

Practicum Training
At
New ERA (Educational Research Associate)

by

Dr. Sudhamsu Koirala

For the Award of Masters of Public Health

IIHMR/JHSPH

2014-2016

Practicum Training

At

New ERA

**Field experience in biological specimen collection for the
Nepal National Micronutrient Status Survey(NNMSS)**

by

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Under the guidance of

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&

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MASTER OF PUBLIC HEALTH

A cooperative Program of

**JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH
&
INDIAN INSTITUTE OF HEALTH MANAGEMENT RESEARCH**

CERTIFICATE BY SCHOLAR

This to certify that the practicum project titled "**Field experience in biological specimen collection for the Nepal National Micronutrient Status Survey- 2016 (NNMSS)**" submitted by Dr. Sudhamsu Koirala enrollment IIHMR/JHU/MPH/2014-2016/2-14 under the supervision of **Dr. Monika Chaudhary** (Practicum advisor) and **Mr. Jagat Basnet** (External advisor) for award of Master of Public Health carried out during the period from 10th January 2016 to 13th April 2015 embodies my original work and has not been formed the basis for award of any other degree, diploma, associateship, fellowship, titles in this or any other Institute or other similar institutions of higher learning.



Signature

Dr. Sudhamsu Koirala

MASTER OF PUBLIC HEALTH

A cooperative Program of

**JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH
&
The IIHMR University**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Sudhamsu Koirala** student of Master of Public Health Program offered by Institute of Health Management Research; Jaipur in cooperation with Johns Hopkins Bloomberg School of Public Health, Baltimore has undergone Practicum Training at **New ERA, Kathmandu** on the topic "**Field experience in biological specimen collection for the Nepal National Micronutrient Status Survey**" from **10-Jan-2016 to 13-Apr-2016**.

The Candidate has successfully carried out the study/tasks designated to him during practicum training and his approach to the study has been sincere, scientific and analytical. The Practicum Training is in fulfillment of the course requirements. I wish him all success in all his future endeavors.

Col. (Dr) Ashok Kaushik
(Dean, Academics and Student Affair)
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(Practicum Advisor)
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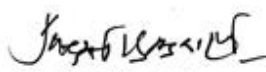

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1. Acknowledgements

I would like to thank New ERA institute for providing me an opportunity to be part of Nepal National Micronutrient Status Survey (NNMSS) 2016. I am also grateful to Mr. Jagat Basnet, Mrs. Nira Joshi, Miss Sandhya Shahi, Mr. Umesh Ghimire, Mr. Ramesh Dangi and Mr. Babauraja Dangol, all from New ERA for their help at various times during the survey. Mr. Nabin Paudyal, Dr. Rajendra Kumar BC and Mr. Lokendra Sumsher Thapa from UNICEF, Nepal need to be mentioned for their suggestions on inputs to the report. I would also like to thank entire JHSPH/IIHMR MPH faculty and friends for their help during my academic tenure and finally special mention goes to Dr. Monika Chaudhary for her guidance in completion of the practicum. Research without willing participants is not possible and thus I thank all the respondents of the survey for their contributions.

2. Abbreviations:

CDC	U.S. Centers for Disease Control and Prevention
CDO	Chief District officer
CHD	Child Health Division
DHO	District Health Officer
FCHV	Female Community Health Volunteer
MoHP	Ministry of Health and Population
MRDR	Modified Relative Dose Response Test
NNMSS	Nepal National Micronutrient Status survey
UNICEF	United Nations Children's Fund

3. Background of the organization

New ERA is one of Nepal's first non-government, non-profit research organization. Its mission is to articulate Nepali people's aspirations in the country's development process. It was registered in 1971 as a private listed company.

3.1 Goal

New ERA's main goal is to provide an independent Nepalese perspective in the design, implementation and assessment of development policies and programs by employing a wide range of quantitative, qualitative and participatory rural appraisal (PRA) methodologies.

3.2 Origin and Development

New ERA, was founded by a group of Peace Corps Volunteers and Nepalese educators to provide research support for the implementation of the National Education System Plan for 1971-76.

Thoroughly committed to the goal of helping to achieve highest possible standard of education, New ERA adopted two strategic policy objectives: to develop itself as an independent educational research and development institution and to serve as a support agency to technical assistance programs and to foreign scholars.

