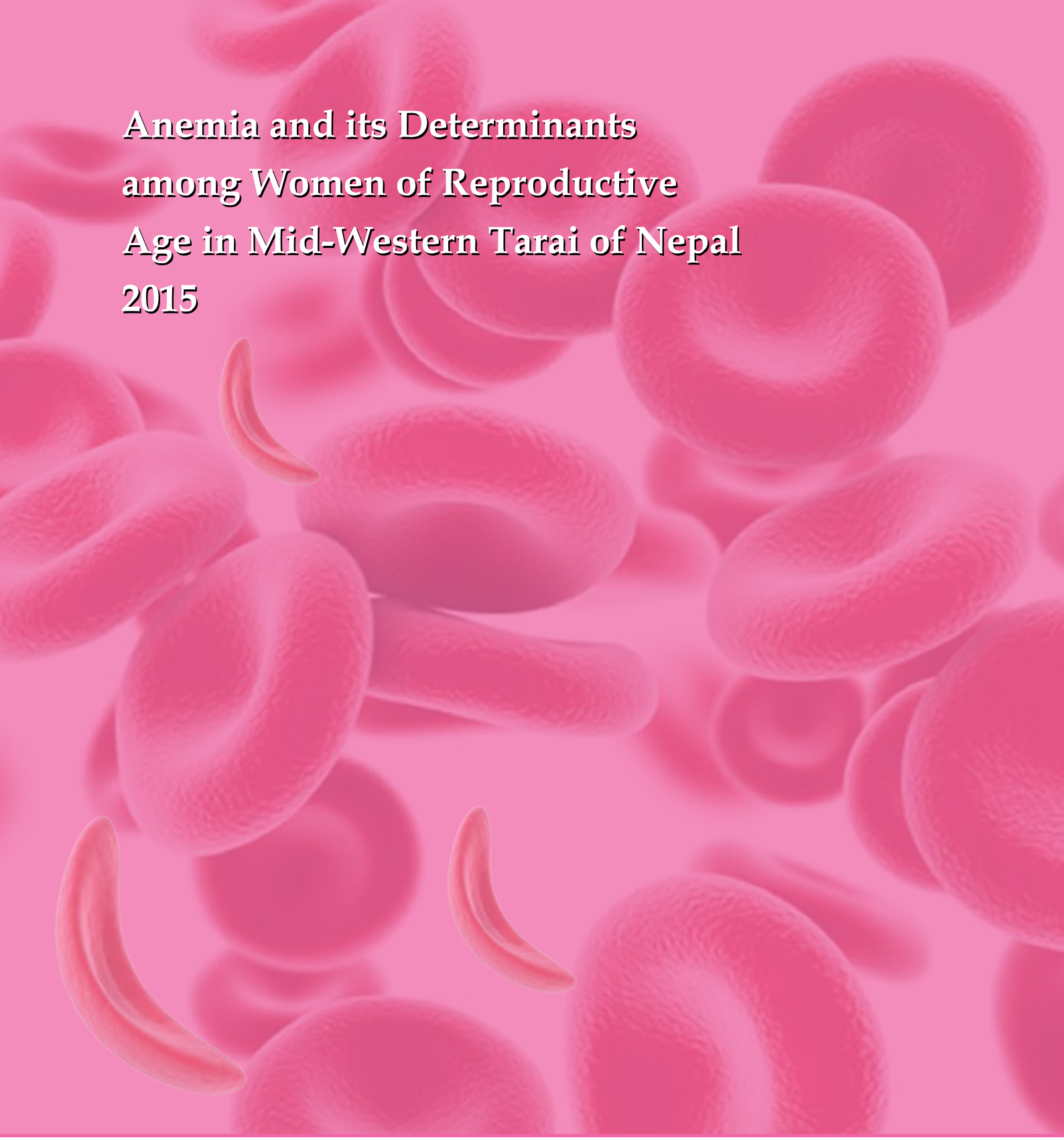
Anemia and its Determinants among Women of Reproductive Age in Mid-Western Tarai of Nepal 2015



Government of Nepal

Nepal Health Research Council

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Acknowledgement

An output of endeavor of multiple people; this report paints a figure of anemia and underlying determinants among the women of reproductive age inhabiting in Mid-western Tarai region of Nepal.

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Dr. Khem Bahadur Karki
Principal Investigator
Member Secretary (Executive Chief)
Nepal Health Research Council

Acronyms and Abbreviations

ANC	Antenatal Care
BMI	Body Mass Index
CI	Confidence Interval
Cm	Centimeter
DHO	District Health Office
DPHO	District Public Health Office
ERB	Ethical Review Board
FFQ	Food Frequency Questionnaire
Hb	Hemoglobin
HDDS	Household Dietary Diversity Score
HFIAS	Household Food Insecurity Access Scale
IDA	Iron Deficiency Anemia
Kg	Kilogram
MCV	Mean Corpuscular Volume
NDHS	Nepal Demographic and Health Survey
NHRC	Nepal Health Research Council
NRs	Nepalese Rupees
PDA	Personal Digital Assistant
PPS	Probability Proportional to Size
RH	Reproductive Health
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization
WRA	Women of Reproductive Age

Scope and Structure of the Report

With a piece of evidence on status of anemia and underlying determinants, this report stands on the ground of five sections and various subsections underneath including executive summary at the very beginning.

- **Chapter 1** basically covers the background of the study, statement of the problem, rational of the study, and the study objectives.
- **Chapter 2** explains the methodology aspect of this descriptive, cross-sectional study.
- **Chapter 3** presents the findings of the study focused on status of anemia, types of anemia, and factors of anemia.
- **Chapter 4** deals with interpretation of the findings; including potential biases, limitations of the study, and application of the study findings.
- **Chapter 5** is all about recommendations to different level of program stakeholders based on answers of research.

The scope of the current report lies within the scaling up of the effective nutrition interventions. Annexes displayed at the end of report comprises of the tools used during the research process. Various materials supplementary to current research are also attached in the annex.

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Executive Summary

Despite a number of targeted interventions, anemia still poses a huge challenge by ruling one-third Nepalese women as anemic. According to Nepal Demographic and Health Survey 2006 and 2011, Anemia prevalence among women of reproductive age group is stagnant compared to the previous survey. Evidences assembled around the world provide an insight to many important contributors to anemia. Evidence around the factors contributing to anemia is scarce. Understanding what drives anemia among this vulnerable populace would be worthwhile, with a great significance on planning and implementing sensitive and specific nutrition interventions. Therefore, this study came as an endeavor with an objective of unveiling the determinants of anemia among women of reproductive age of Mid-western Taraiof Nepal. This was a descriptive, cross-sectional study executed in Dang, Banke, and Bardiya. A total of 849 (response rate: 99.7%, computed sample 852) women of reproductive age agreed to be the part of study, who were drawn through probability proportional to size sampling. The 781research participants (response rate: 91.7%) gave written consent for extraction of blood sample, and 791research participants (response rate: 92.8%) provided stool sample. A standard semi-structured questionnaire was employed to assess socio-demographic and behavioral aspects. Laboratory tests were done for blood and stool specimens using validated tool.The study soughtan approval from the Ethical Review Board of the Nepal Health Research Council. Trained enumerators underwent a face-to-face interview, after selected samples granted a written consent. Anthropometric measurements together with blood and stool sample collection were undertaken by a group of laboratory technicians in the following day. Stool samples were analyzed in the field laboratory set up made by the research team under close supervision of senior medical lab technologists. Blood specimens were transported the same evening to Kathmandu which was then handed over to Civil Service Hospital, Kathmandu for the analysis. Data were analyzed in Statistical Package for Social Sciences software full version 20. The results of the current study are presented on the ground of univariate and bivariate analysis.

Socio-demographic features (n=849)

- A large number of samples was shared by upper caste (39.1%), Hindu (92.5%), and married (88.3%).
- Three out of ten received higher secondary and above education.
- One-half were homemakers and the similar proportion lived in nuclear family.
- The 69 out of 100 revealed an annual income of more than one lakh (of those responding).

Reproductive health history (n=849)

- Mean age at first menstruation counted 13.8± 1.4 years.
- Mean duration of menstrual cycle was figured at 32.9± 14.7 days.
- Mean days of bleeding during menstruation equaled to 4.6± 3.3 days.
- Prevalence of self-reported normal menstrual cycle and normal bleeding days during menstruation was 83.5% and 93.3% respectively.

Reproductive health history of married women (n=750)

- Mean age at marriage was computed to be 17.3 ± 2.9 years.
- Mean age at first child-birth was estimated to be 19.3±2.8 years.
- Mean birth-interval was 41.9 ± 25.7 months, with birth interval of two years and more among 81.8%.
- Of 718 (responding question), 21.0% experienced pregnancy wastage in the past, and 12.1% underwent a planned induced abortion.

Health seeking behavior among those who became pregnant during last five years preceding the survey (n=358)

- Nine out of ten (89.4%) paid an antenatal care visit; of which 72.5% made four or more visits.
- Statistics of iron tablet and albendazole consumption during the last pregnancy was: 86.0% and 81.8% accordingly.
- The 70.4% consumed vitamin A capsule after giving birth to last child.
- Of 750 married women, 39.7% were using modern contraceptives in the last 12 months.

Alcohol and tobacco use (n=849)

- Among the total women13.5% ever consumed alcohol; from which 94.8% acknowledged consuming in the last 12 months.
- Five out of 100 were smoking; of which 77.3% were daily smokers.
- It was six out of 100 using smokeless tobacco products; of which 74.5% were daily users.
- A 43.0% were exposed to second hand smoke.

Illness pattern (n=849)

- A10.4% was found to suffer from chronic illness during some point at their lives.
- Twenty percent reported being ill in last one month.

Dietary pattern in the last seven days (n=849)

- Of 772 non-vegetarian, negligible percentage consumed meat (1.4%), fish (0.3%), egg (3.1%), and fruit (2.4%) daily in the last seven days.

- About 81.0% did not consume fish in the last seven days; while it was 60.3%, 51.6%, and 47.8% for egg, milk, and fruit accordingly.

Knowledge of anemia(n=849)

- Term anemia was heard by 30.3%; of them 58.0% correctly defined, half reported knowledge on signs of anemia, and 60.7% were knowledgeable on specific diets to be taken to prevent anemia.

Household food security and dietary diversity (n=849)

- Considerable proportion (87.3%, 95% CI: 84.9-89.7) was found to have household food secure status.
- Dietary diversity was visible among 67.8% participants(95% CI: 64.0-71.6).

Prevalence of hookworm, roundworm, and giardiasis (n=791)

- Hookworm, roundworm,and giardiasis were seen on 1.5%, 5.3%, and 14.7% participants. As for pregnant women, roundworm, and giardiasis was spotted in 4.3% and 8.7% samples.

Prevalence of malaria (n=781)

- None of the samples were malaria positive.

Height, weight, and Body mass index (n=791)

- Mean height was 152.4± 6.6 cm. Likewise, mean weight was 51.0± 8.9 kg. The proportion of underweight women constituted a total of 15.4%. Also, 18.8% were overweight.

Status of anemia(n=735 for non pregnant, 46 for pregnant women)

- Three out of ten (28.3%, 95% CI: 3.8-52.8) pregnant women were anemic. A sizeable proportion of anemic pregnant women came from disadvantaged janajati (42.9%) and farmers (36.4%).
- For non-pregnant women, figure of anemia stood at 37.6% (95% CI: 31.9-43.3), and majority were mildly anemic (92.4%, 95% CI: 89.1-95.7). The highest prevalence in this stratum was found among <30 years (42.8%, 95% CI: 35.1-50.5), disadvantaged non-dalit Taraicaste (49.2%, 95% CI: 31.9-66.5), separated/divorced/widowed (46.7%, 95% CI: 4.7-77.7), students (40.0 %, 95% CI: 21.2-58.8), and those without dietary diversity (43.5%, 95% CI: 34.0-53.0).
- For pregnant women, 4.3% anemic belonged to Banke, 15.2% to Bardiya, and 8.7% to Dang. While for non-pregnant women 9.9% anemic were from Banke, 15.8% from Bardiya, and 11.8% from Dang.

Types of anemia

- It was 2.4% who had sickle cell disorder. Not surprisingly, 94.7% sickle cell carrier was Tharu/Chaudhari. Interestingly, prevalence of sickle cell disorder was heavily localized in Bardiya district, with 84.2% sickle cell carriers.
- Two out of 100 non-pregnant women (1.8%) were suffering from iron deficiency anemia.

Correlates of anemia

- None of the factors were related with anemia among pregnant women.
- Significant socio-demographic drivers among non-pregnant women were: age group (p=0.008) and ethnicity (p=0.002).
- Associated reproductive history factors among normal women included: number of children (p=0.009), currently breast feeding (p=0.002), and planned induced abortion (p=0.000).
- Presence of chronic illness (p=0.003), dietary diversity (p=0.020), and milk products consumption in the last seven days (p=0.001) were also correlated with anemia among the normal women.

With a depiction of substantial proportion of anemic women in both pregnant and non-pregnant groups, findings underscore necessity of nutrition interventions chiefly covering younger women <30 years, separated/divorced/widowed, farmers,disadvantaged janajati, disadvantaged non-dalit Tarai caste and students.

