
Female	43	4.19	2.22	62	5.00	1.45	105	4.56	1.94
Total (N)	**102**	**4.09**	**2.12**	**116**	**5.02**	**1.42**	**218**	**4.46**	**1.92**
21-22 months Child									
Male	56	4.50	1.31	69	4.68	1.35	125	4.58	1.32
Female	56	3.70	1.79	59	4.64	1.62	115	4.06	1.78
Total (N)	**112**	**4.10**	**1.61**	**128**	**4.66**	**1.47**	**240**	**4.32**	**1.58**
23 months Child									
Male	30	4.40	1.52	40	4.85	1.41	70	4.60	1.48
Female	23	4.48	1.53	42	4.86	1.46	65	4.67	1.49
Total (N)	**53**	**4.43**	**1.51**	**82**	**4.85**	**1.42**	**135**	**4.63**	**1.48**

Note: Total % and 95%CI are weighted.
The score of 1 was given to the response if the child does so
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At 11-12 months, the score was 3.0 in Kapilvastu and 4.1 in Achham. At 13-14 months, it was 3.1 in Kapilvastu and 4.5 in Achham. At 15-16 months, it was 3.6 in Kapilvastu and 4.7 in Achham. At 17-18 months, it was 4.3 in Kapilvastu and 5.2 in Achham. At 19-20 months, it was 4.1 in Kapilvastu and 5.0 in Achham. At 21-22 months, it was 4.1 in Kapilvastu and 4.7 in Achham. At 23 months, it was 4.4

in Kapilvastu and 4.9 in Achham. There were minimal variations in the mean score of gross module by sex of children in each district (Table 7.6).

8.0 Child Health

This chapter presents findings on the maternal report of prevalence and treatment of some common childhood diseases (diarrhea, respiratory infections, and fever). The maternal reports were not confirmed with a health care provider or medical examination for validation.

8.1 Prevalence of Diarrhea in the last two weeks

Diarrhea can cause dehydration, which is particularly dangerous in children and older people, and should be treated promptly to avoid serious health problems.

Table 8.1 shows the percent of children whose mothers reported they had diarrhea in the two weeks preceding the survey. Almost four in ten children (39%) had diarrhea in the two weeks before the survey, with the prevalence of 41% in Kapilvastu and 35% in Achham.

Table 8.1: Maternal or Caretaker Recall of Child Diarrhea within the Last Two weeks, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
Child had Diarrhea within last two weeks	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
Yes	525	40.8	(34.7-47.1)	445	35.3	(32.2-38.6)	970	38.8	(34.7-43)
No	763	59.2	(52.9-65.3)	816	64.7	(61.4-67.8)	1579	61.2	(57-65.3)
Total (N)	**1288**			**1261**			**2549**		
Note: Total % and 95%CI are weighted.									

8.2 Prevalence of Fever in the last two weeks

Table 8.2 presents data on the percentage of children with fever during the two weeks preceding the survey. Fever is one of the body's immune responses that attempt to neutralize a bacterial or viral infection. Fever can be caused by many different conditions ranging from the benign to the potentially serious. Respondents were asked whether their children had fever in the two weeks preceding the survey. All episodes of fever were included, regardless of the extent/intensity of the fever. Around one third of the children (34%) were reported to have had fever. Fever was more prevalent among children in Achham (39%) than compared with Kapilvastu (31%).

Table 8.2: Maternal or Caretaker Recall of Child Fever within the Last Two weeks, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	**%**	**95%CI**	**n**	**%**	**95%CI**	**n**	**%**	**95%CI**
Child suffered from fever within last two weeks									
Yes	397	30.8	(27.6-34.3)	494	39.2	(35.3-43.2)	891	33.9	(31.3-36.5)
No	891	69.2	(65.7-72.4)	767	60.8	(56.8-64.7)	1658	66.1	(63.5-68.7)
Total (N)	**1288**			**1261**			**2549**		
Note: Total % and 95%CI are weighted.									

8.3 Prevalence of Illness with a Cough in the last two weeks

Information was also collected about children who suffered from an illness with a cough during the two weeks preceding the survey. Mothers or caretakers were asked about the symptoms they had observed in their children in relation to cough.

Table 8.3 shows that 40% reported that their children had suffered from illness with a cough in the two weeks preceding the survey. There was no difference in the proportion of children suffering from cough in either district (40% in Kapilvastu and 41% in Achham). The respondents who reported that their child suffered from cough were further asked whether their child breathed faster than usual with short, rapid breaths or had difficulty breathing. About four in ten (37%) reported this occurred, with a higher proportion reporting in Achham (52%) than in Kapilvastu (28%).

Table 8.3: Maternal or Caretaker Recall of Child Cough and Problems with Breathing within the Last Two weeks, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

	Kapilvastu			Achham			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Child suffered from illness with a cough within last two weeks									
Yes	515	40.0	(36.1-44.0)	516	40.9	(37.6-44.4)	1031	40.3	(37.5-43.2)
No	773	60.0	(56-63.9)	745	59.1	(55.6-62.4)	1518	59.7	(56.8-62.5)
Total (N)		**1288**			**1261**			**2549**	
Among those with cough, those who breathed faster than usual with short, rapid breaths or had difficulty breathing[1]									
Yes	145	28.2	(23.1-33.8)	267	51.7	(45.1-58.4)	412	36.8	(32.7-41.1)
No	370	71.8	(66.2-76.9)	248	48.1	(41.4-54.7)	618	63.1	(58.8-67.2)
Don't know	0	-	-	1	0.2	(0.0-1.4)	1	0.1	(0.0-0.5)
Total (N)		**515**			**516**			**1031**	

Note: Total % and 95%CI are weighted.
[1]Includes only those children who had cough in the last two weeks.

9.0 Nutritional and Micronutrient Status of Children

This chapter provides the results of the biological analyses of micronutrient status and anthropometric measurements for children 6-23 months. The chapter provides information on the conditions and status of anemia, iron, vitamin A, folate, vitamin B_{12}, zinc, malaria, stunting, wasting and underweight among children. While malaria was assessed as part of this survey because it can influence the prevalence of anemia and micronutrient indicators, only one case was identified in Kapilvastu district, so no further data are included in this report on malaria infection.

Several indicators of micronutrient status are acute-phase reactant proteins and are influenced by the inflammatory process. In the presence of inflammation, retinol levels usually decrease so that the prevalence of vitamin A deficiency is overestimated. MRDR, an indicator of vitamin A liver stores, is not an acute-phase reactant and is not influenced by the inflammatory process (Tanumihardjo 2011). Iron status indicators, particularly ferritin, are also affected by the inflammatory process, which usually elevates ferritin values resulting in an underestimation of the prevalence of iron deficiency. Serum zinc concentration is also often reduced in the presence of inflammation. Definitions of public health problems acknowledge that inflammation can influence the interpretation of these biomarkers (WHO 2011; WHO 2011). To date there is no global guidance on how to address this issue and definitions of public health problems are based on the use of retinol and ferritin without adjustment or exclusion of those with inflammation. For this survey, AGP and CRP were collected in order to understand the influence of inflammation on the acute-phase reactant protein biomarkers and additional tables are included in Annex F describing the prevalence of inflammation (Table F1-3), and the prevalence of deficiency by each biomarker excluding those with any inflammation (Tables F4-8).

9.1 Mean Hemoglobin and Anemia Prevalence

Hemoglobin was collected from intravenous blood samples and analyzed using HemoCue® Hb-301 instruments. Hemoglobin concentrations were adjusted for altitude following WHO (WHO, 2011). Table 9.1 presents the mean hemoglobin levels and anemia prevalences among 2,458 children aged 6-23 months according to some background characteristics. The mean hemoglobin level among children in Kapilvastu was 10.9 g/dl and in Achham was 11.4 g/dl. Among all children, 43% were anemic having hemoglobin levels less than 11.0 g/dl. Prevalence of anemia was higher among children in Kapilvastu (49%) than compared with Achham (33%). Among male children, the anemia prevalence was statistically higher than female children in Kapilavastu (54% vs 43%). There was no difference in anemia by wealth quintile for either district, and in the highest quintile the prevalence of anemia was still 38% in Kapilvastu and 27% in Achham. Anemia was higher among children in Kapilvastu who were wasted or underweight compared to children who were wasted or underweight in Achham; the

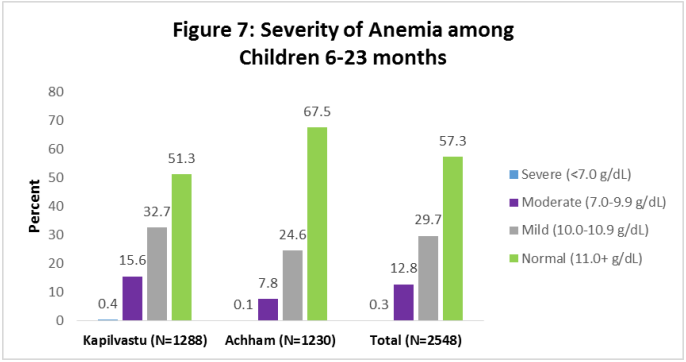
prevalence was also higher among stunted children in Kapilvastu compared to Achham, but the differences were not statistically different. In Annex F, Table F4 presents the prevalence of anemia by inflammation status.

Table 9.1: Mean Hemoglobin [a] and Anemia Prevalence in Children 6-23 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu					Achham					Total				
	Hemoglobin		Anemia Hemoglobin < 11.0 g/dL[a]			Hemoglobin		Anemia Hemoglobin < 11.0 g/dL[a]			Hemoglobin		Anemia Hemoglobin < 11.0 g/dL[a]		
	n	Mean ± SD	n	%	95% CI	n	Mean ± SD	n	%	95% CI	n	Mean ± SD	n	%	95% CI
Age in months															
6-11	420	(11.06±1.03)	420	46.2	(40.8-51.7)	385	(11.31±0.94)	385	34.8	(29.4-40.6)	805	(11.15±1.01)	805	42.2	(38.2-46.4)
12-18	550	(10.88±1.20)	550	50.7	(45.3-56.1)	524	(11.27±1.03)	524	36.6	(32.7-40.7)	1074	(11.02±1.16)	1074	45.7	(41.9-49.6)
19-23	258	(10.86±1.28)	258	48.4	(40.5-56.4)	321	(11.63±1.11)	321	23.1	(18.7-28.1)	579	(11.19±1.27)	579	37.8	(32.8-43.1)
Sex															
Female	583	(11.06±1.11)	583	42.7	(36.8-48.8)	577	(11.45±0.97)	577	30.5	(26.2-35.2)	1160	(11.20±1.08)	1160	38.3	(34.2-42.5)
Male	645	(10.82±1.21)	645	54.1	(49.4-58.8)	653	(11.31±1.08)	653	34.3	(30.5-38.3)	1298	(11.00±1.19)	1298	46.8	(43.6-50.0)
Wealth Quintile															
Lowest	244	(10.72±1.24)	244	57.0	(49.3-64.3)	244	(11.42±1.03)	244	30.3	(25.2-36.0)	488	(10.97±1.21)	488	47.2	(41.6-52.8)
Second	244	(10.85±1.09)	244	53.3	(46.6-59.8)	241	(11.27±1.05)	241	36.1	(30.8-41.8)	485	(11.00±1.09)	485	47.0	(42.3-51.8)
Middle	250	(10.97±1.04)	250	50.4	(42.9-57.9)	255	(11.40±1.12)	255	35.7	(29.5-42.4)	505	(11.13±1.09)	505	44.9	(39.5-50.4)
Fourth	240	(10.97±1.24)	240	44.6	(37.5-51.9)	254	(11.30±1.00)	254	33.5	(26.9-40.7)	494	(11.09±1.16)	494	40.4	(35.3-45.7)
Highest	250	(11.18±1.17)	250	38.4	(31.9-45.4)	236	(11.49±0.95)	236	26.7	(21.7-32.3)	486	(11.29±1.11)	486	34.3	(29.8-39.1)
Stunted[b]															
Yes	476	(10.84±1.28)	476	50.2	(44.5-55.9)	109	(11.23±1.09)	109	38.5	(30.4-47.4)	285	(10.80±1.25)	285	51.6	(46.0-57.1)
No	749	(11.00±1.08)	749	47.7	(42.8-52.6)	1118	(11.39±1.03)	1118	32.0	(28.7-35.5)	2167	(11.14±1.11)	2167	41.5	(38.4-44.7)
Wasted[e]															
Yes	176	(10.64±1.27)	176	56.3	(49.2-63.0)	575	(1134±1.10)	575	32.2	(28.5-36.0)	1051	(11.05±1.23)	1051	42.8	(38.9-46.7)
No	1049	(10.99±1.14)	1049	47.4	(42.7-52.1)	652	(11.40±0.98)	652	33.0	(29.1-37.1)	1401	(11.14±1.06)	1401	42.7	(39.3-46.3)
Underweight[d]															
Yes	364	(10.73±1.34)	364	52.7	(46.8-58.6)	397	(11.29±1.14)	397	33.2	(28.7-38.1)	761	(10.95±1.29)	761	45.2	(40.9-49.5)
No	862	(11.02±1.07)	862	47.0	(42.1-51.9)	831	(11.42±0.98)	831	32.3	(28.6-36.1)	1693	(11.16±1.06)	1693	41.7	(38.4-45.1)
Total	**1228**	**(10.94±1.17)**	**1228**	**48.7**	**(44.2-53.3)**	**1230**	**(11.38±1.04)**	**1230**	**32.5**	**(29.2-36.0)**	**2458**	**(11.10±1.14)**	**2458**	**42.7**	**(39.6-45.9)**

Note: Total % and 95% CI and mean are weighted
Sample size might vary slightly due to missing data
[a] Hemoglobin concentrations are adjusted for altitude. WHO 2011.
[b] Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[e] Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.
[d] Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children < -3 SD; WHO 1995.

The severity of anemia is shown in Figure 7. Overall, 30% of children 6-23 months were mildly anemic, 13% were moderately anemic and less than one percent (0.3%) was severely anemic. The proportion of moderate anemia in Kapilvastu was almost two times higher than compared to Achham.



9.2 Mean Ferritin and Iron Deficiency Prevalence

Ferritin is the WHO recommended indicator to assess iron status and low serum ferritin concentrations reflect depleted iron stores (WHO 2011). In order to detect the status of iron nutriture, serum ferritin concentration was estimated from venous blood samples collected from the children participating in the survey. Table 9.2 presents information on the geometric mean ferritin level and the prevalence of iron deficiency, defined as ferritin <12.0 µg/L. The ferritin concentrations were available for 2,347 children and the geometric mean ferritin in Kapilvastu was 15.56 µg/L and that in Achham was 17.37 µg/L. Among the total sample, 39% were iron deficient and the prevalence was 42% among children in Kapilvastu and 36% in Achham. In each district, the prevalence of iron deficiency was lower among children 6-11 months compared to children 12-18 months or 19-23 months. The prevalence of iron deficiency was also higher among children 19-23 months in Kapilvastu (54%) than in Achham (33%). The prevalence of iron deficiency was higher among males in each districts compared to females. In Annex F, Table F5 presents the prevalence of iron deficiency assessed with ferritin by inflammation status.

Table 9.2: Geometric Mean Ferritin[a] and Iron Deficiency Prevalence in Children 6-23 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu					Achham					Total				
	Ferritin µg/L		Iron deficiency Ferritin < 12.0 µg/L[b]			Ferritin µg/L		Iron deficiency Ferritin < 12.0 µg/L[b]			Ferritin µg/L		Iron deficiency Ferritin < 12.0 µg/L[b]		
	n	Geom Mean ± SE	n	%	95% CI	n	Geom Mean ± SE	n	%	95% CI	n	Geom Mean ± SE	n	%	95% CI
Age of the child															
6 – 11 months	396	25.57±0.15	396	24.2	(21.2-27.5)	359	22.64±0.16	359	26.2	(22.5-30.3)	755	24.52±0.11	755	24.9	(22.5-27.4)
12– 18 months	526	12.48±0.14	526	48.7	(43.4-54.0)	508	14.29±0.13	508	43.7	(38.6-48.9)	1034	13.10±0.11	1034	46.9	(43.0-50.8)
19 – 23 months	248	11.24±0.19	248	53.6	(45.4-61.7)	310	17.61±0.14	310	32.9	(27.9-38.3)	558	13.58±0.13	558	44.9	(39.6-50.3)
Sex of the child															
Male	619	13.87±0.15	619	46.7	(40.9-52.6)	620	15.24±0.13	620	41.1	(36.7-45.7)	1239	14.36±0.11	1239	44.6	(40.6-48.7)
Female	551	17.71±0.15	551	35.6	(30.9-40.5)	557	20.10±0.12	557	29.3	(25.8-33.0)	1108	18.56±0.11	1108	33.2	(30.0-36.6)
Wealth Quintile															
Lowest	226	15.57±0.18	226	44.7	(38.4-51.1)	235	17.41±0.17	235	33.6	(27.9-39.9)	461	16.24±0.13	461	40.5	(36.1-45.1)
Second	237	16.42±0.17	237	39.7	(33.1-46.7)	221	16.36±0.19	221	37.6	(30.8-44.9)	458	16.40±0.13	458	38.9	(34.0-44.1)
Middle	242	14.71±0.19	242	43.4	(36.5-50.6)	250	17.98±0.16	250	34.0	(28.2-40.4)	492	15.86±0.14	492	39.9	(35.0-45.0)
Fourth	225	15.74±0.19	225	39.6	(32.5-47.0)	245	17.59±0.19	245	35.1	(29.0-41.7)	470	16.43±0.14	470	37.8	(32.9-43.1)
Highest	240	15.45±0.17	240	40.0	(33.8-46.6)	226	17.46±0.14	226	37.6	(32.1-43.5)	466	16.13±0.12	466	39.2	(34.7-43.8)
Stunted[c]															
Yes	445	14.20±0.16	445	47.9	(42.5-53.3)	551	16.21±0.12	551	38.7	(34.2-43.3)	996	15.01±0.11	996	44.0	(40.3-47.8)
No	722	16.55±0.11	722	37.3	(33.5-41.2)	623	18.42±0.11	623	32.9	(29.0-37.1)	1345	17.15±0.08	1345	35.8	(33.0-38.7)
Wasted[d]															
Yes	163	17.30±0.23	163	40.5	(32.7-48.7)	102	16.94±0.28	102	42.2	(32.6-52.4)	265	17.21±0.18	265	40.9	(34.6-47.5)
No	1004	15.34±0.11	1004	41.4	(37.4-45.6)	1072	17.36±0.10	1072	35.0	(31.6-38.6)	2076	16.10±0.08	2076	39.0	(36.1-41.9)
Underweight[e]															
Yes	339	14.66±0.15	339	45.1	(39.9-50.4)	387	17.33±0.16	387	37.5	(32.7-42.5)	726	15.67±0.12	726	42.1	(38.3-45.9)
No	829	16.00±0.12	829	39.8	(35.5-44.3)	788	17.36±0.10	788	34.6	(30.9-38.6)	1617	16.47±0.09	1617	38.0	(34.9-42.1)
Total	**1170**	**15.56±0.11**	**1170**	**41.5**	**(37.7-45.3)**	**1177**	**17.37±0.96**	**1177**	**35.5**	**(32.2-39.0)**	**2347**	**16.21±0.44**	**2347**	**39.3**	**(36.6-42.0)**

Note: Total % and 95% CI and mean are weighted, ferritin was not normally distirbuted and is reported as a geometric mean
[a] ELISA; Erhardt et al 2004.
[b] UNICEF, United Nations University, WHO 2001.
[b]Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[c]Weight-for-length Z-score <-2 standard deviations (-2 SD);this also includes children <-3 SD; WHO 1995.
[d]Weight-for-age Z-score <-2 standard deviations (-2 SD);this also includes children <-3 SD; WHO 1995.