With passage of time, the scope of New ERA's research activities broadened to include other aspects of national development. By mid-1970s, New ERA was involved in projects concerning rural and human resources development, communications and in women development issues. Later half of the 1970s saw New ERA engaged in training (language and culture) for foreign technical and volunteer agencies such as the American Peace Corps and in the implementation of Semester Abroad Program for American college students.

In early 1980s New ERA's activities expanded to newer fields like agriculture, livestock, horticulture, communications, drinking water and sanitation, forestry, environment, gender issues, human resources, migration and resettlement, population and family planning, health and nutrition, rural development and technology, socio-economics and tourism.

In the beginning New ERA's projects were designed, negotiated and carried out jointly by the Nepalese and New ERA's American partners. As New ERA's Nepali staff's program management and research capacities increased expatriate involvement was gradually phased out. It eventually ended in 1977.

Although New ERA was run entirely by a team of Nepalese professionals, it was only in 1981 that it became a Nepalese organization in the real sense of the term. (Source <http://www.newera.com.np/aboutusmain>)

4. About the Survey

Nepal National Micronutrient Survey 2016 (NNMS 2016) is the most comprehensive micronutrient survey ever attempted in the history of Nepal. As mentioned in the NNMS 2016 protocol the survey details are as follows.

4.1 Major stakeholders

- i. The Department of Health Services, (DoHS), Ministry of Health (MOH)
- ii. Nepal Health Research Council(NHRC),GoN
- iii. National Public Health Laboratory (NPHL),MoH
- iv. Director, Child Health Division, Department of Health Services
- v. Center for disease Control (CDC), Atlanta,USA
- vi. New ERA ,Kathmandu, Nepal
- vii. UNICEF Nepal
- viii. USAID

4.2 Primary objectives of the survey

1. To assess the magnitude and the distribution of anemia; deficiencies in vitamins A and B₁₂, iron, folic acid, zinc, and iodine; infectious diseases (malaria, STH, H. pylori, visceral leishmaniasis); blood disorders; inflammation; and anthropometry in young women. The data will be representative of non-pregnant women 15–49 years and provide estimates among a small sample of pregnant women.
2. To assess the magnitude and distribution of anemia; deficiencies in vitamin A, iron, and folic acid; malaria infection; H. pylori; inflammation; and anthropometry amongst adolescent girls 10-19 years.
3. To assess the magnitude and the distribution of the condition of anemia; deficiencies in vitamin A and iron; malaria infection; H. pylori; and inflammation amongst adolescent boys 10-19 years.
4. To assess iodine status among children 6–9 years of age.
5. To assess the magnitude and distribution of anemia; deficiencies in vitamins A and B₁₂, iron, zinc, and folic acid; infectious diseases (malaria, STH, H. pylori, and visceral leishmaniasis); blood disorders; inflammation; and anthropometry among children 6–9 years of age.
6. To examine the etiology of anemia among non-pregnant women and children 6–59 months of age.
7. To collect consumption patterns of fortifiable wheat flour among non-pregnant women and adolescent boys 10–19 years.
8. To assess coverage and adherence for key national micronutrient and nutrition interventions.

4.3 Survey Design and Target Populations

4.3.1 Survey design

The NNMSS is cross-sectional; population based, and is nationally representative. It has been stratified to provide representative estimates for the five development regions: Eastern, Central, West, Midwest and Far West and of the three eco-zones: terrain (plains), hills, and mountains.

4.3.2 Target populations

- i. Head of Household
- ii. Children 6–59 month
- iii. Children 6–9 y
- iv. Adolescent girls 10–19 y
- v. Adolescent boys 10–19 y
- vi. Non-pregnant women 15–49 y
- vii. Pregnant women 15–49 y

4.4 Data Collection Overview

4.4.1 Divisions for local governance

Nepal is divided into different municipalities and village development councils (VDC). Each municipality and VDCS is further divided into wards.

4.4.2 Summary of types of data to be collected

The participants will be interviewed by using purpose developed questionnaires to collect relevant information.

Seven sets of questionnaires, each for even different target groups were developed.