Most importantly, considering the fact of 94.7% sickle cell carriers from Tharu community;awareness campaigns targeting Tharu community and training of health workers, female community health volunteers in sites heavily populated by Tharu is of utmost importance.

As study uncovered the fact of lower awareness of anemia and substantial anemic from those without dietary diversity, health education campaigns with more stress on kitchen gardening should be on line at school and community settings. Culturally sensitive and specific programs too account imperative in the context of more anemic women from Hindu's and presence of significant association of anemia with ethnicity.

This study represented a pilot study focusing a smaller portion of Nepal. The findings are entirely generlizable for Mid-western Tarai only. As determinants may vary remarkably among different settings, a large-scale study with sufficient sample size covering an entire nation needs a great initiation as a vital measure to help counter this prevailing problem.

Chapter I
Introduction

1.1 Background

An indicator of poor nutrition and poor health; anemia is a condition with the lower hemoglobin (Hb) concentration in the blood. It indicates deficiency of one or more essential nutrients(1), heavy blood loss, hookworm infection, acute and chronic infections, and congenital hemolytic diseases(2). With reference to the World Health Organization's (WHO) definition, anemia in normal reproductive aged woman and pregnant woman is defined as a Hb concentration below 12 and 11 g/dL respectively(3).

According to WHO estimate, 42.0% of pregnant women and 30.0% of non-pregnant women are anemic, worldwide (4). Iron deficiency anemia (IDA) accounts for about half the world's anemia burden(5). Asthe WHO report shows,death toll carried by IDA reached 273,000; 45.0% in Southeast Asia alone, in the year 2004(6).

Nepal holds the evidences of alarming rate of anemia among the women of reproductive age (WRA). As major health problem in Nepal, it especially affects young children and the WRA(7).More importantly, high fertility rate, closely spaced pregnancies, low level of education, blended with other ecological and demographic factors, are what that make Nepalese women very vulnerable to IDA and its consequences.

One-third Nepalese women (35.0%) are suffering from anemia; 29.0% fall under mildly anemic(8). Rural women (36.0%) and women from the Taraibelt are the one to suffer (42.0%) most(8). Despite a number of targeted interventions, nation hardly witnesses any reduction in the prevalence of anemia among the women over the span of five years period from 2006 to 2011(8).

A significant cause of morbidity and mortality;anemia leaves a huge burden, from diminished learning ability, to reduce work capacity, infections, and greater risk of death associated with pregnancy and childbirth(9, 10). Besides, infants and children are the one to pay harder, with born to low birth weight and prematurity(11, 12),poorer cognitive development(13, 14), and mental impairment(15). This holds true situation in the developing world as well.

What we know (available evidence) regarding anemia?

International literature does suggest several drivers of anemia apart of iron deficiency(16-21).As far as Nepali research is concerned, national snapshot of anemia among WRAis well documented(8). Likewise, studies on determinants of anemia in

various sub-groups: pregnant women(22, 23), rural women, WRA (24), women from eastern Nepal(25), and adolescent girls(26)do exist. Nevertheless, they got restricted to limited samples and area, posing the challenge to external validity of the studies.

What is lacking (research gap)?

What Nepali literature lacks is study on determinants of anemia among WRA at a national level. Mostly, large-scale study covering the Western Tarairegion is almost non-existent. Thereby, to fill this gap, this study came as an attempt to unveil the determinants of anemia among WRA of Mid-western Terai.

Justifying ground of the study

Understanding what drives anemia among WRA would be worthwhile, in a sense that they carry significance on planning and implementing sensitive and specific nutrition interventions. As anemia burden vary among various sub-groups and settings, tracing out its drivers is of utmost significance to better address it.The study findings will come up with significant implication for maternal health promotion.

1.2 Objectives of the study

1.2.1 General objective

- To assess the determinants of anemia among WRA residing in mid-western Tarai of Nepal.

1.2.2 Specific objectives

- To determine the prevalence of anemia among WRA residing in mid-western Tarai of Nepal, and its association with:
  - Socio-demographic characteristics
  - Reproductive health characteristics
  - Health behavioral characteristics
  - Knowledge of anemia
  - Dietary pattern
  - Anthropometric measurements
  - Micronutrients
  - Infections (malaria and hookworm)
- To identify the various types of anemia among WRA inhabiting in mid-western Tarai of Nepal.

Chapter II
Methodology

2.1 Study design, setting and population

This was a descriptive, cross-sectional study, with quantitative methods. Three districts of the Mid-western Tarai: Banke, Bardiya, and Dang represented the study sites. The rationale of the study site selection originated from findings of Nepal Demographic and Health Survey (NDHS) 2011, which depicted an evidence of highest anemia prevalence in Mid-western Tarai among 13 eco-developmental zones.WRA which is defined as 15-49 years old women were the study participants. Mentally challenged and severely ill were excluded from the study.

2.2 Study variables

- Outcome variable of the study was prevalence of anemia.
- List of explanatory variables were as follow:

Socio-demographic variables

Age	Ethnicity	Religion
Marital status	Education	Occupation
Education of husband	Occupation of husband	Type of family
Family size	Type of housing	Place of residence
Annual income of family		

Reproductive health (RH) related variables

Birth interval	Pregnancy wastage	Planned induced abortion
Regularity of the menstrual cycle		
Duration of bleeding days during menstruation		

Health behavioral variables

Antenatal care (ANC) visit during pregnancy	Number of ANC visits
Iron intake during pregnancy	Albendazole intake during pregnancy
Vitamin A intake during postpartum	Use of footwear in the field
Use of modern contraceptives (last 12 months)	Ever consumed alcohol
Use of alcohol in the last 12 months	Use of alcohol in last 30 days
Current use of smoked tobacco products	Smoking of cigarettes daily
Current use of smokeless tobacco products	Current use of smokeless tobacco products daily

Household passive smoking
Ever had chronic disease
Visit to health facility during illness
Illness in last one month
Current intake of vitamins

Knowledge related variables

Heard the term anemia
Knowledge of anemia
Knowledge on symptoms of anemia
Knowledge on specific diets to be taken to prevent anemia

Dietary pattern related variables

Food diversity
Food security
Intake of meat in the last seven days
Intake of egg in the last seven days
Intake of fish in the last seven days
Intake of milk products in the last seven days
Intake of fruits in the last seven days
Intake of pulses in the last seven days
Intake of vegetables in the last seven days
Intake of cereals in the last seven days
Intake of tea/coffee daily in the last seven days
Intake of tea/coffee especially after breakfast/lunch/dinner in the last seven days

Anthropometric variables

Height
Weight
Body Mass Index (BMI)

Infections related variables

Presence of malaria
Presence of hookworm infection
Presence of chronic disease (self- reported)

2.3 Operational definition of variables

For the purpose of study, following operational definitions were created after literature review.

Anemia was defined as per the WHO's definition.

- For non-pregnant women: Hb level of <12.0 g/dl [Mild (10.0-11.9g/dl), Moderate (8.0-10.9 g/dl), and Severe (8.0g/dl)](27).
- For pregnant women: Hb level of <11.0 g/dl [Mild (10.0-10.9 g/dl), Moderate (7.0-9.9g/dl), and Severe (<7.0g/dl)](27).

Iron-deficiency anemia: As for assessing IDA, three indicators: Hb, serum ferritin, and Mean Corpuscular Volume (MCV) were used. Cut-off points were: Hb<12.0 g/dl, serum ferritin <6.24 nanogram/milliliter, and MCV< 82.0(5).

Knowledge of anemia: If women answered, "Anemia is a decrease in amount of Hb in the blood", then she was considered knowledgeable.

Knowledge on symptoms of anemia: Women was regarded knowledgeable on symptoms of anemia, if she spelled out at least three symptoms out of the mentioned symptoms: easy fatigue and loss of energy; unusually rapid heartbeat, particularly with exercise; shortness of breath and headache, particularly with exercise;difficulty concentrating; dizziness;pale skin;leg cramps; and insomnia.

Knowledge of mothers on iron-containing foods: Study considered women answering at least three iron-containing foods as knowledgeable on iron-containing foods.

Dietary pattern related variables

Food diversity: To assess food diversity over last seven days preceding the survey, the following questions were put forward to the participants(28).

- How often did you consume meat (liver, blood, body parts, sausage) in the last seven days?
- How often did you consume fish (shell fish, prawn, shidra, and other fishes) in the last seven days?
- How often did you consume egg in the last seven days?
- How often did you consume any milk products (youghurt, mahi, milk) in the last seven days?
- How often did you consume any fruits/fruit juice in the last seven days?
- How often did you consume any pulse items in the last seven days?
- How often did you consume any vegetables in the last seven days?
- How often did you eat any of the following mentioned food items (rice, maize, millet, wheat, sorghum, chapatti, bread, noodles, porridge, etc) in the last seven days?

Those answering at least once in a week were coded as 1, and those giving the response of not taking were given the code 0, to each of the 8 items.The probable food security score, computed as the sum of the responses to these questions, could range from a lower of 0 (all responses coded 'no' or 0) to 8 (all responses coded 'yes' or 1). The categories of food diversity were then defined as follows:

- Score of 5 to 8 = food diversity
- Score of 0 to 4 = Absence of food diversity

Food security: The calculation of the household food security score(8, 29)was based on responses to seven questions, with each response coded as yes (1) or no (0).

- In the last 12 months, were you worried that your household would not have enough food?
- In the last 12 months, was there any instance when you or any household members not able to eat the kinds of foods you preferred because of lack of resources?
- In the last 12 months, was there any instance you or any household members have to eat a limited variety of foods due to lack of resources?
- In the last 12 months, was there any instance you or any household members have to eat a smaller meal than you felt you needed because there was not enough food?
- In the last 12 months, was there any instance you or any household members eat fewer meals in a day because of resources to get food?

- In the last 12 months, was there any instance with no food to eat of any kind in your household because of resources to get food?
- In the last 12 months, was there any instance you or any household members go to sleep at night hungry because there was not enough food?

The possible household food security score, calculated as the sum of the responses to these questions, could range from a low of 0 (all responses coded 'no' or 0, representing the most food securestate) to 7 (all responses coded 'yes' or 1, representing the most food insecure state). The categories of food security were then defined as follows:

- Score of 0 to 2 = food secure
- Score of 3 to 5 = moderately food insecure
- Score of 6to 7 =severely food insecure

Anthropometric variables

Height : It's height of women in centimeter (cm). It was recorded near to 100 cm.

Weight : It's a weight of women in kilogram (Kg). It was recorded near to 0.5 Kg.

BMI : It was computed using standard formula, weight in kg/height in (meter)^2 It was categorized as underweight (<18.5), normal (18.5-25.0) and overweight (> or equals to 25)(29).

2.4 Sample size and sampling technique

Using level of confidence 95%, margin of error 0.05, prevalence of anemia 49.0%, design effect 2, and non-response rate 12.0%, a sample size of 852 was computed. The study used Probability Proportional to Size (PPS) sampling to get a representative sample. Altogether 50 clusters (wards), the primary sampling units (PSU),were selected. For selecting the PSUs, a list of entire wards of three districts was created and then the desired number of clusters (50) was withdrawn. Following the selection of clusters, list of all houses of the selected clusters was created and 17 WRA were recruited randomly through systematic random sampling from each of the selected clusters.

2.5 Data collection tool

A standard semi-structured questionnaire was employed to assess behavioral aspects. Likewise, height and weight was measured by stadiometer and digital weighing machine. Laboratory tests were done for blood and stool specimens using validated tool.

Data collection procedure

After an ethical approval from the Ethical Review Board (ERB) of Nepal Health Research Council (NHRC) and approval of District Health Office (DHO)/District Public Health Office (DPHO), field survey was started. Data collection was initiated from the third week of Falgun 2071 and completed on the second week of Baisakh 2072.

A group of four teams with three persons (all public health graduates) undertook behavioral data collection and measurement. After selected samples granted a written informed consent, they were administered a face-to-face questionnaire. In case, women did not give their consent, a woman from house adjacent to selected house was kindly invited to participate in the study. The next day, a group of lab assistants visited the same house to carry out anthropometric measurements, and blood and stool sample collection.

Three steps of data collection

First step was limited to collection of information regarding socio-demographic characteristics, reproductive health history, dietary pattern including household food security, food diversity, health seeking behavior, and knowledge of anemia objectively.

Dietary pattern assessment: It was assessed specially using the modified Food Frequency Questionnaire (FFQ)(28). The original FFQ was modified matching local circumstances.

Household food diversity assessment: The household dietary diversity was determined as per different food groups consumed by the women over the last 7 days. Household Dietary Diversity Score (HDDS)(30) was adapted and modified as per local context.Food intake pattern was recorded in terms of frequency of consumption of eight food items: meat, egg, fish, milk, fruit, pulses, vegetable, and cereals. Consumption of food items were kept into an ordinal scale.

Household food security assessment: Household Food Insecurity Access Scale (HFIAS) (29) was adopted as a reference to assess household security status.

2nd step covered anthropometric measurements. Height was taken in cm using a stadiometer, to the nearest one cm. The subjects were made to stand erect looking straight on a leveled surface with heels together and toes apart, without shoes. The moving head piece of the tape was lowered to rest flat on the top of the head and the reading was taken.