9.3 Iron Deficiency Anemia Prevalence

Table 9.3 presents the information on iron deficiency anemia (IDA) among children 6-23 months by background characteristics. IDA was defined as a ferritin concentration less than 12.0 µg/L and hemoglobin concentration less than 11 g/dL. The prevalence of IDA was higher in Kapilvastu (28%) compared with Achham (17%). In each district, the prevalence of IDA was lower among children 6-11 months compared to children 12-18 months, and in Kapilvastu the prevalence was also lower compared to children 19-23 months. For children 19-23 months in each district, the prevalence of IDA was more than double in Kapilvastu (35%) compared to Achham (15%). Compared to females in each district, the prevalence of IDA was higher among males. In Annex F, Table F6 presents the prevalence of iron deficiency anemia assessed with ferritin by inflammation status.

Table 9.3: Geometric Mean Ferritin [a] and Iron Deficiency Anemia Prevalence in Children 6-23 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu					Achham					Total				
	Ferritin µg/L		Iron deficiency anemia Hemoglobin < 11.0 g/dL[b] and Ferritin < 12.0 µg/L [c]			Ferritin µg/L		Iron deficiency anemia Hemoglobin < 11.0 g/dL[b] and Ferritin < 12.0 µg/L [c]			Ferritin µg/L		Iron deficiency anemia Hemoglobin < 11.0 g/dL[b] and Ferritin < 12.0 µg/L [c]		
	n	Geom Mean ± SE	n	%	95% CI	n	Geom Mean ± SE	n	%	95% CI	n	Geom Mean ± SE	n	%	95% CI
Age of the child															
6 – 11 months	396	25.57±0.15	395	16.7	(13.6-20.3)	359	22.64±0.16	359	12.0	(8.6-16.5)	755	24.52±0.11	754	15.1	(12.7-17.8)
12– 18 months	526	12.48±0.14	523	32.5	(27.5-37.9)	508	14.29±0.13	508	20.9	(17.0-25.3)	1034	13.10±0.11	1031	28.3	(24.8-32.1)
19 – 23 months	248	11.24±0.19	248	34.7	(27.0-43.2)	310	17.61±0.14	310	14.8	(10.8-20.0)	558	13.58±0.13	558	26.3	(21.5-31.8)
Sex of the child															
Male	619	13.87±0.15	617	32.9	(27.6-38.7)	620	15.24±0.13	620	20.3	(16.9-24.2)	1239	14.36±0.11	1237	28.3	(24.7-32.2)
Female	551	17.71±0.15	549	21.7	(17.4-26.6)	557	20.10±0.12	557	12.4	(9.9-15.3)	1108	18.56±0.11	1106	18.2	(15.4-21.5)
Wealth Quintile															
Lowest	226	15.57±0.18	225	31.6	(25.6-38.2)	235	17.41±0.17	235	12.8	(8.9-18.0)	461	16.24±0.13	460	24.5	(20.3-29.2)
Second	237	16.42±0.17	236	28.8	(23.2-35.1)	221	16.36±0.19	221	21.7	(16.4-28.2)	458	16.40±0.13	457	26.3	(22.2-30.9)
Middle	242	14.71±0.19	241	31.5	(24.7-39.3)	250	17.98±0.16	250	18.0	(12.9-24.6)	492	15.86±0.14	491	26.4	(21.6-32.0)
Fourth	225	15.74±0.19	225	24.0	(17.3-32.2)	245	17.59±0.19	245	17.6	(12.7-23.8)	470	16.43±0.14	470	21.5	(16.9-27.0)
Highest	240	15.45±0.17	239	22.2	(16.4-29.2)	226	17.46±0.14	226	12.8	(9.5-17.1)	466	16.13±0.12	465	18.9	(15.0-23.5)
Stunted[d]															
Yes	445	14.20±0.16	444	30.0	(24.4-36.2)	551	16.21±0.12	551	17.8	(14.1-22.2)	996	15.01±0.11	995	24.9	(21.1-29.1)
No	722	16.55±0.11	719	26.0	(22.1-30.4)	623	18.42±0.11	623	15.6	(13.0-18.6)	1345	17.15±0.08	1342	22.5	(19.8-25.5)
Wasted[e]															
Yes	163	17.30±0.23	163	29.4	(23.3-36.5)	102	16.94±0.28	102	20.6	(13.6-30.0)	265	17.21±0.18	265	27.1	(22.0-32.9)
No	1004	15.34±0.11	1000	27.2	(23.2-31.6)	1072	17.36±0.10	1072	16.2	(13.6-19.2)	2076	16.10±0.08	2072	23.0	(20.4-25.8)
Underweight[f]															
Yes	339	14.66±0.15	339	31.0	(26.1-36.4)	387	17.33±0.16	387	19.9	(15.2-25.6)	726	15.67±0.12	726	26.6	(22.9-30.6)
No	829	16.00±0.12	825	26.2	(22.2-30.6)	788	17.36±0.10	788	15.0	(12.5-17.8)	1617	16.47±0.09	1613	22.2	(19.5-25.1)
Total	**1170**	**15.56±0.11**	**1166**	**27.6**	**(23.9-31.7)**	**1177**	**17.37±0.96**	**1177**	**16.6**	**(14.0-19.5)**	**2347**	**16.21±0.44**	**2343**	**23.5**	**(21.0-26.3)**

Note: Total % and 95% CI and mean are weighted, ferritin was not normally distirbuted and is reported as a geometric mean
[a] ELISA; Erhardt et al 2004
[b] Adjusted for altitude; WHO 2011.
[c] UNICEF, United Nations University, WHO 2001
[d] Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[e]Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.
[f]Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

Summary of Anemia, Iron Deficiency and Iron Deficiency Anemia

Figures 8 and 9 show the prevalence of anemia, iron deficiency and iron deficiency anemia among children 6-23 months by age groups in Kapilvastu and Achham district respectively. In Kapilvastu, among children 6-23 months, 49% were anemic, 42% were iron deficient and 28% were iron deficient anemic. In Accham, 33% were anemic, 36% were iron deficient and 17% were iron deficient anemic. Children above one year of age groups were more likely to be iron deficient than children 6-11 months in both districts. The prevalence of iron deficiency anemia was also high among children above one year in both districts than children 6-11 months. On the other hand, anemia was more prevalent among children less than 18 months in Accham district.

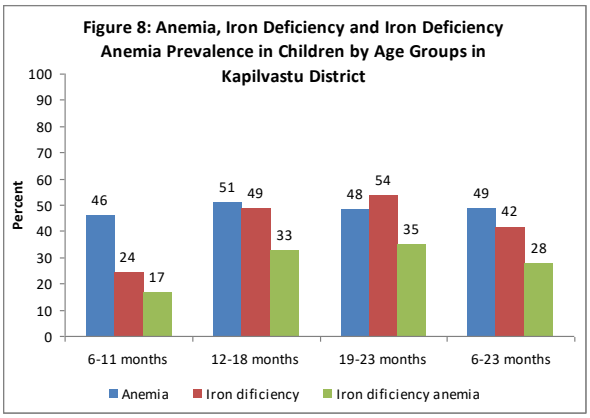


Figure 8: Anemia, Iron Deficiency and Iron Deficiency Anemia Prevalence in Children by Age Groups in Kapilvastu District
Percent
100
90
80
70
60
50
40
30
20
10
0
46
24
17
51
49
33
48
54
35
49
42
28
6-11 months
12-18 months
19-23 months
6-23 months
Anemia
Iron dificiency
Iron dificiency anemia

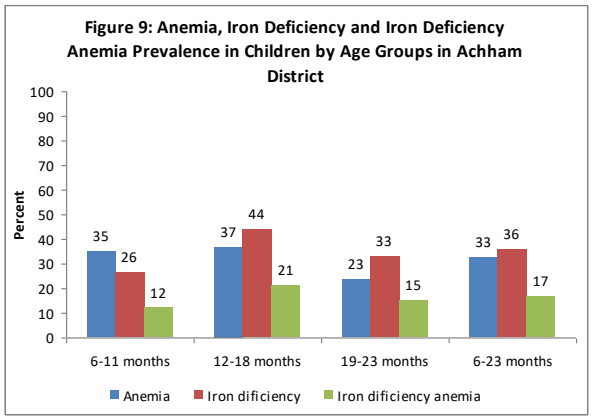


Figure 9: Anemia, Iron Deficiency and Iron Deficiency Anemia Prevalence in Children by Age Groups in Achham District
Percent
100
90
80
70
60
50
40
30
20
10
0
35
26
12
37
44
21
23
33
15
33
36
17
6-11 months
12-18 months
19-23 months
6-23 months
Anemia
Iron dificiency
Iron dificiency anemia

9.4 Mean Retinol Binding Protein and Vitamin A Deficiency Prevalence

WHO defines vitamin A deficiency as serum retinol <0.70 µmol/L (WHO, 2006). Retinol binding protein (RBP) is a subclinical indicator of vitamin A deficiency and nutriture. A standard cut-off to categorize vitamin A deficiency using RBP is not defined. RBP was assessed among 2,347 children 6-23 months in this sample and serum retinol was also assessed among a randomly selected sub-sample of 175 children. To determine the appropriate cut off to define vitamin A deficiency in this population, we examined the retinol-RBP relationship among the sub-sample using linear regression and a retinol cut-off of 0.70 µmol/L corresponded to an RBP cut-off 0.84 µmol/L.

Table 9.4 describes the mean RBP concentrations and the prevalence of vitamin A deficiency (RBP <0.84 µmol/L) among 2,347 children 6-23 months by background characteristics. The mean RBP level among children in Kapilvastu was 0.94 µmol/L and among children in Achham was 1.02 µmol/L. The prevalence of subclinical vitamin A deficiency assessed by RBP was 30% among all children; deficiency was higher among children in Kapilvastu (34%) than Achham (25%). The prevalence of vitamin A deficiency was higher among children who suffered from wasting or underweight in Kapilvastu compared to those who were not categorized as wasted or underweight. In Annex F, Table F7 describes vitamin A deficiency assessed using RBP by inflammation status.

Table 9.4: Mean Retinol Binding Protein (RBP) [a] and Vitamin A Deficiency Prevalence in Children 6-23 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu					Achham					Total				
	RBP µmol/L		Vitamin A deficiency RBP <0.84 µmol/L[b]			RBP µmol/L		Vitamin A deficiency RBP <0.84 µmol/L[b]			RBP µmol/L		Vitamin A deficiency RBP <0.84 µmol/L[b]		
	n	Mean ±SD	n	%	95% CI	n	Mean ±SD	n	%	95% CI	n	Mean ±SD	n	%	95% CI
Age of the child															
6 – 11 months	396	(0.93±0.23)	396	34.3	(29.6-39.0)	359	(1.00±0.26)	359	27.9	(23.2-32.5)	755	(0.96±0.24)	755	31.3	(28.0-34.6)
12– 18 months	526	(0.94±0.26)	526	34.6	(30.5-38.7)	508	(1.01±0.24)	508	24.8	(21.0-28.6)	1034	(0.97±0.25)	1034	29.8	(27.0-32.6)
19 – 23 months	248	(0.95±0.24)	248	33.4	(27.5-39.3)	310	(1.04±0.24)	310	21.3	(16.8-25.9)	558	(0.99±0.25)	558	26.7	(23.0-30.4)
Sex of the child															
Male	619	(0.93±0.25)	619	36.3	(32.5-40.1)	620	(1.00±0.25)	620	27.7	(24.2-31.2)	1239	(0.96±0.25)	1239	32.0	(29.4-34.6)
Female	551	(0.95±0.24)	551	31.9	(28.0-35.8)	557	(1.03±0.24)	557	21.5	(18.1-24.9)	1108	(0.98±0.24)	1108	26.7	(24.1-29.3)
Wealth Quintile															
Lowest	226	(0.91±0.26)	226	40.2	(33.8-46.6)	235	(1.01±0.24)	235	26.4	(20.8-32.0)	461	(0.95±0.25)	461	33.2	(28.9-37.5)
Second	237	(0.92±0.25)	237	39.2	(33.0-45.4)	221	(0.99±0.23)	221	29.0	(23.0-35.0)	458	(0.95±0.24)	458	34.3	(30.0-38.6)
Middle	242	(0.93±0.22)	242	34.3	(28.3-40.3)	250	(1.01±0.27)	250	25.6	(20.2-31.0)	492	(0.96±0.24)	492	30.0	(26.0-34.0)
Fourth	225	(0.95±0.25)	225	31.6	(25.5-37.7)	245	(1.02±0.23)	245	23.7	(18.4-29.0)	470	(0.98±0.25)	470	27.4	(23.4-31.4)
Highest	240	(0.98±0.24)	240	26.3	(20.7-31.9)	226	(1.05±0.26)	226	19.5	(14.3-24.7)	466	(1.00±0.25)	466	23.0	(19.2-26.8)
Stunted[c]															
Yes	445	(0.93±0.25)	445	37.3	(32.8-41.8)	551	(1.02±0.25)	551	26.7	(23.0-30.4)	996	(0.96±0.25)	996	31.4	(28.5-34.3)
No	722	(0.95±0.24)	722	30.3	(27.1-33.5)	623	(1.02±0.24)	623	23.1	(19.8-26.4)	1345	(0.97±0.24)	1345	28.1	(25.7-30.5)
Wasted[d]															
Yes	163	(0.88±0.25)	163	43.6	(36.0-51.2)	102	(0.97±0.25)	102	31.4	(22.4-40.4)	265	(0.90±0.25)	265	38.9	(33.0-44.8)
No	1004	(0.95±0.24)	1004	32.8	(29.9-35.7)	1072	(1.02±0.25)	1072	24.2	(21.6-26.8)	2076	(0.98±0.25)	2076	28.4	(26.5-30.3)
Underweight[e]															
Yes	339	(0.91±0.24)	339	39.2	(34.0-44.4)	387	(1.01±0.26)	387	27.4	(23.0-31.8)	726	(0.95±0.25)	726	32.9	(29.5-36.3)
No	829	(0.95±0.24)	829	32.3	(29.1-35.5)	788	(1.02±0.24)	788	23.5	(20.5-26.5)	1617	(0.98±0.25)	1617	28.0	(25.8-30.2)
Total	**1170**	**(0.94±0.24)**	**1170**	**34.3**	**(31.6-37.0)**	**1177**	**(1.02±0.25)**	**1177**	**24.8**	**(22.3-27.3)**	**2347**	**(0.98±0.25)**	**2347**	**29.5**	**(27.7-31.3)**

Note: Total % and 95% CI and mean are weighted
[a] ELISA; Erhardt et al 2004.
[b]Vitamin A deficiency RBP <0.84 µmol/L is comparable to a retinol cut off of <0.7 µmol/L
[c]Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[d]Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.
[e]Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

9.5 Modified Relative Dose Response and Vitamin A Deficiency Prevalence

Modified relative dose response (MRDR) measures vitamin A liver stores and is used to assess vitamin A status from deficiency through sufficiency, but is not used for defining toxic levels. It was measured in a randomly selected subsample of the survey population. A challenge dose of 3, 4 didehydroretinol was administered 4-6 hours before the collection of blood and the increase in the release of RBP was calculated. Vitamin A deficiency is defined as MRDR >0.060 (Tanumihardjo, 2011). The MRDR results are presented in Table 9.5.

The MRDR results are available for a total of 151 children in both districts. The mean MRDR was 0.04 +/- 0.02 in Kapilvastu and 0.04 +/- 0.03 in Achham. Overall, 18% of children in both districts were vitamin A deficient. The prevalence of vitamin A deficiency was 20% among children in Kapilvastu and 15% in Achham. There were no significant differences in the prevalence of deficiency assessed by MRDR by subgroup characteristics.

Table 9.5: Mean Modified Relative Dose Response (MRDR) [a] and Vitamin A Deficiency Prevalence in Children 6-23 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu					Achham					Total				
	MRDR		Vitamin A deficiency MRDR >0.060 [a]			MRDR		Vitamin A deficiency MRDR >0.060 [a]			MRDR		Vitamin A deficiency MRDR >0.060 [a]		
	n	Mean ±SD	n	%	95% CI	n	Mean ±SD	n	%	95% CI	N	Mean ±SD	n	%	95% CI
Age of the child															
6 – 11 months	25	(0.06±0.02)	25	32.0	(17.0-51.9)	24	(0.05±0.04)	24	16.7	(6.2-37.6)	49	(0.05±0.03)	49	26.5	(15.7-41.2)
12– 18 months	33	(0.04±0.03)	33	18.2	(8.5-34.6)	28	(0.04±0.03)	28	21.4	(9.6-41.3)	61	(0.04±0.03)	61	19.3	(11.1-31.3)
19 – 23 months	19	(0.03±0.02)	19	5.3	(0.7-30.6)	22	(0.03±0.02)	22	4.5	(0.6-27.3)	41	(0.03±0.02)	41	5.0	(1.1-19.2)
Sex of the child															
Male	38	(0.04±0.02)	38	15.8	(7.2-31.2)	36	(0.04±0.04)	36	16.7	(7.4-33.2)	74	(0.04±0.03)	74	16.1	(9.1-26.9)
Female	39	(0.04±0.02)	39	23.1	(13.8-35.9)	38	(0.04±0.03)	38	13.2	(5.9-26.6)	77	(0.04±0.02)	77	19.5	(12.6-28.8)
Wealth Quintile															
Lowest	11	(0.04±0.02)	11	18.2	(4.3-52.6)	18	(0.04±0.03)	18	27.8	(13.9-47.8)	29	(0.04±0.02)	29	22.9	(11.1-41.3)
Second	16	(0.05±0.04)	16	18.8	(5.0-50.0)	10	(0.05±0.05)	10	10.0	(1.3-48.8)	26	(0.05±0.04)	26	16.4	(5.2-41.5)
Middle	15	(0.04±0.02)	15	13.3	(3.5-39.8)	20	(0.04±0.03)	20	15.0	(4.9-37.4)	35	(0.04±0.02)	35	14.1	(5.9-30.1)
Fourth	18	(0.05±0.02)	18	27.8	(10.7-55.3)	12	(0.05±0.04)	12	8.3	(1.1-43.1)	30	(0.05±0.02)	30	22.4	(9.7-43.7)
Highest	17	(0.04±0.02)	17	17.6	(5.9-42.1)	14	(0.03±0.02)	14	7.1	(0.9-39.2)	31	(0.04±0.02)	31	14.2	(5.4-32.6)
Stunted[b]															
Yes	31	(0.05±0.03)	31	19.4	(9.3-36.1)	32	(0.05±0.04)	32	15.6	(6.8-31.9)	63	(0.05±0.03)	63	18.0	(10.3-29.5)
No	46	(0.04±0.02)	46	19.6	(11.0-32.3)	42	(0.04±0.03)	42	14.3	(6.6-28.3)	88	(0.04±0.02)	88	17.7	(11.2-27.0)
Wasted[c]															
Yes	13	(0.05±0.03)	13	23.1	(8.1-50.4)	5	(0.02±0.01)	5	0.0	-	18	(0.05±0.03)	18	18.9	(6.6-43.5)
No	64	(0.04±0.02)	64	18.8	(11.6-28.9)	69	(0.04±0.03)	69	15.9	(9.5-25.6)	133	(0.04±0.03)	133	17.7	(12.4-24.6)
Underweight[d]															
Yes	27	(0.05±0.03)	27	22.2	(10.8-40.2)	22	(0.05±0.04)	22	22.7	(10.5-42.5)	49	(0.05±0.03)	49	22.4	(13.1-35.6)
No	50	(0.04±0.02)	50	18.0	(10.3-29.6)	52	(0.04±0.02)	52	11.5	(5.4-22.9)	102	(0.04±0.02)	102	15.6	(9.9-23.6)
Total	**77**	**(0.04±0.02)**	**77**	**19.5**	**(12.6-28.8)**	**74**	**(0.04±0.03)**	**74**	**14.9**	**(8.9-23.8)**	**151**	**(0.04±0.03)**	**151**	**17.8**	**(12.7-24.4)**

Note: Total % and 95% CI and mean are weighted
[a]Tanumihardjo 2011.
[b]Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[c]Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.
[d]Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

9.6 Red Blood Cell (RBC) Folate Concentrations

Red blood cell (RBC) folate reflects body store over the last 3 months and is not influenced by recent folate intake. Deficiency is defined as RBC folate <226.5 nmol/L (<100 ng/mL) (WHO 2015). The RBC folate levels were available for a total of 2405 children. Mean RBC Folate levels among the studied children were 1356.04±605.29 nmol/L overall among children in both districts, and there was no evidence of folate deficiency (Table 9.6). There were no differences by any of the subgroups examined, such as district of residence, sex, wealth quintile, presence or absence of stunting, wasting or underweight.