Venous blood samples will be collected from the target groups in sampled households, except for children 6–9 yrs. Urine and stool samples will be collected from some select groups. Wheat flour and salt samples will be collected from sampled households.

Geographic Positioning information system (GPIS) will be taken to determine the location of the following.

1. Each selected household in each cluster 2.
2. At the nearest health facility to the cluster
3. At all female community health volunteer's (FCHV) households in each selected cluster;(if there is no FCHV living in the selected cluster, then the GIS data will be collected from the closest FCHV household in neighboring clusters or who serve the families in the selected cluster, based on information provided by the MoH and community members.)

4. 5 Sample Size Estimates

The sample size estimates were calculated for key micronutrient indicators (anemia, iron deficiency, and vitamin A deficiency) for each population group (Table 5). The assumed design effect was 2 or was informed by data from the 2011 DHS for anemia and IYCF/MNP baseline evaluation survey unpublished preliminary data for ferritin and inflammation. The assumed household response rate was 95%. Blood samples are being collected using venous sampling and for these indicators the assumed individual response rate was 90%. For the collection of urinary iodine, the assumed individual response rate was 90%. The sample size for pregnant women was assumed to be 5% of all women based on NDHS 2011 data. The sample size for women 15–49 y, children 6–59 months and adolescent girls 10–19 y was 2,130.

The samples are collected from 15 strata in this survey in order to produce representative estimates for the five development regions in the country: Eastern, Central, West, Midwest and Far West, and the three eco-zones in the country as a whole: terrain (plains), hills, and mountains. The 15 strata are the five development regions each from the mountain eco-zone, hill eco-zone and terrain eco-zone. Because 93% of the population lives in the terrain (50%) and hills (43%), and only 7% live in the mountains, this stratification by eco-zone was done to ensure reasonable estimates for the mountain ecology.

5. Practicum Objective

To gain practical field experience in biological specimen collection for the Nepal National Micronutrient status survey 2016 (NNMSS-2016)

6. Competencies Gained

6.1 Establish relationship with community stakeholders

NNMSS data collection was preceded by a series of among key stakeholders to finalize objectives of the survey.

This process started with initial meeting with regional health in charge from five major developmental regions. The purpose of this meeting was to convey the objectives and seek their support.

This was followed by another district level meeting lead by District health Officer (DHO). Chief District Officer (CDO), Superintendent of Police of that district (SP) and representatives of district from Ministry of Education (MOE) attended this meeting.

This is followed by another cluster meeting with teachers of a school in the cluster, religious leaders, Female community health volunteers (FCHV) and few others in cluster. The purpose of this meeting was to secure their buy-out on the objectives of the survey and to educate them on the immediate and long term health benefits to the community including its impact on Nepal's nutrition policy.

Each meeting was followed by feedback from the audience. Where relevant audience feedback and suggestions were incorporated during implementation.

6.2 Ethics in Public Health Research

The protocol for NNMMS survey was submitted to the ethical review board (ERB) of NHRC. The NHRC ethical committee approved (ethical) code of conduct on Feb 18, 2016.

Accordingly, informed consent from participants in the survey was obtained prior to conduct of the survey. Due to concerns about creating fear and high refusal rates among illiterate participants the ethical committee approved oral informed consent. The interviewers read out the wordage in the informed consent following which the interview and biological specimen collection was initiated. The details for securing the consent were as follows.

The informed consent was secured first from head of the household or his/her authorized representative (aged 18 or over) knowledgeable about dietary habit of and the quality of grocery consumed in the household.

In general carrying out the interviews and the biological data collection required prior permission from legal guardians or parents of children in target children and adolescents. Participants between 7 to below 18 years old were asked for permission before proceeding with the interview and biological data collection. Following their permission, consent from their legal guardians was obtained. If the research

participant is 6 month to below 7 year, their legal or parents will be asked to provide the their participation, and if the research participant is 7 to below 18 year, he or she will be asked to provide signed consent proceeding for interviewing and also their children's biological data collection on behalf of their children before assent before interviewing or biological data collection and also take proxy consent from their legal guardian. If the research participant is 6 month to below 7 year, their legal guardians or parents will be asked to provide signed proxy consent on behalf of their children before proceeding for interviewing and taking child's biological sample.