Weight was measured in kg using digital weighing machine. The zero error of the

weighing scale was checked before taking the weight and corrected as and when required.

An average of three measurements was counted as the final measurement. BMI was then computed using the standard formula Weight in Kg/ (Height in meter)^2(29).

3rd step was the collection of blood and stool sample. This was done in the following day by a group of lab assistants. Containers for stool specimens were given to each woman at the time of questionnaire administration. Blood was extracted for determining micronutrient status (Hb, total leucocyte count, differential leucocyte count, reticulocyte count, lactate dehydrogenase, serum iron, total iron binding-capacity, vitamin B12, serum ferritin, serum folate) and infections namely malaria. Stool was collected to examine protozoal infections.The participants were asked in the day of completing the interview to collect the stool sample in the next morning in the provided container and come to the laboratory set up made near by their community. A mobile sample collection unit was set up in a convenient setting within the selected ward to collect the blood samples, stool sample and measure height and weight. In case, the ward selected for the study was large and not convenient for all the sampled participants, the team made the set up in two to three different locations. The participants then accordingly visited the collection unit accordingly for the above-mentioned procedures.

Blood sample collection, transport and storage: Ten ml of venous blood was drawn from study participants by trained laboratory technicians or health assistants following standard procedures. Out of the collected samples 3 ml was transferred to K3 EDTA vial, 5 ml to the serum tube with gel clot activator. With the isotonic solution of Supravital stain (Brilliant Cresyl Blue) and few drops of peripheral blood sample, the reticulocytes were stained during living state from which a thin blood smear was prepared in the filed set up itself. The above mentioned samples prepared accordingly and the stool sample was then transported using icebox maintaining cold chain to another laboratory set up made in a convenient place for a group of wards. This laboratory set up had refrigerator and electricity back up so as to further store the samples. Once the samples reached to this set up within 2-4 hours, the blood sample stored in the serum tube with gel clot activator was centrifuged at 2000 rpm for 10 minutes so as to separate the serum. The separated serum was then transferred to another vial with airtight lid. The serum vial and the EDTA tubes with whole blood were refrigerated at 2 to 8°C.Samples were then dispatched in the same evening maintaining the cold chain, which was transported to Civil Service Hospital, Kathmandu in the next morning. The hematological tests: Hb, TLC, DC, RBC and Retics count were carried out the same day using the whole blood. The remaining whole blood, serum and the peripheral blood smear were then stored at -20°C until the remaining tests were completed within the next 4 to 5 days.

Blood and stool sample analysis: Stool samples were examined in the laboratory set up by the medical lab technicians under the regular supervision of a senior medical lab technologist. In the same set up, the whole blood sample was tested for malaria and kalazar (Visceral Leishmaniasis) using rapid test kits.

The other tests were carried out in Civil Service Hospital, Kathmandu using standard procedures as mentioned below:

Complete blood count (CBC) including RBC indices was performed in Sysmex 1000 i blood cell counter also called Coulter Counter. Reticulocytes count was done manually by observing the slide prepared with supravital stained blood sample through the microscope with oil immersion objective. This was counted under microscope and expressed in percentage.

Serum ferritin, Vitamin B12 and Folic acid were calculated done by the principle of chemiluminiscence. Serum iron and total iron binding capacity (TIBC) were measured spectrophotometrically. TIBC is measured in reference to iron by saturating its capacity to bind serum iron by using saturating chemicals.

Coombs test also called as Antiglobulin test was performed using direct Coombs test. The blood sample was mixed in equal volume with Coombs sera and allowed to incubate at 37 degree C and the presence of visible agglutination reaction when noted was recorded as positive Direct Coombs test.

Blood sample analysis for sickle cell anemia

Blood samples

In this study,the team screened 781 blood samples. Control Sickle cell sample was kindly provided by Tribhuvan University Teaching Hospital after an informed consent obtained from the patient. Positive sickling test was confirmed by using RFLP-PCR test.

DNA extraction

Genomic DNA was extracted from the 200 µl of whole blood samples using QIAamp DNA Blood Mni Kit (Qiagen, USA) according to the manufacturer's instructions. The concentration and purity of DNA were analyzed in Biospec Nanodrop spectrophotometer (SHIMADZU Cooperation, Japan).

Primer design

Tetra primer ARMS-PCR method is extensively low cost, short turn time and requiring no post-PCR manipulation. But design of ARMS-PCR tetra primers is crucial. Number

of variables in melting temperatures, GC content, complementarity and selection of mismatch bases are the major factors for the selection of good working primers. In ARMS-PCR a mismatched base is introduced in the middle of allele-specific primers (Ye *et al.*2001need to Change Ref Style). ARMS-PCR technique combines two inner SNP-specific primers and two outer primers in a single reaction and encompasses deliberate mismatches at position -2 from the 3' end of inner primers as shown in Fig 1 and Fig 2. Primers (Table 1) were designed by using online software Primer design for Terta-Primer ARMS-PCR and designed primers were blast on the program at Basic Local Alignment Search Tools.

PCR method

All the PCR conditions were optimized using gradient PCR on BIORAD T10 Thermo Cycler to determine the best annealing temperature. The optimal common annealing temperatures for all ARMS-PCR primers were obtained at 60 °C and another pair of primer for RFLP analysis, was obtained at 57°C. The optimization of PCR was performed in a single tube reaction containing 25 µl of reaction volume made up of the following components: 5µl master mix (10mM Tris-HCl, 50mM KCl, 1.5mM MgCl, 5 units/ml Taq DNA polymerase, 0.2 mM dNTPs each, 0.8%IGEPAL, 0.05%Tween 20), 50 ng of genomic DNA and uM of each primer. and rest volume of millique water (SIGMA, Germany) cycling was performed at 95 °C for 5 min followed by 35 cycles of denaturation at 95 °C for 30 s, annealing at specific temperature for 30 sec, extension at 72 °C for 60 sec and final extension at 72 °C for 5 min. For ARMS-PCR and RFLP-PCR conditions were applied 94°C 5 min, (94°C 20 sec, 60°C 30 sec, 72°C 30 sec) x 357, 72°C 5 min and for RFLP PCR PCR condition was 94°C 5 min, (94°C 30 sec, 58°C 30 sec, 72°C 30 sec) x 35, 72°C 5 min respectively. All the PCR products were analyzed in high sensitive by QIAxcel DNA Screening gel cartridge (Qiagen) on QIAxcel system (Qiagen). DNA Size Marker of 50–1.5 kb (Qiagen) and Alignment Marker 50 bp/1.5kb (Qiagen) were used in each QIAxcel runs and the size of the products was determined using the Screen Gel software (Qiagen). Because each of the amplicons was of a different length, the alleles were detected on the basis of the patterns of peak sizes.

Sickle cell test was again confirmed by using RFLP. The fragments obtained from RFLP-PCR were separated in 2% agarose gel by using DNA size marker of 50–1000 bp followed by staining with ethidium bromide and visualized and semi-automatically analyzed by the gel documentation system (Wise 3, DAIHAN, South Korea).

Restriction Fragment Length Polymorphism (RFLP) analysis

The RFLP analysis was performed in a single tube reaction containing 30 µl of reaction

volume made up of the following components: 20 µL of the amplified PCR product, 3 µL of 10X Smart cut buffer (NEB), 1.5 µL of 10 U/mL of DdeI restriction enzyme (NEB, USA), 5.5 µL of millique water (SIGMA, Germany). All the RFLP reaction mixtures were digested for overnight at 37ºC and digested products were separated according to size on a 2% agarose gel (SIGMA, Germany), by application of a 90-volt current for 40 minutes and visualized by ethidium bromide staining under ultraviolet light.

2.6 Quality control

Prior to data collection, an intensive training was conducted for the enumerators. The training was focused on how to perform standardized measurement and on interviewing techniques of the semi-structured questionnaire. The tools used were adapted to the socio-cultural setting of the study site through an expert opinion. Questionnaire initially designed in English was translated and pretested in Nepali language.

The standard tool was adapted for anthropometric and biochemical measurements. Research staff well followed protocols to standardize data collection methods. Supervisors did check data for completion and accuracy each day of the interview. Incorrect, unacceptable, and doubtful responses were assessed again in the same day. Every evening the survey group had meeting to discuss the experience of the day and plan for the next day. To further boost quality, research team frequently visited field to supervise the field team.

2.7 Statistical analysis

Data collected in PDA (Personal Digital Assistant) were transferred to Microsoft Excel and then to Statistical Package for Social Sciences (SPSS) full version 20 for cleaning and analysis. Inconsistencies were addressed and outliers were dropped. Standard tabulations were generated in which the outliers were detected before subjecting the data to analysis. Results were obtained by the frequency distribution and cross tabulation of the variables, Univariate, bivariate and multivariate analysis were used.

Descriptive analyses (percentage, frequency) were used to report socio-demographic characteristics,RH history, household food security, food diversity, health seeking behavior, and knowledge of anemia. Frequency tables were generated for categorical variables, while mean and standard deviation (SD) for continuous variables. The distribution of quantitative data was examined for normality using the Kolmogrov-Smirnov test of Normality.

Status of anemia was presented in frequency and percentage along with 95% confidence interval (CI) among different sub-groups. The chi-square test was used to test the association of anemia with various socio-demographic and other variables.

2.8 Ethical consideration

The study obtained an approval from an independent ERB of NHRC. Formal permission was also obtained from the respective DHOs/DPHO's of three districts: Banke, Bardia, and Dang. Most importantly, written consent was taken from the participants, prior to data collection.The purpose and procedure of the study was thoroughly explained to the participants. They were also informed of possible risks and benefits from participating in the study, and their right to voluntary participation. Besides, they were also ensured that strict confidence of their information would be maintained. After getting written consent, they were provided with an information sheet and data collection was conducted. Blood test reports were made available to every respondent.

Chapter III
Findings

This chapter presents the results of the study, based on the univariate and bivariate analysis.

A glance at socio-demographic background

Table 1 illustrates an overview of ethnic background of the participants.Mean age was 29.3±8.4 years. Distribution of the age was grossly normally distributed.

Of the total 849participants, a large number was shared by upper caste (39.1%), followed by disadvantaged janajati (32.9%). Having looked over <30 years age group, four out of ten belonged to disadvantaged janajati. The largest share of sample in 30-39 and 40-49 years was by upper caste.

Table 1. Ethnic distribution of the participants (n=849)

Age group (in years)	Dalit		Disadvantaged janajati		Disadvantaged non-dalit Tarai caste group		Religious minorities		Relatively advantaged janajati		Upper caste	
	n	%	n	%	n	%	n	%	n	%	n	%
<30	59	13.2	169	37.9	36	8.1	24	5.4	3	0.7	155	34.8
30-39	28	10.3	77	28.2	25	9.2	21	7.7	2	0.7	120	44.0
40-49	7	5.4	33	25.4	20	15.4	8	6.2	5	3.8	57	43.8
Total	94	11.1	279	32.9	81	9.5	53	6.2	10	1.2	332	39.1

Majority (92.5%) acknowledged being Hindu. Alike was the scenario across all the age groups (Table not shown).

It was revealed that just a quarter (27.9%) completed higher secondary and above education. Taking a look through <30 years, a two-fifth were higher secondary and above education holders.The older generations: 30-39 and 40-49 years greatly consisted of informal education holders (Table 2).

Table 2. Educational status of the participants (n=849)

Age group (in years)	Illiterate		Informal education		Primary		Secondary		Higher secondary and above	
	n	%	n	%	n	%	n	%	n	%
<30	23	5.2	65	14.6	38	8.5	146	32.7	174	39.0
30-39	30	11.0	108	39.6	25	9.2	58	21.2	52	19.0
40-49	29	22.3	60	46.2	12	9.2	18	13.8	11	8.5
Total	82	9.7	233	27.4	75	8.8	222	26.1	237	27.9

The 88.3% of women self-reported being married. A mere of 2.0% were separated/ divorced/widowed. All the age groups comprised of the large number of married women (Table not shown).

Approximately half were homemakers, and one-third was involved in agriculture. Relatively more proportion of homemakers was seen in all the age groups, the exception being 40-49 years, where 45.4% were engaged in farming (Table 3).

Table 3. Occupational status of the participants (n=849)

Age group (in years)	Agriculture		Employed		Homemaker		Student	
	n	%	n	%	n	%	n	%
<30	139	31.2	39	8.7	194	43.5	74	16.6
30-39	104	38.1	29	10.6	138	50.5	2	0.7
40-49	59	45.4	14	10.8	57	43.8		
Total	302	35.6	82	9.7	389	45.8	76	9.0

An enquiry on married women (n=750) about husband's educational status showed that one-fourth (26.3%) of the participant's husband completed a lower secondary education. Three out of ten (28.3%) told that their husbands were out of country for occupational purpose. Agriculture remained major occupation of 22.0% participants husband (Table not shown).

Mean number of members in household was 6.0 with SD 2.8. One-half were living in nuclear family. Extended family was observed in seven out of 100 participants.

Taking a look at housing type, it was unveiled that kachha house was the home to 53.6%participants(Table not shown).