Table 9.6: Mean RBC Folate[a] in Children 6-23 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu		Achham		Total	
	RBC folate nmol/L		RBC folate nmol/L		RBC folate nmol/L	
	n	Mean ± SD	n	Mean ± SD	n	Mean ± SD
Age of the child						
6 – 11 months	409	(1505.94±620.00)	371	(1765.67±598.19)	780	(1595.55±624.52)
12– 18 months	541	(1234.32±598.77)	517	(1489.91±555.78)	1058	(1325.54±596.24)
19 – 23 months	252	(998.74±420.26)	315	(1170.89±435.85)	567	(1071.14±434.90)
Sex of the child						
Male	636	(1301.48±575.16)	637	(1500.63±593.29)	1273	(1374.72±589.55)
Female	566	(1250.24±632.25)	566	(1481.06±576.41)	1132	(1335.04±622.10)
Wealth Quintile						
Lowest	237	(1230.94±596.53)	237	(1503.49±596.17)	474	(1331.07±610.11)
Second	240	(1251.48±561.13)	234	(1553.76±593.94)	474	(1360.76±590.77)
Middle	247	(1205.64±565.64)	253	(1443.48±593.14)	500	(1294.35±586.88)
Fourth	233	(1346.22±726.38)	250	(1457.87±555.44)	483	(1389.08±667.47)

Highest	245	(1354.38±542.68)	229	(1504.82±586.04)	474	(1407.31±562.35)
Stunted[a]						
Yes	465	(1167.95±658.02)	562	(1413.43±572.73)	1027	(1269.19±635.55)
No	734	(1345.98±555.30)	638	(1558.85±588.99)	1372	(1417.38±575.47)
Wasted[b]						
Yes	173	(1181.64±653.58)	105	(1466.93±619.74)	278	(1255.99±655.97)
No	1026	(1293.00±593.18)	1095	(1493.03±582.58)	2121	(1369.54±596.98)
Underweight[c]						
Yes	356	(1185.65±714.67)	392	(1450.89±593.06)	748	(1289.10±681.81)
No	844	(1316.19±545.42)	809	(1510.28±581.15)	1653	(1385.59±565.99)
Total	**1202**	**(1277.35±603.01)**	**1203**	**(1491.42±585.25)**	**2405**	**(1356.04±605.29)**

Note: Total mean are weighted
[a]Microbiological assay; O'Broin S and Kelleher B 1992; Pfeiffer et al 2011.
[b]Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[c]Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.
[d]Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

9.7 Median Vitamin B_{12} and Vitamin B_{12} Deficiency Prevalence

Table 9.7 describes the median serum vitamin B_{12} concentrations and prevalence of vitamin B_{12} deficiency among 2,166 children by background characteristics. Vitamin B_{12} deficiency was defined as <203 pg/mL. The median vitamin B_{12} concentration was 264.00 pg/mL in Kapilvastu and 257.00 pg/mL in Achham. Among the total sample and in each district, 30% of children were deficient. There were no significant differences in the prevalence of deficiency by subgroup categories within or between districts.

Table 9.7: Median Vitamin B_{12} [a] and Vitamin B_{12} Deficiency Prevalence in Children 6-23 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu					Achham					Total				
	Vitamin B_{12} pg/mL		Vitamin B_{12} deficiency (Serum vitamin B_{12} <203 pg/mL) [b]			Vitamin B_{12} pg/mL		Vitamin B_{12} deficiency (Serum vitamin B_{12} <203 pg/mL) [b]			Vitamin B_{12} pg/mL		Vitamin B_{12} deficiency (Serum vitamin B_{12} <203 pg/mL) [b]		
	n	Median ± SD	n	%	95% CI	n	Median ± SD	n	%	95% CI	N	Median ± SD	n	%	95% CI
Age of the child															
6 – 11 months	359	(253.00±151.72)	359	33.7	(28.5-39.4)	321	(237.00±133.03)	321	35.2	(28.5-42.5)	680	(243.50±143.80)	680	34.2	(30.0-38.7)
12– 18 months	494	(264.00±144.64)	494	30.0	(25.0-35.4)	463	(256.00±139.30)	463	32.8	(25.3-41.3)	957	(260.00±142.14)	957	31.0	(26.7-35.6)
19 – 23 months	244	(273.50±139.43)	244	25.4	(19.0-33.1)	285	(289.00±149.08)	285	21.1	(16.3-26.8)	529	(280.00±145.00)	529	23.6	(19.3-28.7)
Sex of the child															
Male	585	(272.00±150.57)	585	28.5	(23.6-34.0)	572	(261.50±142.40)	572	28.3	(22.7-34.7)	1157	(267.00±146.61)	1157	28.5	(24.7-32.6)
Female	512	(255.50±139.82)	512	32.0	(26.6-38.0)	497	(253.00±141.33)	497	32.8	(26.4-39.9)	1009	(254.00±140.52)	1009	32.3	(28.1-36.9)
Wealth Quintile															
Lowest	216	(253.00±134.56)	216	32.9	(26.2-40.3)	214	(245.00±125.58)	214	35.5	(26.6-45.6)	430	(246.50±130.09)	430	33.8	(28.4-39.8)
Second	225	(244.00±153.97)	225	35.1	(26.4-45.0)	205	(256.00±132.04)	205	28.8	(22.0-36.7)	430	(246.00±143.77)	430	32.9	(26.6-39.9)
Middle	221	(270.00±146.45)	221	30.8	(23.0-39.8)	224	(247.00±143.08)	224	33.9	(26.7-42.0)	445	(259.00±144.80)	445	31.9	(26.2-38.3)
Fourth	215	(254.00±130.74)	215	28.8	(21.8-37.0)	229	(261.00±155.46)	229	29.7	(22.2-38.4)	444	(258.50±143.93)	444	29.2	(23.8-35.1)
Highest	220	(303.50±155.10)	220	23.2	(17.5-30.1)	197	(281.00±147.64)	197	23.4	(17.4-30.6)	417	(290.00±151.80)	417	23.2	(18.8-28.3)
Stunted[b]															
Yes	422	(248.50±147.99)	422	34.1	(27.9-40.9)	508	(258.50±143.00)	508	30.3	(24.3-37.1)	930	(255.50±145.23)	930	32.6	(28.1-37.4)
No	671	(270.00±144.40)	671	27.7	(23.6-32.3)	559	(255.00±141.30)	559	30.6	(24.4-37.5)	1230	(264.50±143.12)	1230	28.7	(25.1-32.5)
Wasted[c]															
Yes	158	(242.50±143.09)	158	39.2	(31.1-48.1)	94	(247.50±186.26)	94	34.0	(23.0-47.1)	252	(244.00±160.29)	252	37.9	(31.1-45.2)
No	935	(268.00±146.30)	935	28.7	(24.2-33.6)	973	(257.50±137.30)	973	30.1	(25.0-35.8)	1908	(263.00±141.87)	1908	29.2	(25.8-32.9)
Underweight[d]															
Yes	321	(277.10±161.59)	321	37.1	(30.0-44.8)	357	(259.00±154.12)	357	32.2	(24.9-40.5)	678	(249.00±149.13)	678	35.2	(29.9-40.8)
No	773	(272.00±146.71)	773	27.4	(23.1-32.3)	711	(256.00±138.58)	711	29.5	(24.3-35.3)	1484	(264.00±141.63)	1484	28.2	(24.7-31.9)
Total	**1097**	**(264.00±147.79)**	**1097**	**30.2**	**(25.7-35.1)**	**1069**	**(257.00±141.94)**	**1069**	**30.4**	**(25.0-36.4)**	**2166**	**(261.00±143.92)**	**2166**	**30.3**	**(26.8-34.0)**

Note: Total % and 95% CI and median are weighted
[a] IMMULITE ® 1000 (Chemiluminescence); Wentworth S, McBride JA and Walker WH, 1994.
[b]WHO 2008.
[b]Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[c]Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.
[d]Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

9.8 Mean Serum Zinc and Zinc Deficiency Prevalence

Zinc is an important micronutrient to support optimal growth and immunity. Serum zinc was estimated to assess zinc status among 1,876 children participating in the survey. Table 9.8 shows the mean serum zinc and the prevalence of zinc deficiency among children by background characteristics. Zinc deficiency was defined as less than 65 or 57 µg/dL depending on the time of day: Morning (until noon), non-fasting: <65µg/dL; Afternoon, non-fasting: <57 µg/dL (IZINCG 2007). The mean level of serum zinc among children in Kapilvastu was 71.00 µ/dL and in Achham was 68.43 µ/dL. Overall across both districts, 20% of children suffered from zinc deficiency and the prevalence was higher among children in Achham (28%) than children in Kapilvastu (16%). In Achham, the prevalence was higher among children who were stunted or underweight compared to children with stunting or underweight in Kapilvastu. In Annex F, Table F8 describes zinc deficiency by inflammation status.

Table 9.8: Mean Serum Zinc[a] and Zinc Deficiency Prevalence in Children 6-23 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu					Achham					Total				
	Zinc µg/dL		Zinc deficiency serum zinc < 65 µg/dL or 57 µg/dL[a]			Zinc µg/dL		Zinc deficiency serum zinc < 65 µg/dL or 57 µg/dL[a]			Zinc µg/dL		Zinc deficiency serum zinc < 65 µg/dL or 57 µg/dL[a]		
	n	Mean ± SD	n	%	95% CI	n	Mean ± SD	n	%	95% CI	n	Mean ± SD	n	%	95% CI
Age of the child															
6 – 11 months	288	(73.53±14.66)	288	10.8	(7.4-15.5)	291	(71.63±13.64)	291	20.6	(16.1-26.0)	579	(72.83±14.31)	579	14.4	(11.5-17.9)
12– 18 months	424	(69.99±12.83)	424	19.3	(15.0-24.6)	408	(67.82±12.10)	408	28.7	(24.3-33.5)	832	(69.21±12.61)	832	22.7	(19.4-26.4)
19 – 23 months	203	(69.52±11.22)	203	15.3	(10.5-21.7)	262	(65.85±12.39)	262	33.2	(28.5-38.3)	465	(67.59±11.86)	465	23.0	(19.5-26.8)
Sex of the child															
Male	503	(71.04±12.84)	503	15.1	(12.0-18.8)	517	(68.66±12.97)	517	25.9	(22.5-29.6)	1020	(70.15±12.94)	1020	19.1	(16.7-21.8)
Female	412	(70.95±13.66)	412	16.5	(12.5-21.4)	444	(68.18±12.71)	444	29.3	(25.2-33.7)	856	(69.88±13.36)	856	21.4	(18.4-24.8)
Wealth Quintile															
Lowest	175	(71.22±11.96)	175	12.0	(8.3-17.0)	187	(68.29±13.42)	187	31.6	(24.2-39.9)	362	(70.10±12.60)	362	19.5	(15.5-24.2)
Second	194	(70.59±14.08)	194	19.1	(14.7-24.4)	186	(67.51±12.91)	186	29.0	(23.0-35.9)	380	(69.49±13.73)	380	22.6	(18.9-26.8)
Middle	181	(70.66±13.46)	181	15.5	(10.5-22.3)	209	(68.75±13.01)	209	25.8	(19.6-33.3)	390	(69.89±13.30)	390	19.6	(15.6-24.5)
Fourth	181	(71.08±13.07)	181	17.1	(12.0-23.8)	208	(68.71±13.30)	208	27.9	(22.6-33.9)	389	(70.13±13.19)	389	21.4	(17.5-25.9)
Highest	184	(71.48±13.41)	184	14.7	(10.8-19.7)	171	(68.87±11.39)	171	14.8	(11.2-19.3)	355	(70.56±12.78)	355	17.5	(14.3-21.3)
Stunted[b]															
Yes	351	(70.87±13.79)	351	17.7	(13.4-22.9)	456	(67.51±12.93)	456	30.0	(25.5-35.0)	807	(69.42±13.52)	807	23.0	(19.8-26.6)
No	561	(71.04±12.87)	561	14.6	(11.4-18.6)	504	(69.27±12.74)	504	25.2	(21.9-28.8)	1065	(70.44±12.85)	1065	18.2	(15.8-21.0)
Wasted[c]															
Yes	120	(71.62±12.84)	120	17.5	(10.2-28.3)	87	(69.99±11.42)	87	19.5	(12.6-29.0)	207	(71.14±12.43)	207	18.1	(12.3-25.9)
No	792	(70.88±13.29)	792	15.5	(12.6-19.0)	873	(68.28±12.98)	873	28.3	(25.0-31.8)	1665	(69.89±13.23)	1665	20.5	(18.2-23.0)
Underweight[d]															
Yes	265	(71.85±12.76)	265	15.5	(10.8-21.6)	321	(67.78±12.59)	321	30.5	(25.3-36.3)	586	(70.12±12.84)	586	21.7	(18.0-25.9)
No	648	(70.63±13.39)	648	15.9	(13.0-19.2)	640	(68.82±12.97)	640	25.9	(22.1-30.2)	1288	(69.97±13.26)	1288	19.6	(17.2-22.2)
Total	**915**	**(71.00±13.21)**	**915**	**15.7**	**(12.9-19.1)**	**961**	**(68.43±12.85)**	**961**	**27.5**	**(24.5-30.6)**	**1876**	**(70.03±13.13)**	**1876**	**20.2**	**(18.0-22.5)**

Note: Total % and 95% CI and mean are weighted

[a] Atomic absorption flame emission spectroscopy; Dipeitro ES et al 1988

[a] IZINCG 2007. Zinc deficiency defined as serum zinc less than 65 or 57 µg/dL depending on time of day: Morning (until noon), non-fasting: <65µg/dL; Afternoon, non-fasting: <57 µg/dL.

[b] Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.

[c] Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

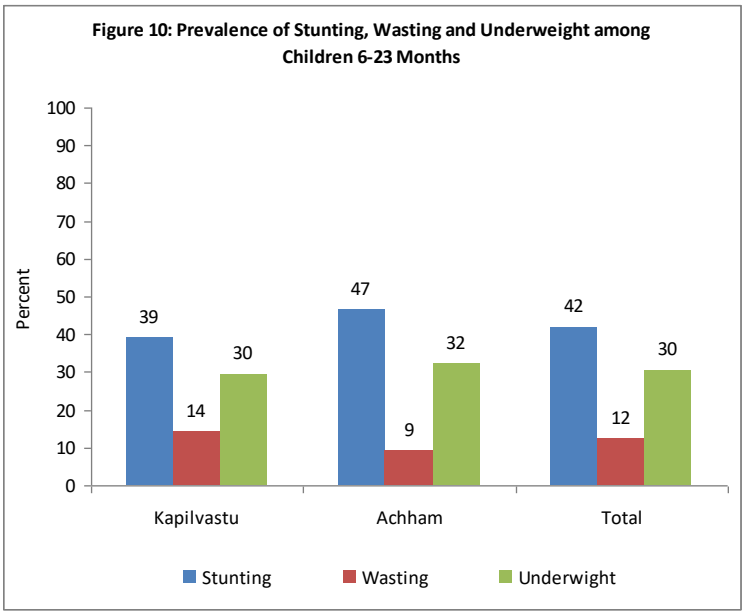
[d] Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

9.9 Prevalence of Stunting, Wasting and Underweight and Severe Stunting, Wasting and Underweight in Children 6-23 Months

The survey collected data on nutritional status of children 6-23 months by measuring recumbent length and weight of the children. Indicators of the nutritional status: weight-for-age, length-for-age, and

weight-for-length were calculated using growth standards published by the World Health Organization (WHO, 2006). Table 9.9 describes the prevalence of stunting, wasting and underweight and Table 9.10 decribes the prevalence of severe stunting, wasting and underweight among children 6-23 months.

Overall, among children 6-23 months 42%, 12% and 30% were stunted, wasted and underweight respectively (Table 9.9 and Figure 10). The prevalence of wasting was higher among children in Kapilvastu than in Achham. Compared to children 6-11 months, the prevalences of stunting and underweight increased significantly among children 12-18 months in both districts. There were no significant differences by sex for any of these indicators in either district. Children living in the households in the lowest wealth quintile had higher prevalences of stunting, wasting, and underweight compared to children living in households in the highest wealth quintile in each district, with the exception of wasting among children in Achham District where the 95% confidence intervals overlap for all wealth quintiles.



Overall, 16%, 3% and 10% of children demonstrated severe forms of stunting, wasting and underweight (Table 9.10). There were no significant differences in the prevalences of severe stunting, wasting or underweight among children 6-23 months in Kapilvastu compared to Achham. There was a significant increase in the prevalence of severe stunting in each district between children 6-11 months and those 12-18 months of age (6% to 16% in Kapilvastu and 6% to 22% in Accham); there was also a significant increase among children 12-18 months and 19-23 months in Kapilvastu (16% to 26%). Children living in households in the lowest wealth quintile were more likely to suffer from severe forms of stunting and underweight compared to those living in households in the highest wealth quintiles in Kapilvastu.