6.3 Building evidence for public health

Results of biological indicators, infectious disease markers and anthropometry from the NMN survey will provide evidence on status of micronutrients, control of selected infectious diseases and etiology of anemia of the target age groups.

This survey assesses anemia not only from nutritional point of view but also gives an estimate of inherited and acquired prevalence qualitative and quantitative disorders of hemoglobin that may result in anemia.

Various biological indicators and the intended target group and method and test are given in the table below.

Table 1: Biological Indicator, Population and Test

Biological indicator	Population	Method & Test
Anemia	Non-pregnant women 15-49 y	HemoCue -Hemoglobin
	Pregnant women 15-49 y	
	Adolescent girls 10-19 y	
	Adolescent boys 10-19 y	
	Children 6-59 month	
Iron Status	Non-pregnant women 15-49 y	ELISA ^b -Ferritin -soluble transferrin receptor (sTfR)
	Pregnant women 15-49 y	
	Adolescent girls 10-19 y	
	Adolescent boys 10-19 y	
	Children 6-59 month	
Vitamin A status	Non-pregnant women 15-49 y	ELISA ^b -Retinol binding protein (RBP)
	Pregnant women 15-49 y	
	Adolescent girls 10-19 y	
	Adolescent boys 10-19 y	
	Children 6-59 month	
Vitamin A status	Non-pregnant women 15-49 y	HPLC MRDR (subsample) ^c -Vit A liver stores -Serum retinol
	Children 6-59 months	
Iodine Status	Non-pregnant women 15-49 y	Ammonium Persulfate method -Urinary iodine
	Pregnant women 15-49 y	
	Children 6-9 y	
Folate status	Non-pregnant women 15-49 y	Microbiological assay -RBC Folate
	Adolescent girls 10-19 y	
	Children 6-59 months	
Vitamin B ₁₂ status	Non-pregnant women 15-49 y	Chemiluminescence -Serum B ₁₂
	Children 6-59 months	
Zinc status	Non-pregnant women 15-49 y	Atomic absorption -Serum zinc
	Children 6-59 months	
Inflammation and/or infection	Non-pregnant women 15-49 y	ELISA ^b -Alpha-1-acid glycoprotein (AGP) -C-reactive protein (CRP)
	Pregnant women 15-49 y	
	Adolescent girls 10-19 y	
	Adolescent boys 10-19 y	
	Children 6-59 months	
Malaria	Non-pregnant women 15-49 y	Malaria rapid diagnostic test kit -Differential diagnosis of <i>P. falciparum</i> + <i>P. vivax</i>
	Pregnant women 15-49 y	
	Adolescent girls 10-19 y	
	Adolescent boys 10-19 y	
	Children 6-59 months	
Blood disorders	Non-pregnant women 15-49 y	HPLC, DNA analysis, PCR, CBC -α-thalassemia -β-thalassemia -sickle cell, -hemoglobin E, -glucose-6-phosphate dehydrogenase deficiency (G6PD)
	Children 6-59 months	

Biological indicator	Population	Method & Test
Soil transmitted helminth infections	Non-pregnant women 15-49 y	Microscopic examination Kato katz /stool - <i>Ascaris</i> spp. - <i>Trichuris</i> spp. -hookworm spp
	Children 6-59 months	
<i>Helicobacter pylori</i>	Non-pregnant women 15-49 y	Immunoassay (stool)
	Children 6-59 months	- <i>H. pylori</i>
	Adolescent girls 10-19 y	<i>H. pylori</i> rapid test kit
	Adolescent boys 10-19 y	<i>H. pylori</i> rapid test kit
Visceral Leishmaniasis	Non-pregnant women 15-49 y	<i>Leishmania donovani</i> antibody detection using the rK39 antigen
	Children 6-59 months	
Anthropometry	Non-pregnant women 15-49 y	Short length/height board & electronic scale -Height & weight
	Pregnant women 15-49 y ^d	
	Adolescent girls 10-19 y	
	Adolescent boys 10-19 y	
	Children 6-59 months	

6.4 Sampling techniques in health surveys

NNMSS is a national level program involving 73 districts throughout Nepal. On arrival in each district, the field team went through multiple sequential steps to ensure every household has equal opportunity to be included in sample.