Only 573 (67.5%) disclosed their annual income status.The 25(2.9%) participants refused to answer, and "*I do not know"* was the answer by 251(29.6%) participants. Mean annual income turned out to be NRs. 2, 04,523.6± 283208.5. Of 573, 394(68.8%) reported an annual income of more than one lakh (Table not shown).

An answer to a question of "duration hold by agriculture to suffice the family" was revealed by only 609 participants; as 213(25.1%) did not own land, and 27 (3.2%) told "*I do not know*". Mean duration was 9.6± 3.2 months (Table not shown).

A glimpse of RH history

On an inquiry of age at first menstruation, 99 (11.7%) responded that they don't know. Mean age at first menstruation was 13.8±1.4years.Mean duration of menstrual cycle was 32.9± 14.7 days.Likewise, mean days of bleeding during menstruation was 4.6± 3.3 days. Among 808 women,675 (83.5%) self-reported normal menstrual cycle. An occurrence of every menstrual cycle within 21-35 days was defined as a normal menstrual cycle (Table 4).

Table 4. Menstrual cycle among the participants(n=808)

Age group (in years)	Normal menstrual cycle		Abnormal menstrual cycle	
	n	%	n	%
<30	363	82.9	75	17.1
30-39	223	84.8	40	15.2
40-49	89	83.2	18	16.8
Total	675	83.5	133	16.5

Study uncovered a fact of normal bleeding during menstruation among nine out of ten participants.Participants answering the average duration of bleeding during menstruation as 2-5 days were categorized as having normal bleeding status (Table 5).

Table 5. Bleeding status of menstruation among the participants (n=821)

Age group (in years)	Normal bleeding		Abnormal bleeding	
	n	%	n	%
<30	415	93.7	28	6.3
30-39	252	93.3	18	6.7
40-49	99	91.7	9	8.3
Total	766	93.3	55	6.7

Univariate analysis revealed mean age at marriage was 17.3± 2.9 years (n=767). Within this married group, 688 (89.7%) had children. Out of this 688 cohort, 543 (78.9%) were mother of more than one child. Mean age at first childbirth was computed to be 19.3±2.8 years. In the same way, mean birth-interval among 544 women was 41.9± 25.7months, with birth interval of two years and more among 81.8% (Table not shown).

Seven hundred eighteen(93.6%) married and divorced/widowed women confessed ever being pregnant (mean number of times of pregnant= 3.1±1.9; mean age at first pregnancy= 18.7± 2.8years). Of 718, 151(21.0%) admitted having pregnancy wastage in the past, with mean number of miscarriage/still-birth equaled to 1.5± 0.9. Among total participants, 718 out of 767 women gave an answer to planned induced abortion. The 87(12.1%) underwent a planned induced abortion (mean number of induced abortions=1.6±0.8) (Table not shown).

An overview of health behavior

Health behavioral variables

As for assessing health behavior,ANC visit, iron tablet and albendazole intake during pregnancy, and consumption of Vitamin A capsule during postpartum was questioned to participants who became pregnant during the last five years preceeding the survey. Out of 767 participants, 358 (46.7%) reported pregnancy in the last five years.

Of these 358, 320 (89.4%) visited health facility for ANC check up, and only 72.5% of them paid four or more visits. Also, 308 (86.0%) consumed iron tablet and 293 (81.8%) consumed albendazole during last pregnancy.The 252 (70.4%) consumed vitamin A capsule after giving birth to last child. Among currently married 750 women, figure of use of modern contraception in the last 12 months was 39.7% (Table not shown).

Of 849, 115 (13.5%) ever consumed alcohol; from which 109 (94.8%) acknowledged consuming in the last 12 months. Only 8 (7.30%) reported daily drinking in the last 12 months. Likewise, within those consuming alcohol in the last 12 months, 83 (76.1%) made it in the last 30 days. From those 83, only 8 (9.6%) drank at least one glass

alcohol daily in last 30 days(Table not shown).

Correspondingly, 44 (5.2%) were using smoked tobacco; of which 34 (77.3%) were daily smokers. Also, 55 (6.5%) were using smokeless tobacco product; of which 41(74.5%) were daily users.Considerable, 43.0% were household passive smokers (Table not shown).

A 10.4% was found to suffer from chronic illness during some point at their lives. Twenty percent reported being ill in last one month. Likewise, 29 (3.4%) were consuming any form of vitamins at the time of survey (Table not shown).

Of the 849 participants, 348 (41.0%) used footwear while working in the field, and 275 (32.4%) did not. While 226 (26.6%) did not have any fields (Table not shown).

Snapshot of dietary pattern in the last seven days

Presented in table six, 772 (90.9%) were non-vegetarian. Of 772 non-vegetarians, a very minimal consumed meat (1.4%) and fish (0.3%) daily in the last seven days. Daily cereal consumption was universal (99.8%); nevertheless, daily consumption of fruits, vegetables, and milk products were 2.4%, 55.1%, and 23.2% respectively.

A half (49.5%) was daily tea/coffee drinker. Of them, 93 (22.1%) drank especially after breakfast/lunch/dinner (Table not shown).

Table 6. Dietary pattern in the last seven days by the participants

Dietary Pattern	Meat (n=772)	Fish (n=772)	Egg (n=775)	Milk (n=849)	Fruit (n=849)	Pulse (n=849)	Vegetable (n=849)	Cereals (n=849)
	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
Daily	11(1.4)	2(0.3)	24(3.1)	197(23.2)	20(2.4)	378 (44.5)	468(55.1)	847 (99.8)
7-10 times	7(0.9)	2(0.3)	3(0.4)	6(0.7)	5(0.6)	91(10.7)	103(12.1)	1(0.1)
3-6 six times	106(13.7)	12(1.6)	62(8.0)	51(6.0)	71(8.4)	239(28.2)	191(22.5)	1(0.1)
1-2 times	447(57.9)	132(17.1)	219(28.3)	157(18.5)	347(40.9)	92(10.8)	66(7.8)	-
Not at all	201(26.0)	624(80.8)	467(60.3)	438(51.6)	406(47.8)	49(5.8)	21(2.5)	-

Knowledge of anemia

Of the total women (849), just 257 (30.3%) heard the term anemia. Among those who heard of anemia 149 (58.0%) correctly defined anemia, and 129 (50.3%) reported knowledge on signs of anemia. Likewise, 156 (60.7%) were knowledgeable on specific

diets to be taken to prevent anemia. The highest percentage of the participants who heard the term anemia came from <30 years (37.0%). In contrary, definition of anemia was correctly given by most of the women from 30-39 years (72.3%) (Table 7).

Table 7. Knowledge of anemia among the participants

Age group	Heard the term anemia(n=849)	Correctly defined anemia(n=257)	Knowledge on signs of anemia (n=257)	Knowledge on specific diets to be taken to prevent anemia (n=257)
(years)	%(95% CI)	%(95% CI)	%(95% CI)	%(95% CI)
<30	37.0(29.6-44.4)	52.1(41.5-62.7)	47.3(36.2-58.4)	58.2(48.3-68.1)
30-39	23.8(13.4-34.2)	72.3(59.5-85.1)	56.9(40.9-72.9)	69.2(55.7-82.7)
40-49	20.8(5.5-36.1)	59.3(35.2-83.4)	51.9(25.7-78.1)	55.6(30.5-80.7)
Total	30.3(24.7-35.9)	58.0(50.1-65.9)	50.2(41.6-58.8)	60.7(53.0-68.4)

Household food security

An appraisal of household food security showed the substantial proportion, 87.3 % (95% CI: 84.9-89.7) of women with household food secure status (Table 8).

Table 8. Household food security among the participants

Household food security	Frequency	Percent	95% CI
Food secure	741	87.3	84.9-89.7
Moderately food insecure	68	8.0	1.6-14.4
Severely food insecure	40	4.7	0.0-11.3

With reference to table nine, dietary diversity was visible among 67.8% (95% CI: 64.0-71.6)participants. The highest dietary diversity was seen among relatively advantaged janajati at 90.0% (95% CI: 70.4-109.6) and least among the dalit with 53.2 % (95% CI: 39.4-67.0).

Table 9. Dietary diversity among the various ethnic groups

Ethnic groups	Food diversity present			Food diversity absent		
	n	%	95% CI	n	%	95% CI
Dalit	50	53.2	39.4-67.0	44	46.8	32.1-61.5
Disadvantaged janajati	175	62.7	55.5-69.9	104	37.3	28-46.6
Disadvantaged non-dalit Tarai caste	49	60.5	46.8-74.2	32	39.5	22.6-56.4
Religious minorities	34	64.2	48.1-80.3	19	35.8	14.2-57.4
Relatively advantaged janajati	9	90.0	70.4-109.6	1	10.0	0-68.8
Upper caste	259	78.0	73.0-83.0	73	22.0	12.5-31.5
Total	576	67.8	64.0-71.6	273	32.2	26.7-37.7

Prevalence of hookworm, roundworm, giardiasis, and malaria

None of the 781 samples were identified with malaria. Among 735 normal women, prevalence of hookworm and roundworm infection was negligible, standing at 1.5% and 5.3% respectively. Nonetheless, proportion of women with giardiasis was slightly higher with 14.7%. As for pregnant women (n=46), figure of roundworm infection and giardiasis was accordingly: 4.3% and 8.7% (Table not shown).

Height, weight, and BMI

The 791 out of 849 women gave the consent to measure the height and weight, making it to response rate of 92.8%. Height was measured in cm and weight in kg. BMI was then calculated to check the under and overweight status. Internationally acknowledged definition was followed to measure BMI(29).

Mean height and mean weight stood at 152.4±6.6 cm and 51.0±8.9 kg. The proportion of underweight women with BMI<18.5 constituted a total of 15.4%. Likewise, a considerable, 18.8% were identified as overweight (BMI>or equals to 25).

Status of anemia

Of 849 participants, 781 women provided blood sample (response rate 92.0%). Therefore, analysis on anemia was done among 781 participants.

Anemia among pregnant women (n=46)

Three out of ten (28.3%, 95% CI: 3.8-52.8) pregnant women were anemic.Across the socio-demographic strata's, a huge segment of anemic women came from 40-49 years (100.0%), disadvantaged janajati (42.9%), and farmers (36.4%).

Anemia among non pregnant women (n=735)

Of 801 unmarried and non-pregnant married women, 735 gave blood sample. Analysis on anemia was, therefore carried out in 735 non-pregnant women.Illustrated in table 10, afigure of anemia stood at 37.6% (95% CI: 31.9-43.3)and majority were mildly anemic (92.4%, 95% CI: 89.1-95.7).Within range of socio-demographic strata, the highest prevalence of anemia was noted among <30 years(42.8%, 95% CI: 35.1-50.5), disadvantaged non-dalit Tarai caste (49.2%, 95% CI: 31.9-66.5), separated/divorced/ widowed (46.7%, 95%CI: 4.7-77.7),and students (40.0 %, 95% CI: 21.2-58.8).

Prevalence of anemia across Banke, Bardiya, and Dang

Among the pregnant women, 4.3% in Banke, 15.2% in Bardiya, and 8.7% in Dang were found to be anemic. While, this figure for non pregnant women was 9.9% in Banke, 15.8% in Bardiya, and 11.8% in Dang (Table not shown).

Table 10. Status of anemia among the various socio-demographic sub-groups

Variable	Catagories	Normal women (n=735)			Pregnant women (n=46)		
		n	Anemia%	95% CI	n	Anemia %	95% CI
Age group	<30	158	42.8	35.1-50.5	10	26.3	-
	30-39	76	30.6	20.2-41.0	2	28.6	-
	40-49	42	35.6	21.1-50.1	1	100.0	-
Ethnicity	Dalit	30	35.3	18.2-52.4	1	33.3	-
	Disadvantaged janajati	113	45.4	36.2-54.6	6	42.9	-
	Disadvantaged non-dalit Taraicaste	32	49.2	31.9-66.5	1	16.7	-
	Religious minorities	10	25.0	-			
	Relatively advan-taged janajati	3	33.3	-			
	Upper caste	88	30.7	21.1-40.3	5	27.8	-
Religion	Hindu	263	38.4	32.5-44.3	13	31.0	5.9-56.1
	Non-Hindu	13	26.0	2.2-49.8			
Marital status	Unmarried	28	39.4	16.5-51.7			
	Married	241	37.1	31.0-43.2	13	28.3	3.8-52.8
	Separated/divorced/ widowed	7	46.7	4.7-77.7			
Education	Illiterate	27	40.3	21.8-58.8			
	Informal education	78	37.5	26.8-48.2	1	12.5	-
	Primary	28	42.4	25.6-59.8	1	25.0	-
	Secondary	70	36.3	25.0-47.6	3	25.0	-
	Higher secondary and above	73	36.3	25.3-47.3	8	38.1	4.4-71.8

Occupation	Agriculture	107	38.8	29.6-48.0	4	36.4	-
	Employed	25	32.9	14.5-51.3	1	33.3	-
	Homemaker	118	37.1	28.4-45.8	8	26.7	-
	Student	26	40.0	21.2-58.8			
Income	Upto one lakh	60	39.5	27.1-51.9	1	12.5	-
	More than one lakh	128	36.5	28.2-44.8	5	26.3	-
Total		276	37.6	31.9-43.3	13	28.3	3.8-52.8

There appeared hardly any differences in distribution of anemic population within food secure and insecure groups, each comprising of one-third anemic populace, among the normal women. Coming through the dietary diversity, the highest proportion of anemic group was shared by the participants without dietary diversity, and that was 43.5% (95% CI: 34.0-53.0)(Table 11).