Table 9.9: Stunting, Wasting and Underweight Prevalence in Children 6-23 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu							Achham							Total						
		Stunting Height-for-age <-2 SD[a]		Wasting Weight-for-Height <-2 SD[b]		Underweight Weight-for-Age <-2 SD[c]			Stunting Height-for-age <-2 SD[a]		Wasting Weight-for-Height <-2 SD[b]		Underweight Weight-for-Age <-2 SD[c]			Stunting Height-for-age <-2 SD[a]		Wasting Weight-for-Height <-2 SD[b]		Underweight Weight-for-Age <-2 SD[c]	
	N	%	95% CI	%	95% CI	%	95% CI	n	%	95% CI	%	95% CI	%	95% CI	n	%	95% CI	%	95% CI	%	95% CI
Age of the child																					
6 – 11 months	437	22.9	(18.8-27.5)	13.0	(9.8-17.2)	20.6	(16.3-25.7)	402	24.4	(19.8-29.6)	11.2	(8.3-15.0)	25.6	(21.4-30.4)	839	23.4	(20.2-26.9)	12.4	(10.0-15.3)	22.3	(19.1-26.0)
12– 18 months	577	42.1	(35.8-48.7)	15.8	(12.8-19.3)	31.5	(26.0-37.6)	531	52.5	(46.6-58.4)	8.3	(6.2-11.0)	35.0	(30.4-39.8)	1108	45.7	(41.1-50.5)	13.2	(11.1-15.6)	32.7	(28.7-36.9)
19 – 23 months	265	58.1	(49.0-66.7)	12.5	(8.5-17.9)	39.8	(31.6-48.7)	325	64.3	(58.4-69.8)	7.7	(5.1-11.4)	35.4	(30.5-40.5)	590	60.7	(54.8-66.3)	10.5	(7.8-13.9)	38.0	(32.7-43.6)
Sex of the child																					
Male	672	40.0	(34.2-46.2)	14.9	(12.1-18.2)	30.2	(24.7-36.2)	670	49.6	(44.7-54.4)	10.3	(8.4-12.6)	33.6	(29.3-38.2)	1342	43.5	(39.3-47.8)	13.2	(11.2-15.4)	31.4	(27.5-35.6)
Female	607	37.6	(32.5-42.9)	13.3	(10.6-16.7)	28.8	(24.2-33.8)	588	43.2	(39.0-47.5)	7.7	(5.2-11.1)	30.4	(27.0-34.0)	1195	39.6	(36.0-43.3)	11.3	(9.3-13.7)	29.4	(26.2-32.8)
Wealth Quintile																					
Lowest	254	50.8	(43.6-58.0)	19.7	(14.6-26.1)	40.4	(32.9-48.4)	251	52.6	(46.1-59.0)	12.0	(7.8-17.8)	39.0	(32.6-45.9)	505	51.4	(46.3-56.6)	16.9	(13.1-21.4)	39.9	(34.5-45.6)
Second	255	46.3	(39.6-53.1)	18.8	(13.9-25.0)	34.4	(27.8-41.6)	247	44.5	(36.9-52.4)	10.9	(7.9-15.0)	34.4	(27.5-42.0)	502	45.6	(40.5-50.9)	16.0	(12.6-21.1)	34.4	(29.4-39.7)
Middle	260	42.3	(36.0-48.9)	11.9	(8.9-15.7)	32.3	(27.1-38.0)	261	46.0	(39.5-52.6)	8.8	(6.1-12.5)	30.3	(24.7-36.5)	521	43.7	(39.0-48.5)	10.8	(8.6-13.4)	31.6	(27.6-35.8)

Fourth	253	32.0	(26.0-38.7)	13.4	(9.8-18.2)	26.1	(19.9-33.3)	257	51.8	(44.6-58.8)	8.6	(5.8-12.4)	33.3	(26.7-40.7)	510	39.3	(34.4-44.5)	11.6	(9.1-14.8)	28.8	(24.0-34.1)
Highest	257	23.0	(18.0-28.8)	7.0	(4.5-10.7)	14.4	(10.9-18.8)	242	37.6	(32.3-43.3)	5.0	(2.6-9.3)	23.1	(18.6-28.5)	499	28.1	(24.1-32.5)	6.3	(4.4-8.9)	17.5	(14.5-21.0)
Total	**1279**	**38.9**	**(34.2-43.8)**	**14.2**	**(11.6-17.1)**	**29.5**	**(24.9-34.6)**	**1258**	**46.6**	**(43.0-50.2)**	**9.1**	**(7.5-10.9)**	**32.1**	**(29.1-35.2)**	**2537**	**41.7**	**(38.4-45.0)**	**12.3**	**(10.6-14.3)**	**30.4**	**(27.3-33.8)**

Note: Total % and 95% CI are weighted
[a]Height-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[b]Weight-for-height Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.
[c]Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

Table 9.10: Prevalence of Severe Stunting, Wasting and Underweight in Children 6-23 Months, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu							Achham							Total					
		Stunting Height-for-age <-3 SD[a]		Wasting Weight-for-Height <-3 SD[b]		Underweight Weight-for-Age <-3 SD[c]			Stunting Height-for-age <-3 SD[a]		Wasting Weight-for-Height <-3 SD[b]		Underweight Weight-for-Age <-3 SD[c]			Stunting Height-for-age <-3 SD[a]		Wasting Weight-for-Height <-3 SD[b]		Underweight Weight-for-Age <-3 SD[c]	
	n	%	95% CI	%	95% CI	%	95% CI	n	%	95% CI	%	95% CI	%	95% CI	n	%	95% CI	%	95% CI	%	95% CI
Age of the child																					
6 – 11 months	437	6.4	(4.6-8.9)	3.0	(1.7-5.2)	8.0	(5.9-10.8)	402	5.5	(3.7-8.1)	3.0	(1.5-5.8)	5.7	(3.8-8.6)	839	6.1	(4.7-7.9)	3.0	(1.9-4.6)	7.2	(5.6-9.2)
12– 18 months	577	15.9	(12.8-19.7)	4.3	(2.9-6.4)	12.5	(9.4-16.3)	531	22.0	(17.4-27.6)	0.8	(0.3-2.0)	7.5	(5.7-9.8)	1108	18.1	(15.4-21.1)	3.1	(2.1-4.4)	10.7	(8.6-13.3)
19 – 23 months	265	26.4	(20.1-33.9)	2.3	(1.1-4.8)	12.8	(8.5-18.8)	325	24.0	(19.1-29.7)	1.2	(0.4-4.1)	8.6	(5.6-13.0)	590	25.4	(21.1-30.3)	1.8	(1.0-3.5)	11.1	(8.1-14.9)
Sex of the child																					
Male	672	15.2	(12.8-19.6)	4.5	(3.0-6.5)	11.3	(8.8-14.5)	670	19.9	(15.9-24.5)	1.5	(0.7-3.1)	7.8	(5.9-10.1)	1342	14.7	(14.8-20.2)	3.4	(2.4-4.8)	10.0	(8.2-12.1)
Female	607	13.7	(10.8-17.2)	2.3	(1.3-4.0)	10.7	(8.0-14.1)	588	14.3	(11.4-17.7)	1.7	(0.7-3.9)	6.6	(4.4-9.8)	1195	13.9	(11.7-16.4)	2.1	(1.3-3.3)	9.2	(7.3-11.6)
Wealth Quintile																					
Lowest	254	21.7	(17.0-27.1)	5.9	(3.5-9.7)	19.2	(14.6-24.9)	251	21.1	(15.4-28.2)	2.8	(1.2-6.5)	11.6	(7.3-17.8)	505	21.5	(17.8-25.7)	4.8	(3.1-7.3)	16.4	(13.0-20.6)
Second	255	18.5	(13.5-25.7)	5.1	(2.6-9.9)	16.4	(11.0-23.7)	247	19.8	(14.2-27.0)	2.0	(0.9-4.6)	9.3	(6.5-13.2)	502	19.2	(15.1-24.1)	4.0	(2.2-7.0)	13.9	(10.2-18.6)
Middle	260	14.0	(10.4-18.6)	2.7	(1.4-5.2)	7.7	(5.4-10.9)	261	15.7	(11.2-21.6)	0.8	(0.2-3.1)	4.2	(2.3-7.6)	521	15.0	(11.8-19.0)	2.0	(1.1-3.6)	6.4	(4.7-8.7)
Fourth	253	13.4	(9.6-18.5)	1.6	(0.6-4.0)	8.7	(5.7-13.1)	257	18.4	(13.4-25.4)	1.6	(0.5-5.0)	7.8	(5.1-11.6)	510	15.4	(12.1-19.3)	1.6	(0.7-3.3)	8.3	(6.1-11.3)
Highest	257	5.8	(3.4-9.8)	1.9	(0.9-4.2)	3.1	(1.6-5.9)	242	10.7	(7.3-15.5)	0.8	(0.2-3.3)	3.3	(1.7-6.2)	499	7.6	(5.4-10.4)	1.5	(0.8-3.1)	3.2	(2.0-5.1)
Total	**1279**	**14.9**	**(12.3-17.8)**	**3.4**	**(2.5-4.7)**	**11.0**	**(8.7-13.8)**	**1258**	**17.2**	**(14.3-20.7)**	**1.6**	**(0.9-2.8)**	**7.2**	**(5.7-9.2)**	**2537**	**15.7**	**(13.7-17.9)**	**2.8**	**(2.1-3.7)**	**9.6**	**(8.0-11.5)**

Note: Total % and 95% CI are weighted
[a]Height-for-age Z-score <-3 standard deviations (-3 SD) from the median of the WHO reference population; WHO 1995.
[b]Weight-for-height Z-score <-3 standard deviations (-3 SD); WHO 1995.
[c]Weight-for-age Z-score <-3 standard deviations (-3 SD); WHO 1995.

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ANNEXES

Annex A: Design Effects for Select Biomarkers, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Biomarker	Design Effect
Anemia (hemoglobin<11 g/dL)[a]	3.2
Iron deficiency (ferritin<12 µg/L)[b]	1.9
Vitamin A deficiency (RBP<0.84 µmol/L)[c]	2.0
Zinc deficiency (zinc <65 µg/dL before noon or <57 µg/dL noon to midnight)[d]	2.0
B_{12} deficiency (<203 pg/ml) [e]	3.4
Inflammation (AGP>1g/L or CRP>5mg/L) [f]	1.7

RBP, retinol binding protein; AGP, alpha-l-acid glycoprotein; CRP, C-reactive protein
[a]WHO 2011
[b]UNICEF, United Nations University, WHO 2001
[c]Vitamin A deficiency RBP <0.84 µmol/L is comparable to a retinol cut off of <0.7 µmol/L
[d]IZINCG 2007
[e]WHO 2008
[f]Thurnham DI et al 2003

Annex B1: Census Form

Baseline Survey of IYCF/Micronutrient Powder "Baal Vita" Impact Evaluation
Department of Health Service, Child Health Division/UNICEF/New ERA - 2012

001. Date of Census: _____/_____/_____ 002. Cluster Number: ☐☐
DD MM YY

003. District Name and Code Number: _____ ☐☐ 004. VDC Name and Code Number: _____ ☐☐

HH No.	Ward No.	Name of the Household Head	HH having children 5 months 15 days to 23 months 29 days		Name of the Child	Sex of the Child		Date of Birth **(DD/MM/YY)**	Name of Village/ Tole
			Yes	No **(Go to next HH)**		Male	Female		
			1	2		1	2	____/___/_____	
			1	2		1	2	____/___/_____	
			1	2		1	2	____/___/_____	
			1	2		1	2	____/___/_____	
			1	2		1	2	____/___/_____	
			1	2		1	2	____/___/_____	
			1	2		1	2	____/___/_____	
			1	2		1	2	____/___/_____	
			1	2		1	2	____/___/_____	

HH No.	Ward No.	Name of the Household Head	HH having children 5 months 15 days to 23 months 29 days		Name of the Child	Sex of the Child		Date of Birth **(DD/MM/YY)**	Name of Village/ Tole
			Yes	No **(Go to next HH)**		Male	Female		
			1	2		1	2	____/___/_____	

Annex B2: Line Listing Form

001. Cluster Number: ☐☐ 002. District Name and Code Number: _____ ☐☐

003. VDC Name and Code Number: _____ ☐☐

HH No.	Ward No.	Name of the Household Head	Name of the Child	Date of Birth **(DD/MM/YY)**	Age **(Completed Months)**	Selected for Interview		Name of Village/Tole
						Yes	No	
				____/_____/_____		1	2	
				____/_____/_____		1	2	
				____/_____/_____		1	2	
				____/_____/_____		1	2	
				____/_____/_____		1	2	
				____/_____/_____		1	2	
				____/_____/_____		1	2	

				____/_____/_____		1	2	
				____/_____/_____		1	2	
				____/_____/_____		1	2	
				____/_____/_____		1	2	
				____/_____/_____		1	2	

Annex C: Questionnaire

Baseline Survey of IYCF/Micronutrient Powder "Baal Vita" Impact Evaluation
Department of Health Service, Child Health Division/UNICEF/New ERA - 2012

Mother/Caretaker Questionnaire for Children Aged 6-23 months

Informed Consent

Namaste! My name is……. I am here from New ERA to collect data for a research survey for Ministry of Health and Population (MOHP). During this survey, I will ask you some questions related to your children aged 6-23 months, including some questions on infant and young child feeding practices. We also request to measure weigh and length of your child and to take a small tube of blood from your child. The test uses disposable new instruments that are clean and safe. With this blood sample during this visit we will be able to tell you if your child has anemia or malaria. We would very much appreciate your participation in this survey. This survey will take about 45 minutes

Your participation in this survey depends on your wish. The information given by you will be strictly treated as confidential. If we come to any questions that you don't want to answer, just let me know and I will go to the next question or you can stop giving the interview at that time. However, I hope that you will participate in this survey and make it a success by providing honest answers to all the questions.

Would you like to ask me any questions about this survey?

May I begin the interview now?

Signature of the interviewer : _____ Date: ____/_____/2069

Respondent agrees for interview … 1 Respondent does not agree for interview→2 Stop interview ↓

Place
Child
Questionaire
Lable Heare

Form No.M ☐☐☐☐

001	Cluster No.	☐☐
002	District Name and Code No.	_____ ☐☐
003	VDC Name and Code No.	_____ ☐☐
004	Ward No.	☐☐
005	Household No.	☐☐
006	Village/Tole Name	_____
007	**GPS Coord** GPS unit No.: ☐☐ Waypoint No.: ☐☐☐☐ Latitude (North/South) ☐☐ • ☐☐ • ☐☐☐ Longitude (East/West): ☐☐☐ • ☐☐ • ☐☐☐ Altitude (Meter) ☐☐☐☐	

Interview Attempt	**1**	**2**	**3**
Name and code No. of interviewer	_____☐☐	_____☐☐	_____☐☐
Date of interview (DD/MM/YY)	_____/_____/2069	_____/_____/2069	_____/_____/2069
Interview status* **(use codes below to fill in this row)**	☐☐	☐☐	☐☐

*__Code__
1 = Interview completed 2 = Partially completed 3 = Postponed interview
4 = Refused survey 5 = No one at home 96 = Others (Specify)_____

008	Reviewed in the field by	_____
009	Name of the supervisor	_____
010	Language of the interview	Nepali .....1 Others (Specify)_____ 96
011	Time started interview (Hr./Min.)	☐☐ : ☐☐
012	Verify name of mother/caregiver: **(Respondent Name)**	Name of the mother _____1 _ Name of the caretaker _____2
013	Verify name of the child 6-23 months selected from the line listing:	
	1. Name of the child	_____
	2. Sex of the child	Female .....1 Male.....2
	3. Date of birth of the child	_____/_____/_____

		DD MM YY Birth certificate (Hospital).....1 Respond's Recall .....2 Immunization Card.....3
	4. Age of the child in months	Month (Completed)..... ☐☐

A. <u>Household Information</u>

S.No.	Questions and Filters	Coding Categories	Skip
1	Caste of child _____	Dalit hill/terai.....1 Disadvantage Janjati/hill/terai.....2 Disadvantage non-dalit terai caste group.....3 Religious minorities.....4 Relatively advantaged Janajati upper caste .....5 Upper caste .....6 Refuse to answer.....77	
2	How many people usually eat from the same kitchen in your household?	Total ..... ☐☐ Don't know.....98 Refuse to answer.....77	

B. Socio-Economic Information

S.No.	Questions and Filters	Coding Categories	Skip
3	What is the level of education of the child's (Name) father? **(Circle the completed level)**	None..... 1 Adult class/Informal education ..... 2 Lower secondary (1-5 class) ..... 3 Secondary level (6-10 class/SLC)..... 4 Higher secondary (11-12 class)..... 5 Bachelor and above..... 6 Don't have father/Dead..... 7 Others (Specify)_____96 Don't know..... 98 Refuse to answer..... 77	
4	What is the level of education of child's (Name) mother/care-taker? **(Circle the completed level)**	None..... 1 Adult class/Informal education ..... 2 Lower secondary (1-5 class) ..... 3 Secondary level (6-10 class/SLC)..... 4 Higher secondary (11-12 class)..... 5 Bachelor and above..... 6 Others (Specify)_____96 Don't know..... 98 Refuse to answer..... 77	
5	What is your household's main source of income?	Crop farming..... 1 Livestock farming ..... 2 Fishing..... 3 Casual wage labour..... 4 Remittance ..... 5 Trade/business..... 6 Assistance programme (pensions, development aid programmes, etc.) ..... 7 Job (Government/Private)..... 8	

S.No.	Questions and Filters	Coding Categories	Skip
		Forest products collection (wood, herbs, etc.) ..... 9 Others (Specify)_____96 Don't know ..... 98 Refuse to answer 77	
6	What is the main material of the floor in the respondent's house. **(Observe and circle the answer)**	Earth/Mud/Dung ..... 1 Wood plank ..... 2 Linoleum/Carpet ..... 3 Ceremic tiles, marble chips ..... 4 Cement ..... 5 Others (Specify)_____96	
7	What is the main material of the roof in the respondent's household. **(Observe and circle the answer)**	Thatch/straw/wheat straw ..... 1 Wood planks, cardboard/rustic mate/ bamboo ..... 2 Glavanized sheel, asbestos, ceramic tiles/slate, cement, roofing shingles ..... 3 Others (Specify)_____96	
8	What is the main material of the wall in the respondent's household. **(Observe and circle the answer)**	Bamboo with mud ..... 1 Bamboo with cement ..... 2 Adobe ..... 3 Unfinished wood/wood planks ..... 4 Cement ..... 5 Bricks ..... 6 Cement blocks ..... 7 Stone ..... 8 Mud stone ..... 9 No walls ..... 10 Others (Specify)_____96	
9	Which of the following does your household have? **(Read each option one by one and circle the correct answer in each option)**	**Yes** **No** Electricity ..... 1 2 Radio ..... 1 2 Television ..... 1 2 Mobile telephone ..... 1 2 Land line telephone ..... 1 2 Refrigerator ..... 1 2 Table ..... 1 2 Chair ..... 1 2 Bed ..... 1 2 Sofa ..... 1 2 Cupboard ..... 1 2 Watch/clock ..... 1 2 Computer ..... 1 2 Fan ..... 1 2 Dhikki/Janto ..... 1 2 Bicycle 1 2	

C. Water, Hygiene and Sanitation

S.No.	Questions and Filters	Coding Categories	Skip
10	From where do you bring the drinking water for your household?	Piped water in to house/yard/plot ..... 1 Piped water from public/neighbor's tap .. 2 Dug well in house/yard/plot..... 3 Public/neighbor's dugwell..... 4 Tube well in yard/plot..... 5 Public/neighbor's tube well..... 6 Spring/Kuwa..... 7 River/Stream/Pond/Lake..... 8 Stone Tap/Dhara ..... 9 Others (Specify)_____ 96 Don't know..... 98 Refuse to answer..... 77	
11	Phease show me your toilet facility? **(Observe and circle the correct answer)**	Flush toilet ..... 1 Traditional pit toilet ..... 2 Ventilated improved pit latrine..... 3 Don't have toilet facility/bush/field..... 4 Not observed, no permision..... 95 Others (Specify)_____ 96	
12	Please show me where members of your household most often wash their hands. **(Observe and circle the correct answer)**	Observed ..... 1 Not observed, not in dwelling/ yard/plot .. 2 Not observed, no permission to see ..... 3 Others (Specify)_____ 96	14
13	Observe presence of water at the place for handwashing.	Water is available ..... 1 Water is not availab..... 2	
14	Please show me your soap or surf or other cleansing agent. **(Observe and circle the correct answer)**	Soap or surf..... 1 Ash, Mud, Sand..... 2 None..... 3	
15	For what purpose did you use soap today or yesterday? **(Multiple answers possible)**	Did not use soap yesterday or today……0 To wash clothes..... 1 To take bath..... 2 To wash the children..... 3 After cleaning the children's stool ..... 4 To wash the children's hands ..... 5 To wash hands after defecating..... 6 To wash hands after cleaning child..... 7 To wash hands before feeding child ..... 8 To wash hands before preparing food..... 9 To wash hands before eating..... 10 Others (Specify)_____ 96 Don't know..... 98 Refuse to answer..... 77	
16	Do you have a bed net?	Yes ..... 1 No..... 2 Don't know..... 98 Refuse to answer..... 77	
17	Do you have a nail clipper/nail cutter?	Have nail clipper (observed)..... 1 Have nail clipper (Not observed)..... 2 Don't have nail clipper ..... 3 Refuse to answer..... 77	

	(Ask to show the nail cutter and circle the correct option after observing)		

D. Child Health

S.No.	Questions and Filters	Coding Categories	Skip
18	Has (name) had diarrhea in the last 2 weeks?	Yes……1 No……..2 Don't Know…….98	
19	Has (NAME) been ill with a fever at any time in the last 2 weeks?	Yes……1 No……..……2 Don't Know……..…..98	
20	Has (NAME) had an illness with a couth at any time in the last 2 weeks?	Yes……1 No……..……2 Don't Know……..…98	22
21	When (NAME) had an illness with a cough, did he/she breathe faster than usual with short, rapid breaths or have difficulty breathing?	Yes……..…..1 No……..2 Don't Know……..…98	