These steps involve listing and mapping of all households in cluster. If the total number of households in a cluster is more than 300; clusters were further divided into segments. Segments are divided based on local landmarks keeping in mind accessibility to various segments making sure there are at least 100 households in each segment. A rough map of different segments with local boundaries was made.

The total number of households in the segment was divided by 24 households to get an interval. A random number was selected between 1 and the interval and this number marks the starting household of the cluster. Additional 23 households are then selected at successive intervals.

Census focusing on the target group in the selected household is then carried out followed by random selection from each target group based upon handpicked lottery number. All this process is documented on various forms shown in the appendix.

Table 2: Total expected sample sizes in each cluster

Target Group	Expected sample size per cluster
Household	24
Non-prégnant Women 15-49 y ^d	12
Adolescent girls 10-19 y	12
Adolescent boys 10-19 y	6
Children 6-9 y	7
Children 6-59 months	12

6.5 Monitoring Supervision and Quality control

During the survey data collection, questionnaires, and biological and food specimens were collected and reviewed by the supervisor and laboratory coordinator before leaving the cluster. Any errors in completing the questionnaires were corrected in the field. All questionnaires were reviewed for consistency and completeness by the supervisor in the evening. Cluster control forms were used to monitor households sampled, questionnaires, cold chain, and custody of biological and food specimens.

Three levels of control run on HemoCue machines every day ensuring quality control of hemoglobin results. Strict maintenance of cold box temperature during collection and freezer temperature during storage and shipment ensured viability of biological specimen collected. All tests for markers of infectious diseases are carried on standardized kits.

6.6 Management /Leadership and Training

Field work in NMMS survey are carried out by 180 field workers consisting of laboratory coordinators, lab assistants, phlebotomist , staff nurses and enumerators.

These 180 field workers were divided into 14 teams. Each team was headed by team supervisor who was the designated leader of that team.

Supervisor was responsible for setting up coordination meetings at district and cluster, distributing questionnaires, mobilizing enumerators and building rapport with the cluster. He is also responsible for field level check of the questionnaires. The supervisor was also responsible for logistic management for the survey, transport management, lodging and fooding. The supervisor acted as a link relaying concerns and suggestions between field staff and the supervision team.

Laboratory coordinators distribute lab supplies to the phlebotomists and supervise cold chain maintenance at household and districts.

Laboratory assistants were involved in specimen processing and storage at temporary laboratories in the cluster.

Phlebotomists collect the required blood urine and stool samples and perform tests for malaria, kalazar, hemoglobin level and H. Pylori at the household level.

Enumerators carried out the household interview and anthropometry measurements along with collecting wheat and salt samples from the household.

All the field staff was given extensive training prior to actual field work by laboratory experts from Center of Disease control (CDC).

7. Challenges

1. The biggest challenge for the NMMS survey was communication of the objective to the community. Since the survey often requires venous blood collection from multiple respondents of various target groups in same household effective communication of objectives in district and cluster control meeting were paramount in obtaining Oral and written informed consent prior to data collection. Despite all efforts of the field team there were occasions where the respondent refused to provide specimen.
2. Logistic management was a huge challenge. Items for collection of specimen, apparatus for processing at field, test kits, Quality control reagents, temporary freezers, ice packs, cold boxes, vials for storage were major components of logistics. Besides the lab equipments, incentives for participation which included various items, food samples, weight machine and height board contributed to huge amount of logistics. Calculation of the required amount and equal distribution of the same to the various teams was a challenge in itself. Field team showed immense patience in carrying these items through difficult terrains of hilly and mountainous regions of Nepal.
3. Coordination between stakeholders in district, community, lab technicians, and enumerators was critical to meeting the schedule given in Kathmandu prior to field visit. Challenges in coordination involved lack of mobile networks, non-motor able roads, varying languages at different regions.
4. Cold chain management was another huge challenge in the entire survey. It is of paramount importance all sample once collected in household be stored at correct temperature in cold box, portable freezers, freezers at district labs and central lab in Kathmandu at specified temperatures. The problem is affected by lack of electricity at all times and lack of fuel to run portable generators.