Table 11. Status of anemia among non pregnant (n=276) and pregnant women (n=13) with food security and dietary diversity

Variables	Non pregnant women			Pregnant women		
	n	Anemia %	95% CI	n	Anemia %	95% CI
Household food security						
Yes	242	37.4	31.3-43.5	12	31.6	5.3-57.9
No	34	38.6	22.2-55.0	1	12.5	-
Dietary diversity						
Yes	172	34.7	27.6-41.8	10	27.8	0.0-55.6
No	104	43.5	34.0-53.0	3	30.0	-

As shown in table 12, alike distribution of anemia was seen among women with and without normal menstrual cycle. Parallel was the condition for those with and without normal bleeding during menstruation.

Table12. Status of anemia among non-pregnant women (n-276) with menstrual cycle and bleeding status

Menstruation cycle	Non pregnant women		
	n	Anemia %	95% CI
Normal menstrual cycle			
Yes	225	38.4	32.0-44.8
No	41	36.3	21.6-51.0
Normal bleeding during menstruation			
Yes	253	38.0	32.0-44.0
No	16	36.4	12.8-60.0

Types of Anemia

Apart from general anemia, based on Hb level, analysis was done to test the presence of sickle cell anemia, IDA.

Iron deficiency anemia: Two out of 100 normal women (1.8%) wasidentified with IDA, with the prevalence of 1.0% (Banke), 0.3% (Bardiya), and 0.5% (Dang) (Table not shown).

Sickle cell disorder

In this study,we used ARMS PCR and reconfirmed the presence of sickle cell disorder by RFLP-PCR method. Following this method of detection and confirmation out of 781 samples analyzed,it was 19 (2.4%) women who suffered from sickle cell disorder. Not surprisingly, 94.7% sickle cell carrier was Tharu/Chaudhari. Likewise, prevalence of sickle cell anemia was heavily localized, with 84.2% sickle cell carrier from Bardiya district (Table not shown).

Determinants of Anemia: Results from a bivariate analysis

This section describes about the association of the key variable anemia with a number of independent variables. Additionally multivariate logistic regression model was fitted to adjust for confounding variables however we did not find any significant association in multivariate analysis.Only cross-tab of the significant explanatory variables and outcome variableanemiahas been presented herewith.

Socio-demographic features and anemia

As for pregnant women,none of the socio-demographic features were found to be significantly associated with anemia (Table not shown).

Nevertheless, when it came to normal women, only significant factors of anemia were ethnicity (p=0.002) and age group (p=0.008).The remaining factors type of housing (p=0.074), religion (p=0.081), marital status (p=0.709), type of family (p=0.411), educational status (p=0.886), number of household members (p=0.739), annual income (p=0.522), occupation (0.784), husband's education (p=0.500), and husband's occupation (p=0.400) were not correlated with anemia (Table 13).

Table 13. Socio-demographic correlates and anemia among the normal women

Socio-demographic features		Anemia		p-value
		Yes	No	
Age group	<30 years	158	211	0.008
	30-39 years	76	172	
	40-49 years	42	76	
Ethnicity	Dalit	30	55	0.002
	Disadvantaged janajati	113	136	
	Disadvantaged non-dalit Tarai caste	32	33	
	Religious minorities	10	30	
	Relatively advantaged janajati	3	6	
	Upper caste	88	199	

RH history and anemia

An analysis did not provide any evidence to support the significant association of RH history factors and anemia among the pregnant women.While for normal women, number of children, currently breast-feeding, planned induced abortion and pregnancy in the last five years were significantly related to anemia. Menstrual cycle (p=0.672), bleeding duration during menstruation cycle (p=0.830), ever been pregnant (p=0.847), pregnancy wastage in the past (p=0.717), and presence of children (p=0.984) were not found to have significant association with anemia.

Table 14. RH history correlates and anemia among the normal women

RH history factors		Anemia		p-value
		Yes	**No**	
No. of children	One	61	68	0.009
	More than one	171	321	
Currently breast feeding	Yes	96	113	0.002
	No	136	276	
Planned induced abortion	Yes	15	63	0.000
	No	219	328	
Pregnancy in last five years	Yes	128	163	0.002
	No	120	253	

Health behaviors and anemia

The study did not uncover significant association between health behaviors related factors and anemia among the pregnant women. Regarding normal women, only variable that counted was ever had chronic illness (p=0.003). The rest of unassociated variables were: visited health facility for ANC check up (p=0.084), number of ANC visits (p=0.941), consumed iron tablet during last pregnancy (p=0.277), consumed albendazole during last pregnancy (p=0.069),and used footwear while working in the field (p=0.245).Likewise, use of modern contraceptives in the last 12 months, ever consumed alcohol, consumed alcohol in the last 12 months, frequency of drinking in the last 12 months, consumed alcohol in the last 30 days, at least one drink in the last 30 days, current smoking, daily smoking, current use of smokeless tobacco product, daily use of smokeless tobacco product, and household passive smoking also joined the list of insignificant factors (Table not shown).

Dietary pattern and anemia

The variables that turned out significant were dietary diversity (p=0.020) and milk product consumption in the last 7days (p=0.001) for normal women. On the other hand, dietary pattern related factors were not associated with anemia among the pregnant counterparts.

Table 15. Dietary patterns and anemia among the normal women

Variables		Anemia		p-value
		Yes	No	
Dietary diversity	Yes	172	324	0.020
	No	104	135	
Milk products consumption in last seven days	Yes	109	238	0.001
	No	167	221	

Knowledge related factors and anemia

Anemia knowledge related factors: 'heard the term anemia', 'correctly defined the term anemia', 'knowledgeable on signs of anemia', and ' knowledge on specific diets to be taken to prevent anemia' were not associated with anemia. This was common for both pregnant and normal women (Table not shown).

Hookworm, roundworm infection, giardiasis, chronic illness, and association with anemia

Significant relationship of anemia with hookworm, roundworm infection, and giardiasis was not identified among both the pregnant and normal women. Presence of chronic illness (p=0.003) was significantly related to anemia among normal women. In contrary, association did not appear significant for pregnant women (Table not shown).

BMI and anemia

There was no any ground of evidenceto detect significant association between anemia and BMI category among both the groups, pregnant and normal (Table not shown).

Chapter IV
Conclusion

Enough to draw an attention of concerned stakeholders; this study concluded one-third anemic population among pregnant women and two-fifth anemic among non-pregnant women of reproductive agein Mid-western Tarai of Nepal. The finding suggests that measures to address anemia in this setting and populace need to be further strengthened. To be specific, targeted and tailored nutrition intervention should be on the floor, especially highlighting young women <30 years, farmers,disadvantaged janajati, disadvantaged non-dalit Tarai caste, and students as findings uncover relatively higher numeral of anemia among these sub-groups.

Most importantly, with the statistics of 94.7% sickle cell carriers from Tharu community; awareness campaigns targeting Tharu community, and training of health workers, female community health volunteers working in Tharu populated sites is of utmost importance to counterpart this problem.

Likewise, four out of ten were anemic among those without dietary diversity.This was also significantly associated with status of anemia. This carries important significance. Health education carrying importance of iron containing local foods needs to be conducted in school and community settings. Besides, enabling environment: promoting kitchen garden is of paramount importance to enhance accessibility of iron loaded low-priced foods. It could be a cost-effective initiation, especially targeting farmers.

Data from the current study revealed some of the significant factors of anemia: age factor and ethnic background. Particularly, ethnicity does play a crucial role in promoting one's feeding habit. By marking this context, together with current findings, it's necessary that interventions be culturally sensitive and specific, respecting their culture as well. As every ethnic group possesses positive sides too, as for instance: health promoting dietary habits. Therefore, health promotion program enhancing positive aspects of certain ethnic groups need to be planned and launched for effective output.

To list, some of the significant RH history factors of anemia represented: number of children, currently breast feeding, and planned induced abortion. An active involvement of pregnant and breast-feeding women would be justifiable in nutrition intervention.

Primarily, a comprehensive health programs covering the aspects of reproductive health: family planning; safe abortion services compounded with nutritional interventions: enhancing accessibility and availability of iron rich foods in community settings is must. All above that, raising awareness of anemia, and important foods to tackle against it needs to be carried out in school settings, and also at peripheral level health facilities.

Current study came up with an evidence of substantial statistics of anemic women in mid-western Terai. Owing to confined area coverage, threats to external validity of this study definitely could not be ruled out. Recall bias, especially in dietary pattern and alcohol consumption related questions might have also retarded the validity of the study. As this was just a cross-sectional study, evidence of causality of the significant factors could not be provided. Nevertheless; use of validated tool, random selection of samples, and well trained enumerators were the noteworthy strengths of this study.

High prevalence of anemia has always remained as one of the Nepal's biggest challenges. Addressing the problem; underlying determinants need to be explored. To mitigate this prevailing problem, a large-scale study with sufficient sample size covering an entire nation needs a great initiation.

Conclusively, the statistics of women suffering from anemia in Mid-western Tarairegion is still high; the burden being more restricted to certain vulnerable groups. A holistic approach featuring predisposing factors (enhancing knowledge on anemia, promoting positive attitude towards iron rich local foods, discarding health deteriorating socio-cultural beliefs), and enabling factors (access to RH services, availability of local iron-rich foods through kitchen garden, access towards number of nutrition campaigns, and nutrition health education sessions in school, community, and health facilities) should be welcomed.

Chapter V

Recommendation

Based on findings of the current study, a list of recommendations has been put forward to the concerned stakeholders at different levels.

Recommendation to respective DHO/DPHO

- Culturally sensitive and specific nutrition interventions should be planned and implemented in integration with RH programs. An active involvement of pregnant and breast-feeding mothers is needed in such interventions.

[Sizeable proportion was anemic in both pregnant and normal women. Factors having direct relation with culture like ethnicity, dietary diversity and some of the RH factors were significantly associated with anemia].

- Health education campaigns of anemia on local language need to be launched in schools and community targeting mostly younger women <30 years, separated/ divorced/widowed, farmers, disadvantaged non-dalit Tarai caste, and students. Health education must stress on importance of iron containing local foods and dietary diversity with importance of kitchen gardening.

[The highest prevalence of anemia among various strata was found among <30 years, disadvantaged non-dalit Taraicaste, separated/divorced/widowed, and students. Awareness and knowledge of anemia was minimal. Significant proportion did not consume fish, egg, milk, and fruit in the last seven days].

- Extensive awareness campaigns on sickle cell anemia coveringTharu community need a greater start.

[Of all sickle cell anemic, 94.7% sickle cell carrier was Tharu/Chaudhari].

- Training on management of sickle cell anemia to health workers and female community health volunteers in sites heavily populated by Tharu is of utmost importance.

[Of all sickle cell anemic, 94.7% sickle cell carrier was Tharu/Chaudhari].

Recommendation to Ministry of Health

- A holistic program considering various determinants like predisposing factors (enhancing knowledge on anemia, promoting positive attitude towards iron rich local foods, discarding health deteriorating socio-cultural beliefs), and enabling factors (access to RH services, availability of local iron-rich foods through kitchen garden, access towards number of nutrition campaigns, and nutrition health education sessions in school, community, and health facilities) should be the strategies of the government.