E. Food Security

S.No.	Questions and Filters	Coding Categories	Skip
22	In the past 12 months, how frequently did you worry that your household would not have enough food?	Never.....1 Rarely.....2 Sometimes.....3 Often 4	
23	In the past 12 months, how often were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	Never.....1 Rarely.....2 Sometimes.....3 Often 4	
24	In the past 12 months, how often did you or any household member have to eat a limited variety of foods due to a lack of resources?	Never.....1 Rarely.....2 Sometimes.....3 Often 4	
25	In the past 12 months, how often did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	Never.....1 Rarely.....2 Sometimes.....3 Often 4	
26	In the past 12 months, how often did you or any household member eat fewer meals in a day because of resources to get food?	Never.....1 Rarely.....2 Sometimes.....3 Often 4	
27	In the past 12 months, how often was there no food to eat of any kind in your household because of lack of resources to get food?	Never.....1 Rarely.....2 Sometimes.....3 Often 4	
28	In the past 12 months, how often did you or any household member go to sleep at night hungry because there was not enough food?	Never.....1 Rarely.....2 Sometimes.....3 Often 4	

S.No.	Questions and Filters	Coding Categories	Skip
	Instructions: If the answer to Q.No. 22-28 is 'Never', go to Q.No. 31. Otherwise ask Q.No. 29-30.		
29	Did your household have to adopt the following to meet the household food need in the last 12 months? **(Read option one by one. Make sure that the adoptation was done only to meet the household food need)**		
		Yes / **No**	
	1. Take loan?	1 / 2	
	2. Collect wild food?	1 / 2	
	3. Consume seed stock for next season?	1 / 2	
	4. Sell household assets?	1 / 2	
	5. Sell livestock/poultry?	1 / 2	
	6. Sell land?	1 / 2	
	96. Prove: Any other steps taken? If yes, specify _____	1 / 2	
30	What was the cause of food deficiency in your household in the last 12 months? **(Multiple answers possible)**	**Natural Diseaster** Drought ..... 1 Landslide ..... 2 Crop Failure ..... 3 Flood ..... 4 **Temporal Factors** Financial problems ..... 5 Not available in market ..... 6 Other (Specify) _____ 96	

F. Knowledge on Community Programs/Interventions

S.No.	Questions and Filters	Coding Categories	Skip
31	In the past 7 days was your child (Name) given iron syrup? **(Observe the bottle and circle the correct answer)**	Yes, observed ..... 1 Yes, not observed..... 2 No ..... 3 Don't know ..... 98 Refuse to answer 77	
32	Did your child (Name) received vitamin A capsule during the last vitamin A distribution event in Kartik?	Yes ..... 1 No ..... 2 Don't know ..... 98 Refuse to answer 77	
33	Did your child (Name) take any drug for intestinal worms in the last 6 months?	Yes ..... 1 No ..... 2 Don't know ..... 98 Refuse to answer 77	
34	Have you ever heard of Baal Vita? **(Show sample sachet)**	Yes ..... 1 No ..... 2 Don't know ..... 98 Refuse to answer 77	39
35	What is Baal Vita? **(Multiple answers possible)**	Sachet of vitamins and minerals..... 1 Something added to the food of young children..... 2 Others (Specify)_____ 96 Don't know ..... 98 Refuse to answer 77	
36	Has the child (Name) ever consumed any Baal Vita sachets?	Yes ..... 1 No ..... 2 Don't know ..... 98 Refuse to answer 77	39

S.No.	Questions and Filters	Coding Categories	Skip
37	In the past 7 days did your child (Name) consume Baal Vita?	Yes ..... 1 No ..... 2 Don't know ..... 98 Refuse to answer 77	
38	How many Baal Vita sachets did the child (Name) ever consume till now?	Number of sachets consumed.. ☐☐☐ Don't know ..... 98 Refuse to answer 77	
39	**Read aloud:** *Now I'm going to tell you something about Baal Vita, which will be avaiable soon in your community. Baal Vita is a small packet of powder that contains iron and some other vitamins. You can mix Baal Vita into your child's food and it has no taste. Baal Vita has help prevent children from having anemia.*		
	If Baal Vita were available in your community would you want to give it to your child (Name)?	Yes ..... 1 No ..... 2 Don't know ..... 98 Refuse to answer 77	
40	In the last 12 months has anyone in your household participated in or received benefits from any of the following programs?		

	Yes	No	
1. Purchasing and consuming of subsidized "two child" logo iodized salt	1	2	
2. Child protection grant for disadvantaged families (200 rupees per month per family) for up to two children	1	2	
3. CMAM using Plumpy Nut	1	2	
4. Nutritious flour (for children)	1	2	
5. Nutritious flour (for pregnant women)	1	2	
6. Open defecation free (ODF) campaign	1	2	
96. Other (Specify) _____	1	2	

G. Infant and Young Child Feeding Practices

S.No.	Questions and Filters	Coding Categories	Skip
41	Have you ever breastfed the child (Name)?	Yes ..... 1 No ..... 2 Refuse to answer 77	47
42	How long after birth did you (Mother) first put the child (Name) to the breast? **(Read each option one by one and circle the correct answer)**	Immediately after birth ..... 1 Within one hour ..... 2 After one hour but within one day ..... 3 After one day ..... 4 Don't know ..... 98 Refuse to answer 77	
43	Are you (Mother) still breastfeeding the child (Name)?	Yes ..... 1 No ..... 2 Refuse to answer 77	46
44	How many times did you breastfeed the child (Name) during the daylight hours yesterday? **(From sunrise to sunset)**	No. of times ..... ☐☐ Don't know ..... 98 Refuse to answer 77	
45	How many times did you breastfeed the child (Name) last evening and night? **(From sunset to sunrise)**	No. of times ..... ☐☐ Don't know ..... 98 Refuse to answer 77	47

S.No.	Questions and Filters	Coding Categories	Skip
46	Why are you no longer breastfeeding the child (Name)? **(Multiple answers possible)**	Workload ..... 1 New pregnancy ..... 2 Not enough breast milk ..... 3 Start using contraception ..... 4 Child ill/weak ..... 5 Mother ill/weak ..... 6 Nipple/breast problem ..... 7 Child refused ..... 8 Weaning age/age to stop ..... 9 Others (Specify)_____ 96 Don't know ..... 98 Refuse to answer 77	
47	Did the child (Name) drink anything from a bottle with a nipple the previous day?	Yes ..... 1 No ..... 2 Don't know ..... 98 Refuse to answer 77	
48	Did the child (Name) receive anything to drink other than breast milk on the previous day?	Yes ..... 1 No ..... 2 Don't know ..... 98 Refuse to answer 77	50
49	If yes, what was the child (Name) given to drink? **(Read each option one by one. Specify frequency for milk and infant formula)**	**Yes No** Other milk than breast milk (eg., tin, powder, animal milk) ..... 1 2 If yes, how many times yesterday. ☐☐ Plain water ..... 1 2 Sugar or glucose water ..... 1 2 Gripe water ..... 1 2 Sugar-salt-water solution ..... 1 2 Fruit juice ..... 1 2 Infant formula (eg., Lactogen) ..... 1 2 If yes, how may times yesterday... ☐☐ Tea ..... 1 2 Honey ..... 1 2 Bhat ko mar (rice water/starch) ..... 1 2 Others (Specify)_____ 1 2 Don't know ..... 98 Refuse to answer 77	
50	How old was the child (Name) when he/she was introduced to solid, semi-solid or soft food (complementary feeding) for the first time? Example of **solid foods** include: Meat, cheese, fish **Semi solid foods** include: rice, lentils, banana, papaya, mango **Soft foods** include: bananas, papaya, mangoes **(Verify the age in completed months)**	Month (Completed) ..... ☐☐ Not yet introduced ..... 96 → 56 Don't know ..... 98 Refuse to answer 77	

S.No.	Questions and Filters	Coding Categories	Yes	No	Skip
51	Did the child (Name) receive solid, semi-solid or soft food yesterday?	Yes ..... 1 No ..... 2 Don't know ..... 98 Refuse to answer 77			→ 54
52	How many times did you give the child (Name) solid, semi-solid or soft food yesterday?	No. of times ..... ☐☐ Don't know ..... 98 Refuse to answer 77			
53	Did the child (Name) eat from the following food groups the previous day? **Read the food groups and the examples**		Yes	No	
	1. Grains, root and tubers (bread, biscuits, noodles, rice or beaten rice, maize, wheat, millit or porridge made from these, potato, sweetpotato, colocasia, yam etc.)		1	2	
	2. Legumes and nuts (Beans, peas, lentils, nuts, seeds or food made from these)		1	2	
	3. Dairy products (milk, curd, cheese or other milk products, ghee)		1	2	
	3.a If yes to dairy, how many times yesterday?		☐☐		
	4. Flesh foods (chicken, mutton, buff, fish, poultry, liver, kidney, heart and other organ meats or blood based food)		1	2	
	5. Eggs		1	2	
	6. Vitamin A rich fruits and vegetables (Ripe mango, pumpkin, carrot, papaya, green vegetables)		1	2	
	7. Other fruits and vegetables (wild fruits, dried amala, banana, apple, seasonal fruits and vegetables)		1	2	
	8. Fortified complementary food (infant food such as cerelac, lito from superflour available in market, unilito, nutrimix, champaign, etc.)		1	2	
54	Does the child (Name) eat from the same plate along with another child? **(Read each option one by one and circle the correct answer)**	All of the meals ..... 1 Most of the meals but not all the meals .. 2 A few meals but not often ..... 3 None of the meals ..... 4 Don't know ..... 98 Refuse to answer 77			
55	Does the child (Name) eat from the same plate along with the mother or caretaker? **(Read each option one by one and circle the correct answer)**	All of the meals ..... 1 Most of the meals but not all the meals .. 2 A few meals but not often ..... 3 None of the meals ..... 4 Don't know ..... 98 Refuse to answer 77			

H. Knowledge About IYCF

S.No.	Questions and Filters	Coding Categories	Skip
56	In your opinion, why does a child below 2 years of age needs to be feed with nutritious food? **(Multiple answers possible)**	For overall development ..... 1 For physical growth ..... 2 For mental development ..... 3 For strength/strong body ..... 4 For developing strong immunity ..... 5 For activity/playing ..... 6 For incresed appetite ..... 7 Others (Specify)_____ 96 Don't know 98	

S.No.	Questions and Filters	Coding Categories	Skip
		Refuse to answer..... 77	
57	In your opinion, what are the main types of vitamins and minerals that are important for health? **(Multiple answers possible)**	Vitamin A ..... 1 Iron ..... 2 Iodine..... 3 Calcium..... 4 Zinc..... 5 Folic acid ..... 6 Others (Specify)_____ 96 Don't know..... 98 Refuse to answer..... 77	
58	In your opinion, why does a mother need to breastfeed her child? **(Multiple answers possible)**	Breast milk contains nutrients that a baby needs ..... 1 Breast milk protects a baby against infection..... 2 Breast milk is easily digested by the body ..... 3 Breast milk costs less than artificial feeding ..... 4 Child does not need other types of food for first 6 months of birth ..... 5 Mother will become healthy ..... 6 Strong bond between mother and child .. 7 Others (Specify)_____ 96 Don't know..... 98 Refuse to answer..... 77	
59	In your opinion, at what age does a child need to start eating complementary foods in addition to breastmilk?	Months (Completed)..... ☐☐ Others (Specify)_____ 96 Don't know..... 98 Refuse to answer..... 77	
60	In your opinion, how many times in a day does your child (Name) need to be fed with supplementary foods in addition to breastmilk?	No of times ..... ☐☐ Don't know..... 98 Refuse to answer..... 77	
61	Did you give the child (Name) sarbottom lito/pitho yesterday?	Yes..... 1 No ..... 2 Don't know..... 98 Refuse to answer..... 77	
62	What are the main ingredients of sarbottom lito/pitho? **(Multiple answers possible)**	Cereals and legumes ..... 1 Others (Specify)_____ 96 Don't know..... 98 Refuse to answer..... 77	
63	Do you know how to prepare sarbottom lito/pitho?	Yes..... 1 No ..... 2 Don't know..... 98 Refuse to answer..... 77	

I. Knowledge about Micronutrients

S.No.	Questions and Filters	Coding Categories	Skip
64	Have you heard about anemia from anywhere?	Yes..... 1 No 2	

S.No.	Questions and Filters	Coding Categories	Skip
		Don't know..... 98 Refuse to answer..... 77	68
65	From what source did you hear about anemia? **(Multiple answers possible)**	Implementing organization/field worker..... 1 Mother's group meeting..... 2 Husband..... 3 Other family members/relatives ..... 4 Friends/neighbour..... 5 FCHV ..... 6 Health facility/health workers ..... 7 School/teacher/students ..... 8 Social mobilizer..... 9 Flipchart..... 10 Pamphlet/Brochure ..... 11 Radio..... 12 Television ..... 13 Flex banner ..... 14 Poster ..... 15 Sticker..... 16 Others (Specify)_____ 96 Don't know..... 98 Refuse to answer..... 77	
66	What is anemia? **(Multiple answers possible)**	Paleness ..... 1 Disorder of the blood/lack of blood..... 2 Kind of disease (Specify)_____.. 3 Others (Specify)_____ 96 Don't know..... 98 Refuse to answer..... 77	
67	What are the negative consequences of anemia in children? **(Multiple answers possible)**	Decreased ability to learn ..... 1 Decreased ability to read and write ..... 2 Brain does not develop well ..... 3 Others (Specify)_____ 96 Don't know..... 98 Refuse to answer..... 77	
68	Have you heard about iron?	Yes..... 1 No ..... 2 Refuse to answer..... 77	71
69	Why is iron required for our body? **(Multiple answers possible)**	Make/increase blood..... 1 Brain development..... 2 Transport oxygen in the body..... 3 Improves ability to learn/read and write . 4 Others (Specify)_____ 96 Don't know..... 98 Refuse to answer..... 77	
70	What are the main food sources of iron? **(Multiple answers possible)**	Meat, fish, egg ..... 1 Pulses..... 2 Green leafy vegetables..... 3 Liver ..... 4 Fruits..... 5 Foods fortified with iron..... 6 Others (Specify)_____ 96 Don't know..... 98 Refuse to answer..... 77	

S.No.	Questions and Filters	Coding Categories	Skip
71	What are main sources of vitamin and minerals? **(Multiple answers possible)**	Fruits ..... 1 Vegetables ..... 2 Meat, fish, egg ..... 3 Food fortified with vitamins and minerals ..... 4 Vitamin and mineral supplements (tablets or liquids) ..... 5 Baal Vita ..... 6 Others (Specify)_____ 96 Don't know ..... 98 Refuse to answer 77	
72	Why is it important to eat a variety of food? **(Multiple answers possible)**	To get sufficient vitamins and minerals for health (balanced diet) ..... 1 Mental development ..... 2 Physical growth ..... 3 Improve immunity/prevent disease ..... 4 Strength/strong body ..... 5 Taste ..... 6 Others (Specify)_____ 96 Don't know ..... 98 Refuse to answer 77	

J. Early Childhood Development

S.No.	Questions and Filters	Coding Categories				Skip
73	Does the child (Name) play on his own with toys, household objects? **(Toys - household objects such as: bowls or pots or objects found outside such as: sticks, rocks, animal shells or leaves)**	Yes ..... 1 No ..... 2 Don't know ..... 98 Refuse to answer 77				
74	In the past 3 days, has the mother or father been in the household?	Yes, mother and father at home ..... 1 Yes, mother only at home ..... 2 Yes, father only at home ..... 3 No 4				
75	In the past 3 days, did you or any household member over 15 years of age engage in any of the following activities with the child (Name)? **If yes, ask who engaged in this activity.**					
		Mother	**Father**	**Other Family Member**	**No one**	
	1. Told stories?	1	2	3	4	
	2. Sang songs	1	2	3	4	
	3. Took outside	1	2	3	4	
	4. Played with child	1	2	3	4	
	5. Named/counted or drew things	1	2	3	4	
76	Yesterday **(in last 24 hours)** did you do any of the following activities **while feeding the child**?					
		Yes	**No**	**Don't know**		
	1. Keep eye contact	1	2	3		
	2. Sing to the child	1	2	3		
	3. Talk to the child	1	2	3		

S.No.	Questions and Filters	Coding Categories	Skip
77	Do you think it is important to communicate with your child during feeding?	Yes.....1 No.....2	

K. Ages and Stages Questions

Following questions are related to activities that a child can perform. Your child might have already done some of these activities whereas some might not have been done yet. Identify the activities your child does regularly, sometimes or has not yet done and tick the appropriate cell.

78. **For 6 month old children (6 months 0 days to 6 months 29 days)**

78.1 Communication

S. No.	Communication related activities	Does	Sometimes	Not yet
1	Does your child scream when s/he is happy or frightened?	1	2	3
2	Does your child make different deep-toned sounds?	1	2	3
3	If you call your child by his/her name without being in his/her sight, does s/he looks at the direction of sound?	1	2	3
4	Does your child turn and looks at the direction from where a loud sound is coming?	1	2	3
5	Does your child make out sounds like da, ga, ka and ba?	1	2	3
6	Does your child make out the same sound when you imitate words s/he makes?	1	2	3

78.2 Gross motor development related activities

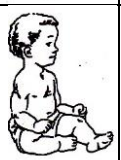
S. No.	Gross motor development related activity	Does	Sometimes	Not yet
1	Does your child lift both legs and try to look at his/her feet while lying on his/her back?	1	2	3
2	Does your child try to move forward on his/her chest stretching both hands while lying on the bed or floor on his/her tummy?	1	2	3
3	Does your child take out both hands from under his/her body while changing the position from lying on his/her back to tummy?	1	2	3
4	Does your child require support of his/her both palms to sit if you put him/her on the floor? (If s/he does not use hands as support please tick in 'Does') 	1	2	3
5	Can your child stand up and balance his/her weight while you hold his/her both hands? 	1	2	3
6	Does your child get in crawling position using both his/her hands and knees? 	1	2	3

79. **For 7 and 8 months old children (7 months 0 days to 8 months 29 days)**

79.1 Communication

S. No.	Communication related activities	Does	Sometimes	Not yet
1	If you call your child by his/her name without being in his/her sight, does s/he looks at the direction of sound?	1	2	3
2	Does your child turn and looks at the direction from where a loud sound is coming?	1	2	3
3	Does your child take out the same sound when you imitate words s/he s makes?	1	2	3
4	Does your child make out sounds like da, ga, ka and ba?	1	2	3
5	Does your child understand general instructions and act accordingly? For example, if you instruct him/her not to do anything does s/he stop doing that activity?	1	2	3
6	Can your child use two similar words like ba-ba, da-da, ga-ga? (The sound need not make any meaning).	1	2	3

79.2 Gross motor development related activities

S. No.	Gross motor development related activity	Does	Sometimes	Not yet
1	Does your child require support of his/her both palms to sit if you put him/her on the floor? (If s/he does not use hands as support please tick in 'Does') 	1	2	3
2	Does your child take out both hands from under his/her body while changing the position from lying on his/her back to tummy?	1	2	3
3	Does your child get in crawling position using both his/her hands and knees? 	1	2	3
4	Can your child stand up and balance his/her weight while you hold his/her both hands? 	1	2	3
5	Can your child sit up properly on the floor for sometime without getting support of his/her hands? 	1	2	3
6	Can your child stand up straight holding bars or railings without leaning on his/her chest? 	1	2	3