5. Lack of confidence in previous government programs: Poor performance of previous government programs and lack of infrastructure in local health facility have resulted in a general feeling ranging from indifference to ignorance to health related programs which often requires a lot of patience in communicating the usefulness of the survey to the community.

8. Strategies to meet challenges

1. Program on radio at local FM, regional, district and cluster meetings, oral communication of contents of consent, letters from Ministry of Health and New ERA are being used to convey the objectives of the program to the community. Mobilization of FCHV, personnel in health and Education related field from the community sometimes motivate the target population in selected household to provide biological samples. All these strategies utilize available human resource at the community thus incur very less cost and since the community leaders themselves communicate the objectives at households the cultural and language barriers seldom affect the process of communication.
2. Coordination between logistic department of UNICEF, Nepal, New ERA Nepal, CDC, Atlanta, USA was pivotal manage the logistics before field work. Transport of Logistics to field is by road on different vehicles that accompany different teams. Porters will be used to carry logistics in remote areas of hills and mountains. Airplanes will transport to regions inaccessible through roads. The survey is thankful to all the field workers who have shown immense character often carrying heavy utensils in extreme climatic conditions.
3. Cold chain management is critical to success of the survey. Five cold boxes, ice packs, digital thermometers, two portable freezers, freezers available at district public health offices,

portable generators runners (people that transport blood samples from cluster to Kathmandu at the end of each cluster) all are part of cold chain management.

8.1 Procedure ensuring cold chain management

- a. Before field each day the phlebotomists store the cold box with six solid frozen ice packs, bubble wraps, cryovial boxes and digital thermometers. The temperature in cold box is maintained at 2°C-8°C through day. Melting ice packs are replaced whenever temperature exceeds 6°C.
- b. Processed specimens are aliquoted in cryovials at temporary labs set at cluster are stored between -2°C to -18°C in portable freezers at District public health office. Portable freezers have inbuilt temperature display.
- c. Runners transport fresh blood samples for analyzing qualitative and quantitative disorders of hemoglobin within 4 days in cold box to NPHL and a private laboratory in Kathmandu.
- d. Time and temperature for collection, storage and transport temperature are noted clearly in different laboratory form.
- e. Portable generators provide backup power when electricity is absent.
- f. All the equipments are checked for proper functioning and repaired when required in places near to cluster where such facilities of repair are present.

9. Practical problems in Implementation

The data collection process for the NNMSS will end on June 15. In general the field workers have experienced following problems during implementation.

- a. **Communication of sampling techniques:** At the end of every district/cluster coordination meetings the participants were curious about the sampling techniques. There were questions related to cluster selection, segmentation within cluster. At household level, the head of household was confused about how his/her house was selected as participant for survey while some other house in the same locality was not selected. Response to being selected ranged from missed opportunity (in some households that were not selected) to indifference (in some households that were selected). Randomization in sampling meant that some communities within cluster where the problem malnutrition was more severe were often missed resulting in problem in communicating the objectives of the survey amongst the people.
- b. **Mapping:** The NNMSS, during the process of planning, envisioned a digitalized mapping of all the household within 73 districts however at field listing of household was done on basis of information provided by municipality, VDC on number of households. Manual mapping which followed listing was not only tedious but also prone to error.
- c. **Low number of respondents in different target groups:** There was a mismatch between the expected and final number of respondents within each of the different target groups. In some clusters, there were no pregnant women between 15-49 years. This was a problem inherent in sampling with no provision for replacement except for a mismatch in age between listing and sampling.
- d. **Change in divisions of local governance:** In some cases VDCs have become municipalities while in others the wards have been renumbered which created confusion in identifying intended clusters.
- e. **Cultural and socioeconomic factors issues:** Cultural and socioeconomic factors influences not only biological specimen collection but also in providing consent of interviews. Most of the

household had a male that had migrated to other countries for better opportunities in such cases getting consent for interviews were difficult.

Stool collection, especially from non-pregnant women, was hampered by general feeling ranging from shyness to disgust especially when the stool was being collected from a male specimen collector.