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Annexes

Annex I: Semi-structured Questionnaire in Nepali

नेपालमा रक्त अल्पताको कारक तत्वहरु : मध्य पश्चिम तराईको प्रजनन उमेर समुहका महिलाहरुमा प्रथम चरणको अध्ययन (२०१४–२०१५)

सर्वेक्षण सम्बन्धी जानकारी

नमस्कार, मेरो नाम .....हो । म यहां नेपाल स्वास्थ्य अनुसन्धान परिषद् को अनुसन्धान मध्य पश्चिम तराईको प्रजनन उमेर समुहका महिलाहरुमा रक्त अल्पता को कारक तत्वहरुको अध्ययन सम्बन्धि तथ्यहरु संकलन गर्न आएको हुं । म हजुरलाई यस अध्ययनमा भाग लिन आमन्त्रण गर्दछु । हजुरले यस अध्यनमा भाग लिन सहमती दिनु पुर्व, हजुरलाई यस अध्ययनको आवश्यकता र यसमा हुने प्रक्रिया बुझ्नु जरुरी छ । म हजुरलाई यस अध्ययनको उद्धेश्य र यसमा तपाईंको भूमीका को बारेमा व्याख्या गर्नेछु । यदि हजुरलाई बिस्तत जानकारी चाहीएमा, तपाईं मलाई सोध्न सक्नुहुनेछ । यस अध्ययनको उद्धेश्य मध्य पश्चिम तराईको प्रजनन उमेर समुहका महिलाहरुमा रक्त अल्पता को कारक तत्वहरुको पत्ता लगाउनु हो ।

स्थान र समय	जवाफहरु	कोड
१. उत्तरदाताको आइ. डी (जिल्ला कोड, क्लस्टर कोड, अन्तर वार्ताकर्ताको कोड, घरधुरीको कोड) (६ डीजीट)	☐☐☐☐☐☐	I1
२. जील्लाको नाम	बाँके १ बर्दीया २ दाङ ३	I2
२. गा.वी.स वा नगरपालीका को नाम	बाँके (१-८) बर्दीया (९-२१) दाङ (२२-३५)	I3
४. क्लस्टर आइ. डी (वार्ड आइ. डी) (२ डीजीट)	☐☐	I4
५. अन्तरवार्ताकर्ताको आइ. डी (२ डीजीट)	☐☐	I5
६. अन्तरवार्ता पुरा भएको मिति	☐☐☐☐☐☐☐☐ दिन महीना बर्ष	I6

अन्तरवार्ताको लागि मञ्जुरीनामा, भाषा र नाम	जवाफहरु	कोड
७.मन्जुरीनामा पढेर सहभागीले मन्जुरी दिनु भएको छ ।	छ १ छैन २ यदि नदिएमा अन्तर वार्ता नलिने	I7
८. थर		I8
९.नाम		I9
१०. फोन नं. (नितान्त जरुरी)		I10

क. सामाजीक–जनसाङ्खीक जानकारी			
प्रश्नहरु	**उत्तर**		**प्रश्न कोड**
तपाई कति बर्षको हुनुभयो ?	**पुरा गरेको बर्ष**		**A1**
तपाईको जाती के हो ?	दलीत पीछडीएको जनजाती पीछडीएको गैर दलीत तराई जाती धार्मीक अल्पसंख्यक तुलनात्मक रुपले पहुंच भएका जनजाती उपल्लो जाती	१ २ ३ ४ ५ ६	A2
तपाई आफूलाई कुन धर्मको भनेर चिनाउनुहुन्छ ?	हिन्दू मूस्लीम बौद्द किश्चीयन अन्य	१ २ ३ ४ ५ (A3 others मा जाने)	A3
	अन्य धर्म	.....	A3 others
तपाईले पुरा गर्नुभएको माथील्लो शैक्षिक तह के हो ?	निरक्षर अनौपचारीक शिक्षा प्राथमीक भन्दा कम प्राथमीक तह (कक्षा ५ उत्तीर्ण) निम्न माध्यमीक (कक्षा ८ उत्तीर्ण) माध्यमीक (एस.एल.सी उत्तीर्ण) उच्च माध्यमीक (कक्षा १२ उत्तीर्ण) स्नातक तह स्नातकोत्तर वा माथील्लो तह	१ २ ३ ४ ५ ६ ७ ८ ९	A4
पछिल्लो १२ महीना मा तपाईको मुख्य पेशा के थियो ? (कुनै एक मुख्य पेशामा मात्र चिन्ह लगाउनुहोस ।)	कृषि ज्याला मजदूरी ब्यापार गृहीणी बिधार्थी गैर सरकारी जागीर सरकारी जागीर व्यावसायीक पशुपालन अन्य	१ २ ३ ४ ५ ६ ७ ८ ९ (A5 Others मा जाने)	A5

	अन्य पेशा	.....	A5 others
तपाईंको बैवाहिक स्थिती के हो ?	अबिवाहित बिवाहित छुट्टिएको/सम्बन्ध बिच्छेद/ बिधुवा	१ (A9 मा जाने) २ ३ (A9 मा जाने)	A6
तपाईको श्रीमानले पुरा गर्नुभएको माथील्लो शैक्षिक तह के हो ?	निरक्षण अनौपचारीक शिक्षा प्राथमीक भन्दा कम प्राथमीक तह (कक्षा ५ उत्तीर्ण) निम्न माध्यमीक (कक्षा ८ उत्तीर्ण) माध्यमीक (एस.एल.सी उत्तीर्ण) उच्च माध्यमीक (कक्षा १२ उत्तीर्ण) स्नातक तह स्नातकोत्तर वा माथील्लो तह	१ २ ३ ४ ५ ६ ७ ८ ९	A7
पछिल्लो १२ महीना मा तपाईको श्रीमानले अपनाउनुभएको मुख्य पेशा के थियो ? (कुनै एक मुख्य पेशामा मात्र चिन्ह लगाउनुहोस ।)	कृषि ज्याला मजदूरी ब्यापार बिधार्थी गैर सरकारी जागीर सरकारी जागीर बैदेशीक रोजगार व्यावसायीक पशुपालन बेरोजगार अन्य	१ २ ३ ४ ५ ६ ७ ८ ९ १० (A8 Others मा जाने)	A8
	अन्य पेशा	.....	A8 others
तपाई लगायत तपाईको परीवारमा कति जना बस्नुहुन्छ ?	परीवारको संख्या └──┘└──┘		A9
तपाईको परीवार मा को को बस्नुहुन्छ ? (परीवारको प्रकार) **एकल:**श्रीमान, श्रीमती र उनीहरुको अविवाहीत बच्चाहरु **संयुक्त:** हजुरबुवा, हजुरआमा, बाबा, आमा र उनीहरुको अविवाहीत बच्चाहरु **बृहत:**हजुरबुवा, हजुरआमा, बाबा, आमा, काका, काकी र उनीहरुको अविवाहीत बच्चाहरु साथै अन्य टाढा या नजीकका नातेदारहरु	एकल संयुक्त बृहत	१ २ ३	A10

घरको किसीम (प्रश्नकर्ता आफैंले अवलोकन गर्ने) **कच्चीः** माटोको छाना वा भित्ता **अर्ध पक्की :** माटो, ढुगां वा सीमेन्ट मीसीएको छाना वा भित्ता **पक्कीः** सीमेन्टको भित्ता	कच्ची अर्ध पक्की पक्की	१ २ ३	A11
तपाईको खेतीपातीबाट आएको अन्नले तपाईको परीवारलाई कति समय सम्म धान्छ ?	महीना खेत छैन थाहा छैन	..... ६६६ ७७७	A12
तपाईको परीवारको बार्षीक आम्दानी कती हो ?	रुपैंयामा थाहा छैन	.... ७७७	A13

ख. प्रजनन स्वास्थ्यको इतिहास

पहिलो महीनाबारी हुदा तपाई कति बर्षको हुनुहुन्थ्यो ?	पुरा गरेको बर्ष थाहा छैन	⌊_⌊_⌋ ७७७	B1
तपाईको अहिलेको महीनाबारी को स्थीती के छ ?	भइरहेको अस्थायी रुपले रोकिएको स्थायी रुपले रोकिएको	१ २ ३ (B5 मा जाने)	B2
औसत मा तपाईंको महिनाबारी कति दिनमा हुन्छ ?	दिन थाहा छैन	⌊_⌊_⌋ ७७७	B3
औसत मा महिनाबारीको बेला तपाईंको कति दिन सम्म रगत बग्छ ?	दिन थाहा छैन	⌊_⌊_⌋ ७७७	B4

तल दिइएका प्रश्नहरु बिवाहीत महीलाहरुको लागी मात्र हुन् ।

तपाईको विवाह हुंदा तपाई कति बर्षको हुनुहुन्थ्यो ?	पुरा गरेको बर्ष	⌊_⌊_⌋	B5
के तपाईको बालबच्चा हरु छन् ?	छ छैन	१ २ (B11 मा जाने)	B6
तपाईले पहिलो पटक बच्चा जन्माउदा तपाईको उमेर कति थियो ?	पुरा गरेको बर्ष	⌊_⌊_⌋	B7
हाल तपाईको कती बालबच्चा हरु छन् ? (गर्भपतन र मृत बच्चा लाई खुलाउनु पर्दैन)	१ २ वा बढी	१ (B10 मा जाने) २	B8
तपाईको कान्छो बच्चा र उ भन्दा अघिल्लो बच्चा बीच कति उमेर को अन्तर छ ?	महीना	⌊_⌊_⌋	B9
के अहिले तपाई बच्चा लाई दुध खुवाउदै हुनुहुन्छ ?	छ छैन	१ २	B10
के तपाई कहिल्यै गर्भवती हुनुभएको छ (अहीलेको गर्भावस्था समेत गरी) ?	छ छ (हाल	१ २	B11

	गर्भवती) छैन	३ (C1 मा जाने)	
तपाई कति पटक सम्म गर्भवती हुनुभएको छ (गर्भपतन र मृत बच्चा समेत गरी) ?	पटक	⌊__⌊__⌋	B12
तपाईको पहिलो गर्भ बस्दा तपाई कति बर्षको हुनुहुन्थ्यो ? (यदि हाल पहिलो गर्भ भए, महीलाको अहिलेको उमेर रेकर्ड गर्ने)	पुरा गरेको बर्ष	⌊__⌊__⌋	B13
के तपाईको विगतमा कहिल्यै बच्चा खेर जाने वा मृत बच्चा हुने भएको छ ?	छ छैन	१ २ (B16 मा जाने)	B14
कृपया तपाईको बिगतमा खेर गएको बच्चा अथवा मृत बच्चाको सङ्ख्या खुलाउनुहोस् ।	बच्चा खेर गएको सङ्ख्या	⌊__⌊__⌋	B15
	मृत बच्चाको सङ्ख्या	⌊__⌊__⌋	
के तपाईले कहिल्यै गर्भपतन गराउनुभएको छ ?	छ छैन उत्तर दिन अस्वीकार गरेको	१ २ (C1 मा जाने) ८८८ (C1 मा जाने)	B16
कृपयो सङ्ख्या खुलाउनुहोस् ।	गर्भपतनको सङ्ख्या	⌊__⌊__⌋	B17

स्वास्थ्य व्यवहार

(अवीवाहीत महीलालाई C8 मात्र सोध्ने)

के पछिल्लो ५ बर्षमा तपाईको कुनै गर्भ रहेको थियो ?	थियो थिएन	१ २ (C8 मा जाने)	C1
के तपाईले पछिल्लो बच्चा लाई जन्म दिनु पुर्व ,स्वास्थ्य संस्थामा गएर गर्भवती जांच गराउनु भयो ?	गराएं गराईन	१ २ (C4 मा जाने)	C2
तपाईले कति पटक गर्भवती जांच गराउनु भयो ?	४ भन्दा कम ४ वा बढी	१ २	C3
के तपाईले पछिल्लो पटक गर्भवती हुंदा आइरन चक्की खानुभयो ?	खाएँ खाइन	१ २(C6 मा जाने)	C4
तपाईले कति दिनसम्म आइरन चक्की खानुभयो ?	पुरा २२५ दिन २२५ दिन पुरा खाएन	१ २	C5
के तपाईले पछिल्लो पटक गर्भवती हुंदा अबलेन्डाजोल चक्की खानुभयो ?	खाएं खाइन	१ २	C6

के तपाईंले पछिल्लो बच्चा लाईं जन्म दिइसकेपछि भीटामीन ए चक्की खानुभयो ?	खाएं खाइन	१ २	C7
के तपाई खेत बारीमा काम गर्दा जुत्ता वा चप्पल को प्रयोग गर्नुहुन्छ ?	गर्छु गर्दीन हाम्रो खेत छैन	१ २ ३	C8
घ. परीवार नियोजन (बिवाहीत महीलालाई मात्र सोध्ने)			
के तपाईंले पछिल्लो १२ महिना देखी कुनै परिवार नियोजनको साधन प्रयोग गरीरहनुभएको छ ?	छ छैन	१ २ (E1 मा जाने	D1
कृपयातपाईले पछिल्लो १२ महिना देखि प्रयोग गरिरहनुभएको परिवार नियोजनको साधनको नाम बताउनुहोस् । (बहुउत्तर)	बन्ध्याकरण आई.यू.सी.डी इन्जेक्टेबल /डीपो नरप्लाण्ट पील्स कण्डम (श्रीमान) महिला कण्डम क्यालेण्डर बिधी आकस्मीक साधन अन्य	१ २ ३ ४ ५ ६ ७ ८ ९ १० (D2 Others मा जाने)	D2
	अन्य परिवार नियोजनको साधन	....	D2 Others

ङ. मद्यपान			
के तपाईंले कहिल्यै मद्यपान जस्तै जाँड, रक्सी, तुम्बा, बीयर, ह्वाइन, ह्वीस्की, खानुभएको छ ?	छ छैन	१ २ (F1 मा जाने)	E1
के तपाईले पछिल्लो १२ महीनामा मद्यपान गर्नुभएको छ ?	छ छैन	१ २ (F1 मा जाने)	E2
पछिल्लो १२ महीनामा तपाईंले कतीको मद्यपान गर्नुभयो ?	दिनहुंजसो हप्तामा ३ वा ४ पटक हप्तामा १ वा २ पटक महिनामा १ देखि ३ पटक महिनामा १ पटक भन्दा कम	१ २ ३ ४ ५	E3
के तपाईंले पछिल्लो ३० दिनमा मद्यपान गर्नुभएको छ ?	छ छैन	१ २ (F1 मा जाने)	E4

पछिल्लो ३० दिनमा तपाईले कस्तीमा पनि एक ग्लास रक्सी कतिको खानुभयो ?	दिनहुंजसो हप्तामा ३ देखि ४ दिन हप्तामा १ देखि २ दिन महिनामा १ देखि ३ दिन एकपटक मात्र	१ २ ३ ४ ५	E5