80. **For 9 and 10 months old children (9 months 0 days to 10 months 29 days)**

80.1 Communication

S. No.	Communication related activities	Does	Sometimes	Not yet
1	Does your child make out sounds like da, ga, ka and ba?	1	2	3
2	Does your child make out the same sound when you imitate words s/he makes?	1	2	3
3	Can your child use two similar words like ba-ba, da-da, ga-ga? (The sound need not make any meaning).	1	2	3
4	Does your child follow instructions like 'do namaste', 'clap hands' without you showing or indicating to him/her what to do?	1	2	3
5	Does your child follow simple instructions like 'come here', 'give me this' without looking at yours or others' gesture?	1	2	3
6	Can your child speak three simple words like mama, dada, baba? (These words must mean something or should be related to someone).	1	2	3

80.2 Gross motor development related activities

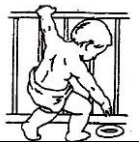
S. No.	Gross motor development related activity	Does	Sometimes	Not yet
1	Can your child stand up and balance his/her weight while you hold his/her both hands? 	1	2	3
2	Can your child sit up properly on the floor for sometime without getting support of his/her hands? 	1	2	3
3	Can your child stand up straight holding bars or railings without leaning on his/her chest? 	1	2	3
4	Can your child stand up holding bars or railings, bend down to lift small goods from the floor and stand up in the same position again? 	1	2	3
5	Can your child sit down without falling by holding bars or railings?	1	2	3
6	Can your child walk around railings or furnitures holding on to it with his/her one hand?	1	2	3

81. **For 11 and 12 months old children (11 months 0 days to 12 months 29 days)**

81.1 Communication

S. No.	Communication related activities	Does	Sometimes	Not yet
1	Can your child use two similar words like ba-ba, da-da, ga-ga? (The sound need not make any meaning).	1	2	3
2	Does your child follow instruction like 'do namaste', 'clap hands' without you showing or indicating to him/her what to do?	1	2	3
3	Does your child follow simple instructions like 'come here', 'give me this' without looking at yours or others' gesture?	1	2	3
4	Can your child speak three simple words like mama, dada, baba? (These words must mean something or should be related to someone).	1	2	3
5	Does your child look at the object while responding to your query like 'where is the ball'? (The object should be in a place where s/he can see it?)	1	2	3
6	Does your child demand things that s/he requires by pointing towards them with his/her fingers?	1	2	3

81.2 Gross motor development related activities

S. No.	Gross motor development related activity	Does	Sometimes	Not yet
1	Can your child stand up holding bars or railings, bend down to lift small goods from the floor and stand up in the same position again? 	1	2	3
2	Can your child sit down without falling by holding bars or railings?	1	2	3
3	Can your child walk around railings or furnitures holding on to it with his/her one hand?	1	2	3
4	Can your child walk without falling if you hold his/her both hands? (If s/he can walk alone without any support please tick in does). 	1	2	3
5	Can your child walk several steps if you hold his/her one hand? (If s/he can walk alone without any support please tick in does). 	1	2	3
6	Can your child stand up alone in the middle of the floor and walk several steps?	1	2	3

82. **For 13 and 14 months old children (13 months 0 days to 14 months 29 days)**

82.1 Communication

S. No.	Communication related activities	Does	Sometimes	Not yet
1	Can your child speak three simple words like mama, dada, baba? (These words must mean something or should be related to someone).	1	2	3
2	Does your child demand things that s/he requires by pointing towards them with his/her fingers?	1	2	3
3	Does your child node his/her head to indicate 'yes' or 'no'?	1	2	3
4	While showing pictures from a book does your child show or touch them?	1	2	3
5	Can your child speak four or more words besides 'mama', 'dada'?	1	2	3
6	Can your child find and bring objects that are known to him/her if you ask him/her to do so? (For example, 'where is the ball', 'bring my book', 'bring my jacket', etc).	1	2	3

82.2 Gross motor development related activities

S. No.	Gross motor development related activity	Does	Sometimes	Not yet
1	Can your child walk without falling if you hold his/her both hands? (If s/he can walk alone without any support please tick in does). 	1	2	3
2	Can your child walk several steps if you hold his/her one hand? (If s/he can walk alone without any support please tick in does). 	1	2	3
3	Can your child stand up alone in the middle of the floor and walk several steps?	1	2	3
4	Can your child climb furniture like bed, table?	1	2	3
5	Can your child bend down to lift small goods from the floor and stand up straight again without anybody's support?	1	2	3
6	Does your child walk few steps instead of crawling?	1	2	3

83. **For 15 and 16 months old children (15 months 0 days to 16 months 29 days)**

83.1 Communication

S. No.	Communication related activities	Does	Sometimes	Not yet
1	While showing pictures from a book does your child show or touch them?	1	2	3
2	Can your child speak four or more other words besides 'mama', 'dada'?	1	2	3
3	Does your child ask for objects that s/he requires by pointing towards it with his/her fingers?	1	2	3
4	If you ask your child to bring some objects that are know to him/her, can s/he find it and bring? (For example, 'where is the ball', 'bring my book', 'bring my jacket', etc).	1	2	3
5	Can your child imitate you when you speak a two word sentences like 'he came', 'go home', 'mother come', etc? (Even if the sentences are not clear please tick does).	1	2	3
6	Can your child speak eight or more words besides 'mama', 'dada'?	1	2	3

83.2 Gross motor development related activities

S. No.	Gross motor development related activity	Does	Sometimes	Not yet
1	Can your child stand up alone in the middle of the floor and walk several steps?	1	2	3
2	Can your child climb furniture like bed, table?	1	2	3
3	Can your child bend down to lift small goods from the floor and stand up straight again without anybody's support?	1	2	3
4	Does your child walk few steps instead of crawling?	1	2	3
5	Can your child walk around properly without falling?	1	2	3
6	Does your child try to get things that s/he wants by steping or climbing on something? (For example climb on a chair and get the ball from the table).	1	2	3

84. **For 17 and 18 months old children (17 months 0 days to 18 months 29 days)**

84.1 Communication

S. No.	Communication related activities	Does	Sometimes	Not yet
1	Does your child ask for objects that s/he requires by pointing towards it with his/her fingers?	1	2	3
2	If you ask your child to bring some objects that are know to him/her, can s/he find it and bring? (For example, 'where is the ball', 'bring my book', 'bring my jacket', etc).	1	2	3
3	Can your child speak eight or more words besides 'mama', 'dada'?	1	2	3
4	Can your child imitate you when you speak a two worded sentences like 'he came', 'go home', 'mother come', etc? (Even if the sentences are not clear please tick does).	1	2	3
5	Can your child show appropriate pictures if asked to do so, for example, if asked to show a cat, can s/he show the correct picture? (the child should at least show one picture correct).	1	2	3
6	Can your child use two or three word sentences in different senses? For example mother came home, puppy went outside. (please check that the child uses words in different sense and makes proper sentences).	1	2	3

84.2 Gross motor development related activities

S. No.	Gross motor development related activity	Does	Sometimes	Not yet
1	Can your child bend down to lift small goods from the floor and stand up straight again without anybody's support?	1	2	3
2	Does your child walk few steps instead of crawling?	1	2	3
3	Can your child walk around properly without falling?	1	2	3
4	Does your child try to get things that s/he wants by steping or climbing on something? (For example climb on a chair and get the ball from the table).	1	2	3
5	Can your child decend stairs if you hold his/her one hand? (Instead of your hands s/he can take support of a wall or railing).	1	2	3
6	Does your child try to copy you by lifting his/her leg or going near to the ball and hit it if you do so? 	1	2	3

85. **For 19 and 20 months old children (19 months 0 days to 20 months 29 days)**

85.1 Communication

S. No.	Communication related activities	Does	Sometimes	Not yet
1	Can your child imitate you when you speak a two worded sentences like 'he came', 'go home', 'mother come', etc? (Even if the sentences are not clear please tick does).	1	2	3
2	Can your child speak eight or more words besides 'mama', 'dada'?	1	2	3
3	Can your child show appropriate pictures if asked to do so, for example, if asked to show a cat, can s/he show the correct picture? (the child should at least show one picture correct).	1	2	3
4	Can your child name correctly a picture if asked to show one? Can he at least name correctly one picture?	1	2	3
5	How many instructions mentioned below can your child follow without your giving clues or using gestures? a. Put the toy on the table b. Close the door c. Bring the towel d. Find your jacket e. Hold my hand f. Give me your book	 1 1 1 1 1 1	 2 2 2 2 2 2	 3 3 3 3 3 3
6	Can your child use two or three word sentences in different senses? For example mother came home, puppy went outside. (Please check that the child uses words in different sense and makes proper sentences).	1	2	3

85.2 Gross motor development related activities

S. No.	Gross motor development related activity	Does	Sometimes	Not yet
1	Does your child try to get things that s/he wants by steping or climbing on something? (For example climb on a chair and get the ball from the table).	1	2	3
2	Can your child walk around properly without falling?	1	2	3
3	Can your child decend stairs if you hold his/her one hand? (Instead of your hands s/he can take support of a wall or railing).	1	2	3
4	Does your child try to copy you by lifting his/her leg or going near to the ball and hit it if you do so? 	1	2	3
5	Can your child stand up/stop properly without falling after running? 	1	2	3
6	Can your child climb or decend two steps of a stair holding the wall or railing? 	1	2	3

86. **For 21 and 22 months old children (21 months 0 days to 22 months 29 days)**

86.1 Communication

S. No.	Communication related activities	Does	Sometimes	Not yet
1	Can your child show the correct picture if asked to show one? Can he/she show at least one picture correct?	1	2	3
2	How many instructions mentioned below can your child follow without your giving clues or using gestures?			
	a. Put the toy on the table	1	2	3
	b. Close the door	1	2	3
	c. Bring the towel	1	2	3
	d. Find your jacket	1	2	3
	e. Hold my hand	1	2	3
	f. Give me your book	1	2	3
3	Can your child show organs like eye/ear/hair/legs if asked to show them? Can s/he show at least seven organs correctly? (S/he needs to show his/her body, your organs and the organs in a doll as well. If s/he can show only three organs please tick on 'sometimes' column).	1	2	3
4	Can your child speak 15 or more words besides 'mama', 'dada'?	1	2	3
5	Can your child appropriately use any two words from I, my, me and you?	1	2	3
6	Can your child use two or three word sentences in different senses? For example mother came home, puppy went outside. (Please check that the child uses words in different sense and makes proper sentences).	1	2	3

86.2 Gross motor development related activities

S. No.	Gross motor development related activity	Does	Sometimes	Not yet
1	Does your child try to copy you by lifting his/her leg or going near to the ball to hit it, if you hit a ball with your feet? 	1	2	3
2	Can your child stand up properly without falling after running? 	1	2	3
3	Can your child decend stairs if you hold his/her one hand? (Instead of your hands s/he can take support of a wall or railing).	1	2	3
4	Can your child climb or decend two steps of a stair holding the wall or railing? 	1	2	3
5	Can your child jump with both legs on the air? 	1	2	3
6	Can your child hit a ball with his/her legs without taking support of anything? 	1	2	3

87. **For 23 months old children (23 months 0 days to 23 months 29 days)**

87.1 Communication

S. No.	Communication related activities	Does	Sometimes	Not yet
1	Can your child show the correct picture (eg. a dog) without you showing it?	1	2	3
2	Can your child imitate you if you use two words sentence like 'mother ate'?	1	2	3
3	How many instructions mentioned below can your child follow without your giving clues or using gestures?			
	a. Put the toy on the table	1	2	3
	b. Close the door	1	2	3
	c. Bring the towel	1	2	3
	d. Find your jacket	1	2	3
	e. Hold my hand	1	2	3
	f. Give me your book	1	2	3
4	Can your child show the correct picture if asked to show one? Can he show at least one picture correct?	1	2	3
5	Can your child use two or three word sentences in different senses? For example mother came home, puppy went outside. (Please check that the child uses words in different sense and makes proper sentences).	1	2	3
6	Can your child appropriately use any two words from I, my, me and you?	1	2	3

87.2 Gross motor development related activities

S. No.	Gross motor development related activity	Does	Sometimes	Not yet
1	Can your child decend stairs if you hold his/her one hand? (Instead of your hands s/he can take support of a wall or railing).	1	2	3
2	Does your child try to copy you by lifting his/her leg or going near to the ball and hit it if you do so? 	1	2	3
3	Can your child climb few steps of a stair holding the wall or railing by oneself? 	1	2	3
4	Can your child stand up/stop properly without falling after running? 	1	2	3
5	Can your child jump with both legs on the air? 	1	2	3
6	Can your child hit a ball forward with his/her legs without taking support of anything? 	1	2	3

Time ended interview:	☐☐ ☐☐ **Hr.** **Min.**

L. Anthropometry

S.No.	Questions and Filters	Coding Categories	Skip
88	Child's weight	Kilograms (kg)..... ☐☐.☐ Weight not measured (Specify)_____ 96	
89	Child's length	Centimeter (cm)..... ☐☐.☐ Length not measured (Specify) _____ 96	

M. Blood Collection

S.No.	Questions and Filters	Coding Categories	Skip
90	Time of specimen collection	☐☐ • ☐☐ Hr. Min.	
91	Was blood collected	Yes, complete ..... 1 Yes, incomplete ..... 2 No, unscuccessful ..... 3 No, refused 4	
92	Haemoglobin level (g/dL)	☐☐.☐ g/dL	
	Check: • *If haemoglobin level is ≥11 g /dl tell the mother/caretaker that the child does not have anemia.* • *If haemoglobin level is 7.0 – 10.9 g /dl tell the mother/caretaker that the child has anemia.* • *If haemoglobin level is <7.0 g /dl tell the mother/caretaker that the child has severe anemia, and give a card referring the child to the health facility.*		
93	Malaria Rapid Diagnositic Test Result *If the first result does not read, repeat the test (once)*	Positive *P. falciparum* ..... 1 Positive *P. vivax* ..... 2 Negative..... 3 Invalid..... 4	
	Check: *Give the mother/caregiver the result of the malaria test. If the malaria result is positive, give the mother/caretaker a referral to the health post.*		
94	**MRDR** **Instructions:** Vitamin A2 will be admininisterded to a preselected subsample of children. You must return to the child's home 4-6 hours after Vitamin A2 administration to collect a venous blood sample.		
94.1	Child selected for MRDR subsample	Yes..... 1 No ..... 2 Refused..... 3	
94.2	Time Vitamin A2 was administered	☐☐ • ☐☐ Hr. Min.	
94.3	Time blood was collected for MRDR	☐☐ • ☐☐ Hr. Min.	

Thank you very much for your valuable time.

Annex D: Form to Document GPS Coordinates for Health Facility and FCHV

001	Cluster no.	☐☐
002	Name of district and code	_____ ☐☐
003	Name of VDC and code no.	_____ ☐☐
004	Ward no.	☐☐
005	Name of Village/Tole	_____
006	Name of FCHV/Health Facility	_____
007	**GPS Coord** GPS unit Code Number ..... ☐☐ Waypoint Number..... ☐☐☐☐☐ Longitude (North/South)..... ☐☐ . ☐☐ . ☐☐☐ Latitude (East/West) ..... ☐☐☐ . ☐☐ . ☐☐☐ Altitude (Meter)..... ☐☐☐☐	

Annex E: External and Internal Quality Assurance and Control for Blood Specimen Analysis

E1. External Qualty Assurance

All international laboratories involved in the analysis of the biological specimens have participated in the CDC external laboratory quality assurance (QA) program, the Vitamin A Laboratory and External Quality Assurance (VITAL-EQA) which includes QA for ferritin, vitamin A (retinol and retinol binding protein [RBP]), C-reactive protein (CRP), folate, and vitamin B_{12}. The VITAL-EQA program participation consists of two rounds per year. The QA analysis is based on exercises immediately preceding and during the laboratory analysis of the survey specimens (Rounds 20-21).

The VitMin Lab (Willstaett, Germany) has participated in CDC's external quality assurance program, VITAL-EQA, since 2006. The laboratory measures ferritin, RBP, and CRP concentrations in plasma using an enzyme-linked immunosorbent assay (ELISA) technique. The precision and bias were Optimal and Desirable for ferritin and CRP (>90% precision of the VITAL-EQA results, with <0.5% bias) (Erhardt, 2004; Haynes, 2008). The precision and bias were shifted 15-20% for RBP making it fall into the Minimal or Unacceptable category (>80-85% precision of the VITAL-EQA results, with 18.3% bias) due to a change in pools used by the VITAL-EQA program. The laboratory however has excellent internal quality control. Alpha-1 acid glycoprotein (AGP) is also measured as part of the ELISA, but the biomarker is not currently part of any EQA program at CDC.

The Peking University, Institute of Reproductive and Child Health laboratory (Beijing, China) has participated in the VITAL-EQA program since 2012. The laboratory measures folate concentrations in red blood cell lysate using the microbiological assay. The precision and bias were Optimal or Desirable (>90% precision of the VITAL-EQA results, with 3.6% bias) for folate (Haynes, 2008).

The Jordan University of Science and Technology (JUST) laboratory (Irbid, Jordan) has participated in the VITAL-EQA program since 2006. The laboratory enrolled in 2011 to measure Vitamin B_{12} as part of the VITAL-EQA program. The laboratory measures vitamin B_{12} concentrations in serum using atomic absorption spectroscopy. The precision and bias were Optimal and Desirable (>80% precision of the VITAL-EQA results, with 8.6% bias) for vitamin B_{12} (Haynes, 2008). JUST laboratory also measured zinc concentrations in serum using atomic absorption flame emission spectroscopy. Zinc however is not currently part of any EQA program at CDC.

The Institute of Nutrition of Central American and Panama (INCAP) (Guatemala City, Guatemala) has participated in the VITAL-EQA program since 2003; however, no results have been reported back to CDC since 2009. The laboratory measures vitamin A (modified relative dose response (MRDR) and retinol) in serum using high-performance liquid chromatography (HPLC). Previous retinol data were reviewed (Rounds 1-13, excluding Rounds 8 and 11 due to missing results). Only retinol resultswere reviewed since MRDR is not currently part of the VITAL-EQA program. The precision and bias on past performance was Optimal or Desirable (>80% precision of the VITAL-EQA results, with 8.9% bias) for retinol (Haynes, 2008).

E2. Internal Quality Control

All laboratories that were involved in the analysis of the biological specimens routinely test quality control (QC) pools along with the specimen analysis. The most reliable internationally acknowledged quality control sera are developed by National Institute of Standards and Technology (NIST) (for vitamin B_{12} and zinc), whole blood (for RBC folate) and serum (ELISA) control material developed by CDC, and bench quality control materials developed by the respective laboratories. Specimen results were documented in a tabulated format using EXCEL files.

The VitMin Lab analyzed the survey specimens for ferritin, CRP, RBP and AGP using an ELISA technique. The lab routinely tested a single QC pool in 10 different wells randomly distributed in each 384-well plate. The inter-assay coefficients variation (CV) for these analytes were 3.8% for RBP, 3.2% for ferritin, 5.1% for AGP, and 5.2% for CRP. A CV of about 10% provides acceptable precision using an ELISA technique (Erhardt, 2004; Haynes, 2008). These data indicate that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens.

The Peking University, Institute of Reproductive and Child Health laboratory analyzed the survey specimens for folate concentrations in red blood cell lysate using the microbiological assay. The lab routinely tested bench and blind quality control materials distributed in each 96-well plate. Each run contained three levels (low, medium, and high) of bench QCs in four replicates each at the front and back of each run. Each run also contained one blind QC replicated in 22 wells throughout the plate. The inter-assay variation (CV) was 3.9% for folate. A CV of about 10% provides acceptable precision using the microbiological assay. These data indicate that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens.

JUST laboratory analyzed the survey specimens for vitamin B_{12} and zinc concentrations in serum using atomic absorption spectroscopy and atomic absorption flame emission spectroscopy, respectively. The laboratory routinely tested quality control sera developed by NIST for all biological specimen runs. All NIST controls were acceptable in each run indicating that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens. The inter-assay variation (CV) was <10% for vitamin B_{12} and zinc indicating that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens.