च. धुम्रपान

के तपाई हाल धुम्रपान गर्नुहुन्छ ?	गर्छु गर्दीन	१ २ (F3 मा जाने)	F1
के तपाई दैनीक धुम्रपान गर्नुहुन्छ ?	गर्छु गर्दीन	१ २	F2
के तपाईं हाल कुनै सुर्तीजन्य पदार्थ जस्तै (पान, जर्दा, गुट्खा, खैनी) को प्रयोग गर्नुहुन्छ ?	गर्छु गर्दीन	१ २(F5 मा जाने)	F3
के तपाई हाल दैनीक सुर्तीजन्य पदार्थ को प्रयोग गर्नुहुन्छ ?	गर्छु गर्दीन	१ २	F4
पछिल्लो ३० दिनमा के तपाईको घरमा कसैले चुरोट पिउनुभयो ?	भयो भएन	१ २	F5

छ. बिरामी हुंदा स्वास्थ्य संस्थाको भेट

के तपाईलाई कहिल्यै कुनै दीर्घ रोग हरु लागेको छ ?	छ छैन	१ २ (G3 मा जाने)	G1
के तपाई रोगको नाम उल्लेख गर्न सक्नुहुन्छ ? (बहुउत्तर)	मुटु रोग दीर्घ कीड्नी रोग सुगर क्यान्सर दीर्घ स्वास प्रश्वास रोग अन्य	१ २ ३ ४ ५ ६ (G2 Others मा जाने)	G2
	अन्य दीर्घ रोग	.....	G2 Others
के तपाई पछिल्लो १ महिनामा बिरामी पर्नुभएको छ ?	परे परीन	१ २(G8 मा जाने)	G3
कृपयातपाईलाई पछिल्लो १ महिनामा लागेको रोगको नाम बताउनुहोस् ।	.....		G4

आफूलाई लागेको रोग निको पार्न तपाईले के गर्नुभयो ?	सरकारी स्वास्थ्य संस्था गएँ प्राइभेट हस्पीटल/क्लीनीक गएँ धामी, झाँक्रीको मा गएँ घरमै उपचार गरे नजीकैको फार्मेसीमा गएर औषधी किने केही पनी गरीन अन्य	१ २ ३(G8 मा जाने) ४(G8 मा जाने) ५(G7 b मा जाने) ६(G8 मा जाने) ७ (G5 Others मा जाने)	G5
	अन्य	.....	G5 Others
के तपाईलाई स्वास्थ्य कार्यकर्ताले कुनै औषधी खान सुझाब दिएको थियो ?	थियो थिएन	१ २ (G8 मा जाने)	G6
के तपाई प्रेस्क्रीप्सन कागज र औषधी देखाउन सक्नुहुन्छ ? (हेरेर औषधी र रोगको नाम रेकर्ड गर्ने)	रोगको नाम	.....	G7a
	प्रेस्क्रीप्सन कागज उपलब्ध भएन	७७७	
	औषधीको नाम	.....	G7b
	प्रेस्क्रीप्सन कागज वा औषधीको खोल उपलब्ध भएन	७७७	
के तपाई हाल कुनै भिटामीन खाईरहनुभएको छ ?	छ छैन	१ २ (H1 मा जाने)	G8
यदी छ भने के तपाई प्रेस्क्रीप्सन कागज वा औषधीको खोल देखाउन सक्नुहुन्छ ?	औषधीको नाम	.....	G9
	प्रेस्क्रीप्सन कागज वा औषधीको खोल उपलब्ध भएन	७७७	
तपाईले भिटामीन खान थालेको कति भयो ?	दिन	⌊_⌊_⌋	G10a
	महिना	⌊_⌊_⌋	G10b
ज. रक्त अल्पताको ज्ञान			

के तपाईले कहिल्यै रक्त अल्पता (Anemia) भन्ने शब्द सुन्नुभएको छ ?	छ छैन	१ २(I1 मा जाने)	H1
रक्त अल्पता भन्नाले तपाई के बुझ्नुहुन्छ ? (शरीरमा रगतको कमी भएमा रक्त अल्पता भनेर बुझिन्छ)	सही परिभाषा गलत परिभाषा	१ २	H2
के तपाईलाई रक्त अल्पता को लक्षणहरु थाहा छ ?	छ छैन	१ २ (H5 मा जाने)	H3
कृपया, रक्त अल्पता को लक्षणहरु बताउनुहोस् । (बहुउत्तर)	थकाई लाग्नु श्वास फेर्न गाहो हुनु मुटु ढुकढुक गर्नु ध्यान एकत्रीत नहुनु चक्कर आउनु टाउको दुख्नु फीका छाला हुनु खुट्टा बाउडीनु निद्रा नलाग्नु अन्य	१ २ ३ ४ ५ ६ ७ ८ ९ १० (H4 Others मा जाने)	H4
	अन्य लक्षण	…… …… ..	H4 Others
के तपाईलाई रक्त अल्पता हुनबाट बचाउने कुनै खानेकुरा हरुको नाम थाहा छ ?	छ छैन	१ २ (I1 मा जाने)	H5
कृपया, खानेकुरा हरुको नाम बताउनुहोस् । (बहुउत्तर)	हरीयो सागसब्जी (पालुङ्गोको साग) मासु (कलेजो, रगत) फर्सीको गेडा सुर्यमुखीको गेडा शखरखण्ड कीसमीस मटरकोसा ब्रोकाउली गुडँ बेरी (स्ट्रबेरी, ग्यास्पबेरी) सीमी च्याउ मस्यौरा टमाटर /गोलभेडा कोदो दाल माछा अण्डा	१ २ ३ ४ ५ ६ ७ ८ ९ १० ११ १२ १३ १४ १५ १६ १७ १८ १९ २० २१	H6

	बदम (काजु, पीस्ता) उसीनाको चामल केरा अनार जामुन कालो अंगुर नरीवल आलु तोफु अन्य	२२ २३ २४ २५ २६ २७ २८ (H6 Others मा जाने)	
	अन्य खानाहरु	....	H6 Others
झ. खानपानको ढाँचा			
खानपानको बिबिधता			
तपाईंको खानपानको व्यवहार कस्तो छ ?	शाकाहारी (मासु नखाने) माछा मासु र हरीयो सागसब्जी दुबै खाने शाकाहारी र अण्डा खाने	१ (I5 मा जाने) २ ३ (I4 मा जाने)	I1
पछिल्लो ७ दिनमा तपाईंले कति पटक मासु कलेजो,रगत, ससेज) खानुभयो ?	दिनदिनै ७ देखि १० पटक ३ देखि ६ पटक १ देखी २ पटक खाईन	१ २ ३ ४ ५	I2
पछिल्लो ७ दिनमा तपाईंले कति पटक माछा, सिद्ध खानुभयो ?	दिनदिनै ७देखि १० पटक ३ देखि ६ पटक १ देखी २ पटक खाईन	१ २ ३ ४ ५	I3
पछिल्लो ७ दिनमा तपाईंले कति पटक अण्डा खानुभयो ?	दिनदिनै ७ देखि १० पटक ३ देखि ६ पटक १ देखी २ पटक खाईन	१ २ ३ ४ ५	I4
पछिल्लो ७ दिनमा तपाईंले कति पटक दुग्धजन्य पदार्थ (दुध, दही, मही) खानुभयो ?	दिनदिनै ७देखि १० पटक ३ देखि ६ पटक १ देखी २ पटक खाईन	१ २ ३ ४ ५	I5
पछिल्लो ७ दिनमा तपाईंले कति पटक फलफूल अथवा जुस खानुभयो ?	दिनदिनै ७देखि १० पटक ३ देखि ६ पटक १ देखी २ पटक खाईन	१ २ ३ ४ ५	I6
पछिल्लो ७ दिनमा तपाईंले कुनै किसीमको दालहरु	दिनदिनै	१	

कति पटक खानुभयो ?	७ देखि १० पटक ३ देखि ६ पटक १ देखी २ पटक खाईन	२ ३ ४ ५	I7
पछिल्लो ७ दिनमा तपाईंले हरियो सागसब्जी कति पटक खानुभयो ?	दिनदिनै ७देखि १० पटक ३ देखि ६ पटक १ देखी २ पटक खाईन	१ २ ३ ४ ५	I8
पछिल्लो ७ दिनमा तपाईंले खानेकुराहरु जस्तै भात, कोदो, गहुँ, मकै, रोटी, जाउलो, चाउचाउ कति पटक खानुभयो ?	दिनदिनै ७देखि १० पटक ३ देखि ६ पटक १ देखी २ पटक खाईन	१ २ ३ ४ ५	I9
के तपाई चिया वा कफी दिनदिनै पिउनुहुन्छ ?	पिउँछु पिउँदिन	१ २ (J1 मा जाने)	I10
के तपाई चिया वा कफी बिशेषगरी खाना खाएपछि पिउनुहुन्छ ?	पिउँछु पिउँदिन	१ २	I11

खानपानको सुरक्षा

पछिल्लो १२ महिनामा, के तपाईंलाई घरपरीवारको सदस्य लाई खानेकुरा पुग्दैन भनेर चिन्ता लागेको थियो ?	थियो थिएन उत्तर दिन अस्वीकार गरेको	१ २ ८८८	J1
पछिल्लो १२ महिनामा, के कुनै यस्तो समय थियो जतीखेर तपाईंको घरपरीवारको सदस्यले पैसाको अभावले गर्दा मनपरेको खानेकुरा खान पाउनुभएको थिएन ?	थियो थिएन उत्तर दिन अस्वीकार गरेको	१ २ ८८८	J2
पछिल्लो १२ महिनामा, के कुनै यस्तो समय थियो जतीखेर तपाईंको घरपरीवारको सदस्यले पैसाको अभावले गर्दा थोरै खानेकुरा खानुपरेको थियो ?	थियो थिएन उत्तर दिन अस्वीकार गरेको	१ २ ८८८	J3
पछिल्लो १२ महिनामा, के कुनै यस्तो समय थियो जतीखेर तपाईंको घरपरीवारको सदस्यले खानाको अभावले गर्दा चाहीएजती भन्दा कम खानेकुरा खानुपरेको थियो ?	थियो थिएन उत्तर दिन अस्वीकार गरेको	१ २ ८८८	J4
पछिल्लो १२ महिनामा, के कुनै यस्तो समय थियो जतीखेर तपाईंको घरपरीवारको सदस्यले पैसाको अभावले गर्दा दिनमा थोरै पटक खानेकुरा खानु परेको थियो ?	थियो थिएन उत्तर दिन अस्वीकार गरेको	१ २ ८८८	J5
पछिल्लो १२ महिनामा, के कुनै यस्तो समय थियो जतीखेर तपाईंको घरमा पैसाको अभावले गर्दा कुनै प्रकारको खानेकुराको अभाव भएको थियो ?	थियो थिएन उत्तर दिन अस्वीकार गरेको	१ २ ८८८	J6

पछिल्लो १२ महिनामा, के कुनै यस्तो समय थियो जतीखेर तपाईंको घरको सदस्यहरु खानेकुराको अभाव ले गर्दा राती भोकै सुत्नु परेको थियो ?	थियो थिएन उत्तर दिन अस्वीकार गरेको	१ २ ८८८	J7
कुल समयावधि	.....(मिनेटमा)		
प्रश्नकर्ताको सही	.....		
उत्तरदाताको सही	.....		

तपाईको सहभागीताको लागी धन्यवाद !

Annex II: Written consent form in Nepali

लिखीत सहमती फारम

नमस्कार, मेरो नाम .....हो । म यहां नेपाल स्वास्थ्य अनुसन्धान परिषद् को अनुसन्धान नेपालमा रक्त अल्पता को कारक तत्वहरुः मध्य पश्चिम तराईको प्रजनन उमेर समुहका महिलाहरुमा प्रथम चरणको अध्ययन (2014-2015) सम्बन्धि तथ्यहरु संकलन गर्न आएको हुं । म हजुरलाई यस अध्ययनमा भाग लिन आमन्त्रण गर्दछु । हजुर्ले यस अध्धयनमा भाग लिन सहमती दिनु पुर्व, हजुरलाई यस अध्धयनको आवश्यकता र यसमा हुने प्रक्रिया बुझ्नु जरुरी छ । म हजुरलाई यस अध्ययनको उद्धेश्य र यसमा तपाईंको भूमीका को बारेमा व्याख्या गर्नेछु । यदि हजुरलाई बिस्तत जानकारी चाहीएमा, तपाईं मलाई सोध्न सक्नुहुने५ ।

अध्ययनको उद्धेश्य

यस अध्ययनको उद्धेश्य मध्य पश्चिम तराईको प्रजनन उमेर समुहका महिलाहरुमा रक्त अल्पता को कारक तत्वहरुको पत्ता लगाउनु हो ।

अध्ययन प्रक्रिया

अध्ययन समूहप्रजनन उमेर समुहका महिलाहरु हुनेछन् । कुल डटण महिलाहरुको प्रश्नावलीको माध्यमबाट प्रत्यक्ष अर्न्तवार्ता लिइनेछ । यो अध्ययनमा वजन र उचाई मापन गर्ने प्रक्रिया समावेश हुनेछ र शरीरमा रहेका आईरन, फोलेट, भीटामीन B12 को तह मापन गर्न रक्त संकलन साथसाथै अंकुशे किरा को संख्या पत्ता लगाउन मलको संकलन गरीने छ । अर्न्तवार्ता शुरु गर्नु पुर्व सहभागीहरुलाई सहमती फारम स्पष्ट र विस्तत रुपमा ब्याखा गरीनेछ । अर्न्तवार्ता करीब 20 देखी 25 मीनेट सम्म रहनेछ । त्यसैगरी रगत र मल संकलन गर्न बढीमा एक मीनेट लाग्नेछ ।

उत्तरदाताहरु को भूमीका

यदी तपाईंले यस अध्ययन मा भाग लिएमा, तपाईंलाई हामी तपाईंको सामाजीक, जनसाङ्खीक, प्रजनन स्वास्थ्यको इतिहास, खानपानको ढांचा र रक्त अल्पताको ज्ञान सम्बन्धित प्रश्नहरु सोध्नछौं । तपाईंले हामीलाई ६ मीलीलीटर रगतको नमूना र मलको नमूना पनि दिनुपर्नेछ ।

खतराहरु

यस अध्ययनको खतराहरु निकै कम छन् र खतराहरु लाई कम गर्न हर पहल गरीनेछ । केही संवेदनशील प्रश्नहरुले केही उत्तरदाताहरु लाई व्याकुल गराउन सक्छ । तपाईंले कुनै या पुरै प्रश्नहरुको उत्तर नदिन पनि सक्नुहुनेछ र कुनै पनि समय उत्तर दिन छोड्न सक्नुहुनेछ ।

फाईदाहरु

यस अध्ययन बाट सहभागीहरुलाई केही फाइदा हुनेछैन । यद्यपी, तपाईंले दिनुभएको जानकारी ले मध्य पश्चिम तराईको प्रजनन उमेर समुहका महिलाहरुमा रक्त अल्पता को कारक तत्वहरु सम्बन्धि जानकारी प्रदान गर्नेछ ।

गोपनीयता

अनुसन्धानकर्ताले गोपनीयता कायम गर्न हरसम्भव प्रयास गर्नेछः जस्तै सबै सहभागीहरुलाई कोड नम्बर दिइनेछ । यस अध्ययन बाट प्राप्त भएको जानकारीलाई बिशुद्व रुपमा अध्ययन को उद्धेश्यको लागी प्रयोग गरीनेछ । गुमनामी लाई कायम राखीने५ ।

स्वेच्छिक सहभागीता

यस अध्ययनमा भाग लिनु स्वेच्छिक हो । सहभागीहरुले निर्बाध रुपमा कुनै पनि बेला अर्न्तवार्ता बाट अलग हुन सक्नेछन् साथसाथै कुनै विनिर्दिष्ट प्रश्नको उत्तर पनि नदिन सक्नेछन् । तपाईं यस अध्ययनमा भाग लिन या नलिन सक्नुहुनेछ ।

के तपाईं यस अध्ययनमा भाग लिन सहमत हुनुहुन्छ ?

छु छैन

सहभागीको नामः

Annex III: Blood and Stool tool

Determinants of Anemia in Nepal: A first phase study among women of reproductive age in Mid-western Terai of Nepal (2014/15)

Survey Information

Namaste, My name is …… I am here to collect data on Nepal Health Research Council's research project entitled "Determinants of Anemia in Nepal: A pilot study among women of reproductive age in Mid-western Terai of Nepal (2014/15). I, invite you to take part in this study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. I will explain you about this study, its objective and your role in this study. Should you need more information, you may ask to me. The objective of this study is to identify factors affecting anemia among women of reproductive age of Mid-western Terai of Nepal.

Location and Date	Response	Code
1. Participants I.D (District code, Cluster code, Interviewer's code, Household code) [6 digits]	⌊_⌊_⌋ ⌊_⌊_⌋ ⌊_⌊_⌋	I1
2. District's name	Banke 1 Bardiya 2 Dang 3	I2
3. Name of VDC/Municipality	Banke (1-8) Bardiya (9-21) Dang (22-35)	I3
4. Cluster I.D (Ward I.D) [2 digits]	⌊_⌊_⌋	I4

5. Interviewer's I.D [2 digits]	⌊__⌋⌊__⌋	I5
6. Date of completion of the interview	Day Month Year	I6

Consent, Interview Language and Name	Response	Code
7. Consent has been read and obtained	Yes 1 No 2 If no, end	I7
8. Family Surname		I8
9. First Name		I9
10. Phone no. (mandatory)	⌊__⌋⌊__⌋⌊__⌋ ⌊__⌋⌊__⌋⌊__⌋	I10

I. Physical measurements			
Indicator	**Response**		**Indicator code**
Height in cm (2 digits)		⌊__⌋⌊__⌋	A
Weight in Kg (2 digits)		⌊__⌋⌊__⌋	B
Body Mass Index (BMI)	Underweight (<18.5) Normal weight(18.5-24.9) Overweight(25-29.9) Obese(>30)	1 2 3 4	C
II. **Biochemical measurements**			
CBC including RBC indices			
Hemoglobin count (2 digits)		⌊__⌋⌊__⌋	D

Total leucocytes count (5 digits)		⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋	E
Differential lymphocytes count	Neutrophil ⌊_⌋⌊_⌋ Eosinophil ⌊_⌋⌊_⌋ Lymphocyte ⌊_⌋⌊_⌋ Monocyte ⌊_⌋⌊_⌋ Basophil ⌊_⌋⌊_⌋		F
Total platelets count (6 digits)	⌊_⌋⌊_⌋	⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋	G
Total RBC count (4 digits)	⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋		H
PCV count (4 digits)	⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋		I
MCV count (4 digits)	⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋		J
MCH count (4 digits)	⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋		K
MCHC count (4 digits)	⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋		L
Reticulocyte counts (3 digits)	⌊_⌋⌊_⌋ ⌊_⌋		M
Peripheral blood smear	Yes No	1 0	N
Serum Ferritin with Iron profile			
Iron (3 digits)	⌊_⌋⌊_⌋ ⌊_⌋		O
TIBC (3 digits)	⌊_⌋⌊_⌋ ⌊_⌋		P
Ferritin (5 digits)	⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋		Q
Vitamin B12 (5 digits)	⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋		R
Folic acid (5 digits)	⌊_⌋⌊_⌋ ⌊_⌋⌊_⌋ ⌊_⌋		S

Coomb's test	Positive Negative	1 0	T
G6PD	Yes No	1 0	U
LDH (4 digits)		⌊_⌊_⌊_ ⌊_⌊_⌊_	V
Malaria	Yes No	1 0	W
Kala-azar	Yes No	1 0	X
Stool test			
Stool indicators	Giardiasis Ascariasis Hookworm Others	1 2 3 4	Y

We, thank you, for your participation.

Annex IV: Appointment card

रक्त तथा दिसा परिक्षण कार्ड

रक्त अल्पता को कारक तत्वको सर्वेक्षणमा सहभागी हुनका लागि मन्जुरीनामा दिनु भएकोमा यहाँलाई धन्यवाद छ ।

सहभागीको परिचय नम्बर :.

सहभागीको नाम :.....

सम्पर्क फोन नं :.....

घरमुलीको नाम :.....

सम्पर्क फोन नं :.....

नमुना संकलन मिति :.....

नमुना संकलन गर्ने समय :.....

नमुना संकलन का लागी सम्पर्क गर्ने ब्यक्ति १ :.....

सम्पर्क फोन नं :.....

नमुना संकलन का लागी सम्पर्क गर्ने ब्यक्ति २ :.....

सम्पर्क फोन नं :.....

कृपया भोलि रगत तथा दिसा को नमुना संकलन आउदा यो कार्ड देखाउनुहोला ।

धन्यवाद !

Annex V: Selected wards with household size

Dis ID	District	VDC ID	VDC/ Municipality	Ward ID	VDC/ Municipality	Ward ID	No. of households
1	Banke	1	Bageswari	1	Bageswari	2	613
1	Banke	2	Bankatawa	2	Bankatawa	3	246
1	Banke	3	Holiya	3	Holiya	9	391
1	Banke	4	Kamdi	4	Kamdi	5	87
1	Banke	5	Khaskarkando	5	Khaskarkando	6	67
1	Banke	6	Kohalpur	6	Kohalpur	9	531
1	Banke	6	Kohalpur	7	Kohalpur	5	824
1	Banke	6	Kohalpur	8	Kohalpur	3	2,799
1	Banke	7	Naubasta	9	Naubasta	6	359
1	Banke	8	Nepalgunj Municipality	10	Nepalgunj Municipality	4	291
1	Banke	8	Nepalgunj Municipality	11	Nepalgunj Municipality	11	326
1	Banke	8	Nepalgunj Municipality	12	Nepalgunj Municipality	12	1,107
1	Banke	8	Nepalgunj Municipality	13	Nepalgunj Municipality	16	1,759
1	Banke	8	Nepalgunj Municipality	14	Nepalgunj Municipality	1	1,925
2	Bardiya	9	Baganaha	15	Baganaha	7	262
2	Bardiya	9	Baganaha	16	Baganaha	1	451
2	Bardiya	10	Belawa	17	Belawa	8	117
2	Bardiya	11	Deudakala	18	Deudakala	3	1,219
2	Bardiya	12	Dhadhawar	19	Dhadhawar	7	374
2	Bardiya	13	Dhodhari	20	Dhodhari	6	181
2	Bardiya	14	Jamuni	21	Jamuni	6	281
2	Bardiya	15	Magaragadi	22	Magaragadi	7	255
2	Bardiya	15	Magaragadi	23	Magaragadi	9	636
2	Bardiya	16	Pasupatinagar	24	Pasupatinagar	5	162
2	Bardiya	17	Rajapur	25	Rajapur	5	233
2	Bardiya	17	Rajapur	26	Rajapur	6	493
2	Bardiya	18	Sanoshree	27	Sanoshree	7	429
2	Bardiya	18	Sanoshree	28	Sanoshree	3	990
2	Bardiya	19	Sorhawa	29	Sorhawa	3	709
2	Bardiya	20	Taratal	30	Taratal	2	143
2	Bardiya	21	Thakudwara	31	Thakudwara	3	201
3	Dang	22	Duruwa	32	Duruwa	2	316

3	Dang	22	Duruwa	33	Duruwa	1	410
3	Dang	23	Gadhawa	34	Gadhawa	3	224
3	Dang	24	Gangapraspur	35	Gangapraspur	6	273
3	Dang	25	Ghorahi Municipality	36	Ghorahi Municipality	11	6,237
3	Dang	26	Hansipur	37	Hansipur	2	171
3	Dang	26	Hansipur	38	Hansipur	9	191
3	Dang	27	Hapur	39	Hapur	6	303
3	Dang	28	Lalmatiya	40	Lalmatiya	3	1,360
3	Dang	29	Narayanpur	41	Narayanpur	3	566
3	Dang	29	Narayanpur	42	Narayanpur	1	751
3	Dang	30	Phulbari	43	Phulbari	8	102
3	Dang	31	Rajpur	44	Rajpur	5	155
3	Dang	32	Rampur	45	Rampur	8	345
3	Dang	33	Shreegaun	46	Shreegaun	2	213
3	Dang	34	Syuja	47	Syuja	7	133
3	Dang	35	Tulsipur Municipality	48	Tulsipur Municipality	8	886
3	Dang	35	Tulsipur Municipality	49	Tulsipur Municipality	10	2,326
3	Dang	35	Tulsipur Municipality	50	Tulsipur Municipality	6	3,607

Annex VI: Participant Feedback Form

Participant Feedback Form

Dear …….....……..

We thank you very much for participating in the **Determinants of Anemia in Nepal: First phase study among women of reproductive age in Mid-western Taraiof Nepal (2014/15)**, conducted by Nepal Health Research Council. This study was undertaken in order to gather information on the following risk/causative factors of Anemia in Mid Western TaraiNepal.

We would like to provide you with an overview of your results from the preliminary blood tests.

Participant ID:

Name of the Participant:

Malaria :	Positive	Negative
Kalazar:	Positive	Negative

Height:	Height:……..cm
Weight:	Weight:……..kg
Body Mass Index:	BMI:…….kg/m^2
BMI Classification:	Underweight (BMI <18.5)
	Normal weight (BMI 18.5-24.9)
	Overweight (BMI 25-29.9)
	Obese (BMI>30)

<u>Checked by</u>

Name: …….

Post:……

Date:…….

Annex VII: List of field supervisors and enumerators

Field Research Supervisors
Mr. Bishnu Khatri
Mr. Shiva Paudel
Mr. Gopal Prasad Kandel
Field Research Assistants
Mr. Upendra Chand
Ms. Sujata Dhakal
Ms. Pramila Shah
Mr. Rajesh Gupta
Ms. Ramila Prajapati
Mr. Prayash Lamsal
Ms. Urmila K.C.
Ms. Prabina Karmacharya
Field Research Assistants (Laboratory)
Ms. Krishna Khatri
Ms. Srijana Ranabhat
Mr. Shiva Kumar Bista
Mr. Dipak Raj Karki
Ms. Sushila Kumari Karki
Ms. Mina Kumari Budathoki

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