INCAP analyzed the survey specimens for vitamin A (MRDR and retinol) in serum using HPLC. The laboratory routinely tested bench control materials distributed in each specimen plate. Each run contained three levels (low, medium, and high) of bench QCs each at the front and back of each run. Each specimen run was accepted based on the following criteria: >50% internal standard recovery; sufficient peak separation between retinol and MRDR peaks; MRDR ratio between 0.01-0.08; MRDR ratio between below 0.06 when the retinol ratio is below 30 µg/dL; and MRDR ratio above 0.03 when the retinol ratio is above 30 µg/dL. The inter-assay variation (CV) was <10% for MRDR and retinol indicating that the lab's performance exceeded the acceptable performance expectations while analyzing the survey specimens.

Annex F: Further Analysis of Selected Indicators

Table F1: Prevalence of Inflammation[a] in Children 6-23 Months by Stage and Background Characteristics in the Total sample (Kapilvastu and Achham Districts combined), Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Total (Kapilvastu and Achham)											
	No infection[b] (CRP<5 mg/L and AGP<1.0 g/L)			Elevated CRP only[b] (CRP ≥5.0 mg/L and AGP <1.0 g/L)			Elevated CRP and AGP[b] (CRP ≥5.0 mg/L and AGP ≥1.0 g/L)			Elevated AGP only[b] (CRP <5.0 mg/L and AGP ≥1.0 g/L)		
	n	%	95% CI		%	95% CI		%	95% CI		%	95% CI
Age of the child												
6 – 11 months	430	57.3	(53.2-61.3)	26	3.7	(2.6-5.4)	130	16.7	(14.2-19.4)	169	22.3	(18.9-26.1)
12– 18 months	571	54.9	(51.1-58.8)	33	3.0	(2.1-4.4)	158	15.4	(13.0-18.2)	272	26.6	(23.5-30.0)
19 – 23 months	357	63.4	(58.8-67.9)	15	2.7	(1.6-4.7)	65	11.7	(9.1-14.9)	121	22.2	(18.6-26.2)
Sex of the child												
Male	728	58.1	(54.8-61.4)	39	3.2	(2.3-4.4)	183	14.9	(12.7-17.4)	289	23.7	(21.0-26.7)
Female	630	57.2	(53.7-60.5)	35	3.2	(2.3-4.4)	170	15.0	(13.1-17.1)	273	24.7	(21.8-27.8)
Wealth Quintile												
Lowest	243	51.5	(46.8-56.2)	17	4.1	(2.6-6.4)	80	17.7	(13.8-22.3)	121	26.7	(22.3-31.6)
Second	243	52.6	(47.7-57.5)	19	4.2	(2.7-6.4)	74	16.4	(13.0-20.3)	122	26.9	(22.8-31.3)
Middle	294	59.6	(54.9-64.1)	13	2.9	(1.7-4.9)	69	13.5	(11.1-16.3)	116	24.0	(20.3-28.2)
Fourth	294	63.4	(58.9-67.6)	11	2.1	(1.1-3.8)	65	13.2	(10.7-16.3)	100	21.3	(17.2-26.1)
Highest	284	61.0	(55.9-65.9)	14	2.8	(1.6-4.7)	65	14.1	(10.4-18.8)	103	22.1	(18.6-26.1)
Wasted [c]												
Yes	126	47.6	(41.7-53.6)	5	1.7	(0.7-4.0)	57	21.7	(17.3-26.8)	77	29.0	(23.8-34.8)
No	1229	59.1	(56.3-61.8)	69	3.4	(2.7-4.3)	295	14.0	(12.5-15.8)	483	23.5	(21.2-26.0)
Stunted [d]												
Yes	557	55.2	(51.7-58.7)	30	2.9	(1.9-4.3)	257	15.8	(13.7-18.1)	252	26.1	(23.3-29.1)
No	798	59.4	(55.9-62.9)	44	3.4	(2.7-4.5)	195	14.4	(12.3-16.7)	308	22.8	(19.9-25.9)
Underweight [e]												
Yes	366	50.1	(45.8-54.5)	26	3.5	(2.4-5.1)	126	17.1	(14.7-20.0)	208	29.2	(25.6-33.1)
No	989	60.9	(57.8-64.0)	48	3.1	(2.4-3.9)	226	14.0	(12.1-16.1)	354	22.0	(19.4-29.4)
Total	**1358**	**57.7**	**(55.0-60.3)**	**74**	**3.2**	**(2.6-4.0)**	**353**	**15.0**	**(13.4-16.6)**	**562**	**24.2**	**(21.8-26.7)**

Weighted estimates
[a]ELISA
[b]Thurnham et al 2003
[c]Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[d]Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.
[e] Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

Table F2: Prevalence of Inflammation[a] in Children 6-23 Months by Stage and Background Characteristics in Kapilvastu District, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu											
	No infection [b] (CRP<5 mg/L and AGP<1.0 g/L)			Elevated CRP only [b] (CRP ≥5.0 mg/L and AGP <1.0 g/L)			Elevated CRP and AGP [b] (CRP ≥5.0 mg/L and AGP ≥1.0 g/L)			Elevated AGP only [b] (CRP <5.0 mg/L and AGP ≥1.0 g/L)		
	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI
Age of the child												
6 – 11 months	231	58.3	(52.8-63.7)	18	4.5	(3.0-6.9)	60	15.2	(12.1-18.9)	87	22.0	(17.4-27.3)
12– 18 months	285	54.2	(48.7-59.6)	14	2.7	(1.5-4.6)	83	15.8	(12.4-19.9)	144	27.4	(23.1-32.1)
19 – 23 months	153	61.7	(54.8-68.1)	7	2.8	(1.3-6.0)	29	11.7	(8.0-16.8)	59	23.8	(19.1-29.3)
Sex of the child												
Male	349	56.4	(51.6-61.0)	21	3.4	(2.2-5.1)	95	15.3	(12.3-19.0)	154	24.9	(21.1-29.1)
Female	320	58.1	(53.4-62.6)	18	3.3	(2.1-5.0)	77	14.0	(11.5-16.8)	136	24.7	(20.6-29.2)
Wealth Quintile												
Lowest	109	48.2	(41.6-54.9)	12	5.3	(3.1-8.9)	42	18.6	(13.2-25.6)	63	27.9	(21.7-35.0)
Second	122	51.5	(44.9-58.0)	10	4.2	(2.4-1.4)	40	16.9	(12.4-22.6)	65	27.4	(22.1-33.5)
Middle	143	59.1	(53.3-64.7)	9	3.7	(2.0-6.8)	29	12.0	(9.0-15.8)	61	25.2	(20.3-30.8)
Fourth	148	65.8	(59.6-71.5)	3	1.3	(0.4-3.9)	26	11.6	(8.6-15.4)	48	21.3	(15.8-28.1)
Highest	147	61.3	(53.6-68.3)	5	2.1	(0.9-4.7)	35	14.6	(9.6-21.6)	53	22.1	(17.3-27.7)
Wasted [d]												
Yes	78	47.9	(40.8-55.0)	2	1.2	(0.3-4.6)	36	22.1	(16.8-28.4)	47	28.8	(22.5-36.1)
No	589	58.7	(54.7-62.5)	37	3.7	(2.8-4.9)	136	13.5	(11.3-16.1)	242	24.1	(20.8-27.8)
Stunted [c]												
Yes	236	53.0	(47.9-58.1)	11	2.5	(1.3-4.8)	71	16.0	(13.1-19.2)	127	28.5	(24.4-33.0)
No	431	59.7	(54.8-64.4)	28	3.9	(2.8-5.3)	101	14.0	(11.3-17.2)	162	22.4	(18.6-26.9)
Underweight [e]												
Yes	167	49.3	(43.6-55.0)	11	3.2	(1.8-5.8)	56	16.5	(13.4-20.3)	105	31.0	(25.9-36.6)
No	500	60.3	(55.8-64.7)	28	3.4	(2.5-4.5)	116	14.0	(11.4-17.1)	185	22.3	(18.6-26.5)
Total	**669**	**57.2**	**(53.5-60.8)**	**39**	**3.3**	**(2.5-4.4)**	**172**	**14.7**	**(12.6-17.1)**	**290**	**24.8**	**(21.5-28.4)**

Weighted estimates
[a]ELISA
[b]Thurnham et al 2003
[c]Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[d]Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.
[e] Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

Table F3: Prevalence of Inflammation [a] in Children 6-23 Months by Stage and Background Characteristics in Achham District, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Achham											
	No infection [b] (CRP<5 mg/L and AGP<1.0 g/L)			Elevated CRP only [b] (CRP ≥5.0 mg/L and AGP <1.0 g/L)			Elevated CRP and AGP [b] (CRP ≥5.0 mg/L and AGP ≥1.0 g/L)			Elevated AGP only [b] (CRP <5.0 mg/L and AGP ≥1.0 g/L)		
	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI
Age of the child												
6 – 11 months	199	55.4	(49.8-60.9)	8	2.2	(1.2-4.2)	70	19.5	(15.8-23.8)	82	22.8	(18.6-27.8)
12– 18 months	286	56.3	(51.8-60.7)	19	3.7	(2.5-5.6)	75	14.8	(12.5-17.4)	128	25.2	(21.1-29.7)
19 – 23 months	204	65.8	(59.9-71.3)	8	2.6	(1.3-5.2)	36	11.6	(8.7-15.3)	62	20.0	(15.0-26.1)
Sex of the child												
Male	379	61.1	(57.0-65.1)	18	2.9	(1.9-4.5)	88	14.2	(11.6-17.3)	135	21.8	(18.5-25.5)
Female	310	55.7	(50.9-60.3)	17	3.1	(1.9-4.8)	93	16.7	(14.0-19.8)	137	24.6	(21.2-28.3)
Wealth Quintile												
Lowest	134	57.0	(52.2-61.7)	5	2.1	(0.9-4.7)	38	16.2	(12.3-21.0)	58	24.7	(19.8-30.4)
Second	121	54.8	(47.8-61.5)	9	4.1	(2.2-7.3)	34	15.4	(11.6-20.1)	57	25.8	(20.4-32.1)
Middle	151	60.4	(52.5-67.8)	4	1.6	(0.6-4.2)	40	16.0	(12.3-20.5)	55	22.0	(16.6-25.8)
Fourth	146	59.6	(53.4-65.5)	8	3.3	(1.6-6.6)	39	15.9	(11.7-21.2)	52	21.2	(15.7-28.0)
Highest	137	60.6	(56.0-65.0)	9	4.0	(1.9-8.1)	30	13.3	(9.4-18.4)	50	22.1	(17.6-27.4)
Wasted [d]												
Yes	48	47.1	(36.6-57.8)	3	2.9	(1.0-8.3)	21	20.6	(13.6-29.9)	30	29.4	(21.4-39.0)
No	640	59.7	(56.2-63.1)	32	3.0	(2.2-4.1)	159	14.8	(12.9-17.0)	241	22.5	(19.9-25.3)
Stunted [c]												
Yes	321	58.3	(54.1-62.3)	19	3.4	(2.2-5.3)	86	15.6	(12.7-19.0)	125	22.7	(19.5-26.2)
No	367	58.9	(54.3-63.3)	16	2.6	(1.7-3.9)	94	15.1	(12.2-18.5)	146	23.4	(20.1-27.1)
Underweight [e]												
Yes	199	51.4	(44.8-58.0)	15	3.9	(2.5-6.0)	70	18.1	(14.3-22.6)	103	26.6	(22.2-31.6)
No	489	62.1	(58.5-65.4)	20	2.5	(1.7-3.8)	110	14.0	(11.7-16.6)	169	21.4	(18.9-24.2)
Total	**689**	**58.5**	**(55.0-62.0)**	**35**	**3.0**	**(2.2-4.0)**	**181**	**15.4**	**(13.4-17.6)**	**272**	**23.1**	**(20.4-26.0)**

Weighted estimates

[a]ELISA

[b]Thurnham et al 2003

[c]Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.

[d]Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

[e] Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

Table F4: Anemia Prevalence Assessed by Hemoglobin in Children 6-23 months by Inflammation Status and Background Characteristics, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu (Unweighted)						Achham (Unweighted)						Total (Weighted)					
	Anemia Hemoglobin < 11.0 g/dL[b]			Anemia Hemoglobin < 11.0 g/ g/dL[b] excluding those with inflammation [c]			Anemia Hemoglobin < 11.0 g/dL[b]			Anemia Hemoglobin < 11.0 g/ g/dL[b] excluding those with inflammation [c]			Anemia Hemoglobin < 11.0 g/dL[b]			Anemia Hemoglobin < 11.0 g/ g/dL[b] excluding those with inflammation [c]		
	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI
Age of the child																		
6 – 11 months	420	46.2	40.8-51.7	230	39.6	33.4-46.1	385	34.8	29.4-40.6	199	25.6	19.2-33.3	805	42.2	38.2-46.4	429	34.9	30.1-40.0
12– 18 months	550	50.7	45.3-56.1	284	44.7	39.2-50.3	524	36.6	32.7-40.7	286	27.3	22.8-32.3	1074	45.7	41.9-49.6	570	38.3	34.3-42.4
19 – 23 months	258	48.4	40.5-56.4	153	42.5	34.5-50.9	321	23.1	18.7-28.1	204	15.2	10.4-21.7	579	37.8	32.8-43.1	357	30.6	25.6-36.1
Sex of the child																		
Male	645	54.1	49.4-58.8	348	47.1	42.8-51.5	653	34.3	30.5-38.3	379	25.9	21.4-30.9	1298	46.8	43.6-50.0	627	38.9	35.7-42.2
Female	583	42.7	36.8-48.8	319	37.3	32.0-42.9	577	30.5	26.2-35.2	310	20.0	15.2-25.9	1160	38.3	34.2-42.5	629	31.1	27.2-35.2
Wealth Quintile																		
Lowest	244	57.0	49.3-64.3	109	44.0	35.2-53.2	244	30.3	25.2-36.0	134	23.9	17.3-32.1	488	47.2	41.6-52.8	243	35.6	29.4-42.4
Second	244	53.3	46.6-59.8	121	49.6	39.0-60.2	241	36.1	30.8-41.8	121	29.8	23.1-37.4	485	47.0	42.3-51.8	242	42.3	35.0-50.0
Middle	250	50.4	42.9-57.9	143	48.3	39.6-57.0	255	35.7	29.5-42.4	151	23.2	16.1-32.2	505	44.9	39.5-50.4	294	38.7	32.3-45.6
Fourth	240	44.6	37.5-51.9	148	36.5	29.4-44.2	254	33.5	26.9-40.7	146	24.7	17.3-33.8	494	40.4	35.3-45.7	294	32.2	26.8-38.1
Highest	250	38.4	31.9-45.4	146	35.6	28.5-43.4	236	26.7	21.7-32.3	137	15.3	10.4-22.1	486	34.3	29.8-39.1	283	28.5	23.3-34.2
Wasted [d]																		
Yes	176	56.3	49.2-63.0	78	41.0	30.7-52.2	109	38.5	30.4-47.4	48	29.2	19.3-41.4	285	51.6	46.0-57.1	126	37.9	29.8-46.7
No	1049	47.4	42.7-52.1	587	42.6	38.5-46.8	1118	32.0	28.7-35.5	640	22.8	19.3-26.7	2167	41.5	38.4-44.7	1227	34.9	32.1-37.9
Stunted [c]																		
Yes	476	50.2	44.5-55.9	236	40.7	35.2-46.4	575	32.2	28.5-36.0	321	23.1	18.6-28.2	1051	42.8	38.9-46.7	557	32.9	29.2-36.8
No	749	47.7	42.8-52.6	429	43.4	38.9-47.9	652	33.0	29.1-37.1	367	23.4	19.4-28.0	1401	42.7	39.3-46.3	796	36.7	33.4-40.2
Underweight [e]																		
Yes	364	52.7	46.8-58.6	167	41.3	33.8-49.2	397	33.2	28.7-38.1	199	25.1	18.4-33.4	761	45.2	40.9-49.5	366	34.7	29.4-40.4
No	862	47.0	42.1-51.9	498	42.8	38.2-47.5	831	32.3	28.6-36.1	489	22.5	18.8-26.7	1693	41.7	38.4-45.1	987	35.4	32.2-38.8
Total	**1228**	**48.7**	**44.2-53.3**	**667**	**42.4**	**38.6-46.4**	**1230**	**32.5**	**29.2-36.0**	**689**	**23.2**	**19.7-27.2**	**2458**	**42.7**	**39.6-45.9**	**1356**	**35.2**	**32.5-38.1**

[a]Weighted estimates
[b]Adjusted for altitude, WHO 2011.
[c]Excluding those with CRP>5 mg/L or AGP>1.0 g/L; Thurnham et al 2003
[d]Length-for-age Z-score <-2 standard deviations (-2 SD) fromthe median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[e]Weight-for-length Z-score <-2 standard deviations (-2 SD);this also includes children <-3 SD; WHO 1995.
[f] Weight-for-age Z-score <-2 standard deviations (-2 SD);this also includes children <-3 SD; WHO 1995.

Table F5: Iron Deficiency Prevalence Assessed by Ferritin[a] in Children 6-23 months by Inflammation Status by Background Characteristics, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu (Unweighted)						Achham (Unweighted)						Total (Weighted)					
	Iron deficiency Ferritin < 12.0 µg/L [b]			Iron deficiency Ferritin < 12.0 µg/L [b] excluding those with inflammation [c]			Iron deficiency Ferritin < 12.0 µg/L [b]			Iron deficiency Ferritin < 12.0 µg/L [b] excluding those with inflammation [c]			Iron deficiency Ferritin < 12.0 µg/L [b]			Iron deficiency Ferritin < 12.0 µg/L [b] excluding those with inflammation [c]		
	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI
Age of the child																		
6 – 11 months	396	24.2	(21.2-27.5)	231	29.4	(24.5-35.0)	359	26.2	(22.5-30.3)	199	31.7	(25.5-38.5)	755	24.9	(22.5-27.4)	430	30.2	(26.2-34.5)
12– 18 months	526	48.7	(43.4-54.0)	285	56.5	(49.8-62.9)	508	43.7	(38.6-48.9)	286	51.4	(44.7-58.1)	1034	46.9	(43.0-50.8)	571	54.6	(49.7-59.4)
19 – 23 months	248	53.6	(45.4-61.7)	153	56.9	(47.1-66.1)	310	32.9	(27.9-38.3)	204	31.9	(25.5-39.0)	558	44.9	(39.6-50.3)	357	46.0	(39.8-52.3)
Sex of the child																		
Male	619	46.7	(40.9-52.6)	349	53.6	(46.2-60.8)	620	41.1	(36.7-45.7)	379	44.1	(38.7-49.6)	1239	44.6	(40.6-48.7)	728	49.9	(45.9-54.9)
Female	551	35.9	(30.9-40.5)	320	40.3	(35.1-45.8)	557	29.3	(25.8-33.0)	310	34.8	(30.0-40.1)	1108	33.2	(30.0-36.6)	630	38.3	(34.5-42.3)
Wealth Quintile																		
Lowest	226	44.7	(38.4-51.1)	109	47.7	(39.1-56.4)	235	33.6	(27.9-39.9)	134	41.8	(34.1-49.9)	461	40.5	(36.1-45.1)	243	45.2	(39.2-51.4)
Second	237	39.7	(33.1-46.7)	122	46.7	(39.1-54.5)	221	37.6	(30.8-44.9)	121	42.1	(33.9-50.9)	458	38.9	(34.0-44.1)	243	45.1	(39.3-50.9)
Middle	242	43.4	(36.5-50.6)	143	51.0	(41.9-60.1)	250	34.0	(28.2-40.4)	151	35.1	(27.1-44.0)	492	39.9	(35.0-45.0)	294	45.0	(38.5-51.6)
Fourth	225	39.6	(32.5-47.0)	148	44.6	(35.8-53.7)	245	35.1	(29.0-41.7)	146	37.7	(30.0-46.0)	470	37.8	(32.9-43.1)	294	42.1	(35.8-48.6)
Highest	240	40.0	(33.8-46.6)	147	46.3	(39.3-53.4)	226	37.6	(32.1-43.5)	137	43.8	(35.7-52.2)	466	39.2	(34.7-43.8)	284	45.4	(40.0-50.9)
Wasted [d]																		
Yes	163	40.5	(32.7-48.7)	78	38.5	(27.5-50.7)	102	42.2	(32.6-52.4)	48	56.3	(40.2-71.1)	265	40.9	(34.6-47.5)	126	43.1	(33.8-53.0)
No	1004	41.4	(37.4-45.6)	589	48.2	(43.3-53.1)	1072	35.0	(31.6-38.6)	640	38.8	(34.8-42.8)	2076	39.0	(36.1-41.9)	1229	44.6	(41.2-48.0)
Stunted [e]																		
Yes	445	47.9	(42.5-53.3)	236	51.7	(45.3-58.0)	551	38.7	(34.2-43.3)	321	43.6	(38.4-48.9)	996	44.0	(40.3-47.8)	557	48.1	(43.9-52.4)
No	722	37.3	(33.5-41.2)	431	44.5	(39.4-49.8)	623	32.9	(29.0-37.1)	367	36.8	(31.5-42.4)	1345	35.8	(33.0-38.7)	798	42.0	(38.1-45.9)
Underweight [f]																		
Yes	339	45.1	(39.9-50.4)	167	45.5	(38.9-52.3)	387	37.5	(32.7-42.5)	199	44.7	(37.9-51.7)	726	42.1	(38.3-45.9)	366	45.2	(40.3-50.1)
No	829	39.8	(35.5-44.3)	500	47.6	(42.2-53.1)	788	34.6	(30.9-38.6)	489	38.0	(33.5-42.8)	1617	38.0	(34.9-41.2)	989	44.1	(40.3-48.0)
Total	**1170**	**41.5**	**(37.7-45.3)**	**669**	**47.2**	**(42.8-51.7)**	**1177**	**35.5**	**(32.2-39.0)**	**689**	**39.9**	**(35.8-44.1)**	**2347**	**39.3**	**(36.6-42.0)**	**1358**	**44.5**	**(41.3-47.7)**

Weighted estimates

[a] ELISA; Erhardt et al 2004.

[b] UNICEF, United Nations University, WHO 2001.

[c] Excluding those with CRP>5 mg/L or AGP>1.0 g/L; Thurnham et al 2003

[d] Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.

[e] Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

[f] Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

Table F6: Iron Deficiency Anemia Prevalence Assessed by Hemoglobin and Ferritin[a] in Children 6-23 months by Inflammation Status and Background Characteristics, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu (Unweighted)						Achham (Unweighted)						Total (Weighted)					
	Iron deficiency anemia Hemoglobin < 11.0 g/dL[b] and Ferritin < 12.0 µg/L[c]			Iron deficiency anemia Hemoglobin < 11.0 g/dL[b] and Ferritin < 12.0 µg/L[c] excluding those with inflammation[d]			Iron deficiency anemia Hemoglobin < 11.0 g/dL[b] and Ferritin < 12.0 µg/L[c]			Iron deficiency anemia Hemoglobin < 11.0 g/dL[b] and Ferritin < 12.0 µg/L[c] excluding those with inflammation[d]			Iron deficiency anemia Hemoglobin < 11.0 g/dL[b] and Ferritin < 12.0 µg/L[c]			Iron deficiency anemia Hemoglobin < 11.0 g/dL[b] and Ferritin < 12.0 µg/L[c] excluding those with inflammation[d]		
	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI
Age of the child																		
6 – 11 months	395	16.7	(13.6-20.3)	230	18.3	(13.5-24.2)	359	12.0	(8.6-16.5)	199	11.6	(7.8-16.9)	754	15.1	(12.7-17.8)	429	16.0	(12.5-20.3)
12– 18 months	523	32.5	(27.5-37.9)	284	34.5	(28.9-40.6)	508	20.9	(17.0-25.3)	286	20.6	(15.9-26.3)	1031	28.3	(24.8-32.1)	570	29.4	(25.4-33.8)
19 – 23 months	248	34.7	(27.0-43.2)	153	32.0	(23.9-41.4)	310	14.8	(10.8-20.0)	204	11.8	(7.3-18.5)	558	26.3	(21.5-31.8)	357	23.2	(18.1-29.1)
Sex of the child																		
Male	617	32.9	(27.6-38.7)	348	34.2	(28.5-40.4)	620	20.3	(16.9-24.2)	379	19.0	(14.8-24.0)	1237	28.3	(24.7-32.2)	627	28.3	(24.4-32.6)
Female	549	21.7	(17.4-26.6)	319	21.9	(17.7-26.9)	557	12.4	(9.9-15.3)	310	11.0	(7.8-12.5)	1106	18.2	(15.4-21.5)	629	18.0	(15.0-21.4)
Wealth Quintile																		
Lowest	225	31.6	(25.6-38.2)	109	28.4	(21.9-36.0)	235	12.8	(8.9-18.0)	134	12.7	(7.8-20.1)	460	24.5	(20.3-29.2)	243	21.9	(17.2-27.4)
Second	236	28.8	(23.2-35.1)	121	32.2	(25.1-40.3)	221	21.7	(16.4-28.2)	121	24.8	(18.5-32.3)	457	26.3	(22.2-30.9)	242	29.5	(24.3-35.3)
Middle	241	31.5	(24.7-39.3)	143	34.3	(25.7-44.0)	250	18.0	(12.9-24.6)	151	13.9	(8.8-21.3)	491	26.4	(21.6-32.0)	294	26.5	(20.6-33.5)
Fourth	225	24.0	(17.3-32.2)	148	23.6	(17.0-31.9)	245	17.6	(12.7-23.8)	146	15.8	(9.7-24.6)	470	21.5	(16.9-27.0)	294	20.8	(15.8-26.8)
Highest	239	22.2	(16.4-29.2)	146	24.0	(17.6-31.8)	226	12.8	(9.5-17.1)	137	10.9	(6.7-17.4)	465	18.9	(15.0-23.5)	283	19.4	(14.9-24.9)
Wasted [e]																		
Yes	163	29.4	(23.3-36.5)	78	20.5	(12.8-31.2)	102	20.6	(13.6-30.0)	48	27.1	(16.3-41.4)	265	27.1	(22.0-32.9)	126	22.2	(15.6-30.7)
No	1000	27.2	(23.2-31.6)	587	29.3	(25.0-34.0)	1072	16.2	(13.6-19.2)	640	14.5	(11.7-18.0)	2072	23.0	(20.4-25.8)	1227	23.6	(20.7-26.7)
Stunted [f]																		
Yes	444	30.0	(24.4-36.2)	236	27.5	(21.9-34.0)	551	17.8	(14.1-22.2)	321	17.1	(12.9-22.4)	995	24.9	(21.1-29.1)	557	22.9	(19.2-27.2)
No	719	26.0	(22.1-30.4)	429	28.7	(24.2-33.6)	623	15.6	(13.0-18.6)	367	13.9	(10.9-17.6)	1342	22.5	(19.8-25.5)	796	23.8	(20.6-27.3)
Underweight [g]																		
Yes	339	31.0	(26.1-36.4)	167	25.1	(19.3-32.0)	387	19.9	(15.2-25.6)	199	22.1	(16.2-29.4)	726	26.6	(22.9-30.6)	366	23.9	(19.6-28.8)
No	825	26.2	(22.2-30.6)	498	29.3	(24.7-34.4)	788	15.0	(12.5-17.8)	489	12.7	(9.8-16.2)	1613	22.2	(19.5-25.1)	987	23.3	(20.2-26.7)
Total	**1166**	**27.6**	**(23.9-31.7)**	**667**	**28.3**	**(24.5-32.6)**	**1177**	**16.6**	**(14.0-19.5)**	**689**	**15.4**	**(12.4-18.9)**	**2343**	**23.5**	**(21.0-26.3)**	**1356**	**23.5**	**(20.8-26.4)**

Weighted estimates
[a] ELISA; Erhardt et al 2004.
[b] Adjusted for altitude, WHO 2011.
[c] UNICEF, United Nations University, WHO 2001.
[d] Excluding those with CRP>5 mg/L or AGP>1.0 g/L; Thurnham et al 2003
[e] Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.
[f] Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.
[g] Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

Table F7: Vitamin A Deficiency Prevalence assessed by Retinol Binding Protein (RBP) [a] in Children 6-23 months by Inflammation Status and Background Characteristics, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu (Unweighted)						Achham (Unweighted)						Total (Weighted)					
	Vitamin A deficiency RBP <0.84 µmol/L [b]			Vitamin A deficiency RBP <0.84 µmol/L excluding those with inflammation [b, c]			Vitamin A deficiency RBP <0.84 µmol/L [b]			Vitamin A deficiency RBP <0.84 µmol/L excluding those with inflammation [b, c]			Vitamin A deficiency RBP <0.84 µmol/L [b]			Vitamin A deficiency RBP <0.84 µmol/L excluding those with inflammation [b,c]		
	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI
Age of the child																		
6 – 11 months	396	34.3	(29.6-39.0)	231	25.1	(21.9-28.3)	359	27.9	(23.2-32.5)	199	17.1	(11.9-22.3)	755	31.3	(28.0-34.6)	430	21.4	(17.5-25.3)
12– 18 months	526	34.6	(30.5-38.7)	285	22.1	(17.3-26.9)	508	24.8	(21.0-28.6)	286	14.0	(10.0-18.0)	1034	29.8	(27.0-32.6)	571	18.0	(14.9-21.2)
19 – 23 months	248	33.4	(27.5-39.3)	153	22.2	(15.6-28.9)	310	21.3	(16.8-25.9)	204	14.2	(9.4-19.0)	558	26.7	(23.0-30.4)	357	17.6	(13.7-21.6)
Sex of the child																		
Male	619	36.3	(32.5-40.1)	349	23.5	(19.1-27.9)	620	27.7	(24.2-31.2)	379	17.7	(13.9-21.5)	1239	32.0	(29.4-34.6)	728	20.5	(17.6-23.4)
Female	551	31.9	(28.0-35.8)	320	22.8	(18.1-27.4)	557	21.5	(18.1-24.9)	310	11.6	(8.0-15.2)	1108	26.7	(24.1-29.3)	630	17.3	(14.4-20.3)
Wealth Quintile																		
Lowest	226	40.2	(33.8-46.6)	109	22.0	(14.2-30.0)	235	26.4	(20.8-32.0)	134	18.7	(12.1-25.3)	461	33.2	(28.9-37.5)	243	20.2	(15.2-25.2)
Second	237	39.2	(33.0-45.4)	122	19.7	(12.7-26.8)	221	29.0	(23.0-35.0)	121	16.5	(9.9-23.1)	458	34.3	(30.0-38.6)	243	18.1	(13.3-22.9)
Middle	242	34.3	(28.3-40.3)	143	28.7	(21.3-36.1)	250	25.6	(20.2-31.0)	151	15.2	(9.5-20.9)	492	30.0	(26.0-34.0)	294	21.8	(17.1-26.5)
Fourth	225	31.6	(25.5-37.7)	148	26.4	(19.3-33.5)	245	23.7	(18.4-29.0)	146	13.0	(7.6-18.5)	470	27.4	(23.4-31.4)	294	19.7	(15.2-24.2)
Highest	240	26.3	(20.7-31.9)	147	18.4	(12.1-24.7)	226	19.5	(14.3-24.7)	137	11.7	(6.3-17.1)	466	23.0	(19.2-26.8)	284	15.1	(10.9-19.3)
Wasted [d]																		
Yes	445	37.3	(32.8-41.8)	78	23.1	(13.8-32.5)	551	26.7	(23.0-30.4)	48	18.8	(10.9-29.9)	996	31.4	(28.5-34.3)	126	21.4	(14.2-28.6)
No	722	30.3	(27.1-33.5)	589	23.3	(19.9-26.7)	623	23.1	(19.8-26.4)	640	14.7	(12.0-17.4)	1345	28.1	(25.7-30.5)	1229	18.8	(16.6-21.0)
Stunted [e]																		
Yes	163	43.6	(36.0-51.2)	236	22.9	(17.5-28.3)	102	31.4	(22.4-40.4)	321	16.5	(12.4-20.1)	265	38.9	(33.0-44.8)	557	19.2	(15.9-22.5)
No	1004	32.8	(29.9-35.7)	431	23.4	(19.4-27.4)	1072	24.2	(21.6-26.8)	367	13.6	(10.1-17.1)	2076	28.4	(26.5-30.3)	798	18.9	(16.2-21.6)
Underweight [f]																		
Yes	339	39.2	(34.0-44.4)	167	21.6	(15.4-27.8)	387	27.4	(23.0-31.8)	199	14.6	(9.7-19.8)	726	32.9	(29.5-36.3)	366	17.8	(13.9-21.7)
No	829	32.3	(29.1-35.5)	500	23.8	(20.1-27.5)	788	23.5	(20.5-26.5)	489	15.1	(11.9-18.3)	1617	28.0	(25.8-30.2)	989	19.5	(17.0-22.0)
Total	**1170**	**34.3**	**(31.6-37.0)**	**669**	**23.2**	**(20.0-26.4)**	**1177**	**24.8**	**(22.3-27.3)**	**689**	**14.9**	**(12.3-17.6)**	**2347**	**29.5**	**(27.7-31.3)**	**1358**	**19.0**	**(16.9-21.1)**

Weighted estimates

[a] ELISA; Erhardt et al 2004.

[b] Vitamin A deficiency RBP <0.84 µmol/L is comparable to a retinol cut off of <0.7 µmol/L

[c] Excluding those with CRP>5 mg/L or AGP>1.0 g/L; Thurnham et al 2003

[d] Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

[e] Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.

[f] Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

Table F8: Zinc Deficiency [a] Prevalence in Children 6-23 months by Inflammation Status and Background Characteristics, Baseline Survey in Kapilvastu and Achham Districts, Nepal, 2012-2013

Characteristics	Kapilvastu (Unweighted)						Achham (Unweighted)						Total (Weighted)					
	Zinc deficiency serum zinc < 65 µg/dL or 57 µg/dL [b]			Zinc deficiency serum zinc < 65 µg/dL or 57 µg/dL [b] excluding those with inflammation [c]			Zinc deficiency serum zinc < 65 µg/dL or 57 µg/dL [b]			Zinc deficiency serum zinc < 65 µg/dL or 57 µg/dL [b] excluding those with inflammation [c]			Zinc deficiency serum zinc < 65 µg/dL or 57 µg/dL [b]			Zinc deficiency serum zinc < 65 µg/dL or 57 µg/dL [b] excluding those with inflammation [c]		
	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI
Age of the child																		
6 – 11 months	288	10.8	(7.4-15.5)	164	12.2	(7.5-19.3)	291	20.6	(16.1-26.0)	161	16.8	(11.3-24.2)	579	14.4	(11.5-17.9)	325	13.9	(10.0-18.8)
12– 18 months	424	19.3	(15.0-24.6)	239	16.3	(11.6-22.5)	408	28.7	(24.3-33.5)	233	27.0	(21.5-33.4)	832	22.7	(19.4-26.4)	472	20.2	(16.4-24.6)
19 – 23 months	203	15.3	(10.5-21.7)	123	16.3	(10.8-23.7)	262	33.2	(28.5-38.3)	170	27.6	(22.2-33.8)	465	23.0	(19.5-26.8)	293	21.3	(17.4-25.9)
Sex of the child																		
Male	503	15.1	(12.0-18.8)	277	13.7	(10.5-17.8)	517	25.9	(22.5-29.6)	313	22.4	(18.4-26.8)	1020	19.1	(16.7-21.8)	590	17.1	(14.5-20.2)
Female	412	16.5	(12.5-21.4)	249	16.5	(12.3-21.6)	444	29.3	(25.2-33.7)	251	26.7	(21.6-32.5)	856	21.4	(18.4-24.8)	500	20.2	(16.9-24.0)
Wealth Quintile																		
Lowest	175	12.0	(8.3-17.0)	79	6.3	(2.6-14.7)	187	31.6	(24.2-39.9)	105	29.5	(19.7-41.8)	362	19.5	(15.5-24.2)	184	16.4	(11.0-23.9)
Second	194	19.1	(14.7-24.4)	101	14.9	(9.8-21.9)	186	29.0	(23.0-35.9)	99	25.3	(17.0-35.7)	380	22.6	(18.9-26.8)	200	18.6	(14.0-24.4)
Middle	181	15.5	(10.5-22.3)	112	16.1	(9.9-24.9)	209	25.8	(19.6-33.3)	130	23.1	(16.3-31.6)	390	19.6	(15.6-24.5)	242	18.9	(14.1-24.8)
Fourth	181	17.1	(12.0-23.8)	120	20.0	(13.2-29.2)	208	27.9	(22.6-33.9)	123	22.8	(16.7-30.2)	389	21.4	(17.5-25.9)	243	21.0	(15.9-27.2)
Highest	184	14.7	(10.8-19.7)	114	14.9	(10.2-21.3)	171	22.8	(17.8-28.7)	107	21.5	(15.4-29.2)	355	17.5	(14.3-21.3)	221	17.2	(13.3-22.0)
Wasted [d]																		
Yes	120	17.5	(10.2-28.3)	61	14.8	(6.6-29.7)	87	19.5	(12.6-29.0)	41	14.6	(5.8-32.4)	207	18.1	(12.3-25.9)	102	14.7	(7.9-25.9)
No	792	15.5	(12.6-19.0)	463	15.1	(11.8-19.2)	873	28.3	(25.0-31.8)	523	25.0	(21.0-29.5)	1665	20.5	(18.2-23.0)	986	19.1	(16.4-22.0)
Stunted [c]																		
Yes	351	17.7	(13.4-22.9)	183	16.9	(12.4-22.7)	456	30.0	(25.5-35.0)	271	27.3	(22.5-32.7)	807	23.0	(19.8-26.6)	454	21.7	(18.3-25.6)
No	561	14.6	(11.4-18.6)	341	14.1	(10.3-18.9)	504	25.2	(21.9-28.8)	293	21.5	(17.1-26.7)	1065	18.2	(15.8-21.0)	634	16.5	(13.6-20.0)
Underweight [e]																		
Yes	265	15.5	(10.8-21.6)	128	11.7	(7.2-18.6)	321	30.5	(25.3-36.3)	169	24.3	(18.2-31.6)	586	21.7	(18.0-25.9)	297	17.2	(13.1-22.2)
No	648	15.9	(13.0-19.2)	396	16.2	(12.9-20.1)	640	25.9	(22.1-30.2)	395	24.3	(19.6-29.8)	1288	19.6	(17.2-22.2)	791	19.1	(16.4-22.2)
Total	**915**	**15.7**	**(12.9-19.1)**	**526**	**15.0**	**(11.8-18.9)**	**961**	**27.5**	**(24.5-30.6)**	**564**	**24.3**	**(20.7-28.3)**	**1876**	**20.2**	**(18.0-22.5)**	**1090**	**18.6**	**(16.1-21.3)**

Weighted estimates

[a] Atomic absorption flame omission spectroscopy; Dipeitro ES et al, 1988.

[b] IZINCG 2007; Zinc deficiency defined as serum zinc less than 65 or 57 µg/dL depending on time of day: Morning (until noon), non-fasting: <65µg/dL; Afternoon, non-fasting: <57 µg/dL.

[c] Excluding those with CRP>5 mg/L or AGP>1.0 g/L; Thurnham et al 2003

[d] Length-for-age Z-score <-2 standard deviations (-2 SD) from the median of the WHO reference population; this also includes children <-3 SD; WHO 1995.

[e] Weight-for-length Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.

[f] Weight-for-age Z-score <-2 standard deviations (-2 SD); this also includes children <-3 SD; WHO 1995.