10. Reflections:

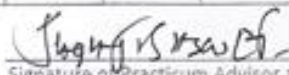
As a fulfillment of Practicum, survey was unique in that it provided me opportunities to gain experience in different aspects of public health management. Starting from training of the field staff, developing research instruments, communicating objectives to different stakeholders, knowledge on sampling at household level, micromanagement of staff and logistics at field level, ensuring quality control during process of data and biological specimen collection and supervising field work.

11. Appendix

Appendix I. Attendance

NEW ERA PVT. LTD, KALOPUL, KATHMANDU, NEPAL						
Attendance record of Dr. Sudhamsu Koirala DUTY HOURS 8hrs /day						
POST: Laboratory supervisor IYCF/NMMS PROJECT No. 870						
DATE	DAY	Holidays	Signature			
10-Jan	SUNDAY					
11-Jan	MONDAY					
12-Jan	TUESDAY					
13-Jan	WEDNESDAY					
14-Jan	THURSDAY					
15-Jan	FRIDAY	Marg SAKRANTI				
16-Jan	SATURDAY					
17-Jan	SUNDAY					
18-Jan	MONDAY					
19-Jan	TUESDAY					
20-Jan	WEDNESDAY					
21-Jan	THURSDAY					
22-Jan	FRIDAY					
23-Jan	SATURDAY					
24-Jan	SUNDAY	4th SUNDAY				
25-Jan	MONDAY					
26-Jan	TUESDAY					
27-Jan	WEDNESDAY					
28-Jan	THURSDAY					
29-Jan	FRIDAY					
30-Jan	SATURDAY					
31-Jan	SUNDAY					
1-Feb	MONDAY					
2-Feb	TUESDAY					
3-Feb	WEDNESDAY					
4-Feb	THURSDAY					
5-Feb	FRIDAY					
6-Feb	SATURDAY					
7-Feb	SUNDAY					
8-Feb	MONDAY					
9-Feb	TUESDAY	SAHID DIWAS				
10-Feb	WEDNESDAY					
11-Feb	THURSDAY					
12-Feb	FRIDAY					
13-Feb	SATURDAY					
14-Feb	SUNDAY	2ND SUNDAY				
15-Feb	MONDAY					
16-Feb	TUESDAY					
17-Feb	WEDNESDAY					
18-Feb	THURSDAY					
19-Feb	FRIDAY	Democracy DAY				
20-Feb	SATURDAY					
21-Feb	SUNDAY					
22-Feb	MONDAY					
23-Feb	TUESDAY					
24-Feb	WEDNESDAY					
25-Feb	THURSDAY					
26-Feb	FRIDAY					
27-Feb	SATURDAY					
28-Feb	SUNDAY	4TH SUNDAY				
29-Feb	MONDAY					

1-Mar	TUESDAY	18						
2-Mar	WEDNESDAY	19						
3-Mar	THURSDAY	20						
4-Mar	FRIDAY	21						
5-Mar	SATURDAY							
6-Mar	SUNDAY	22						
7-Mar	MONDAY	MAHA SHIVARATRI						
8-Mar	TUESDAY	WOMENS DAY						
9-Mar	WEDNESDAY	GYALMO LHOSAR						
10-Mar	THURSDAY	23						
11-Mar	FRIDAY	24						
12-Mar	SATURDAY							
13-Mar	SUNDAY	2ND SUNDAY						
14-Mar	MONDAY	25						
15-Mar	TUESDAY	26						
16-Mar	WEDNESDAY	27						
17-Mar	THURSDAY	28						
18-Mar	FRIDAY	29						
19-Mar	SATURDAY							
20-Mar	SUNDAY	30						
21-Mar	MONDAY	31						
22-Mar	TUESDAY	FALGU PURNIMA						
23-Mar	WEDNESDAY	1						
24-Mar	THURSDAY	2						
25-Mar	FRIDAY	3						
26-Mar	SATURDAY							
27-Mar	SUNDAY	4th SUNDAY						
28-Mar	MONDAY	4						
29-Mar	TUESDAY	5						
30-Mar	WEDNESDAY	6						
31-Mar	THURSDAY	7						
1-Apr	FRIDAY	8						
2-Apr	SATURDAY							
3-Apr	SUNDAY	9						
4-Apr	MONDAY	10						
5-Apr	TUESDAY	11						
6-Apr	WEDNESDAY	12						
7-Apr	THURSDAY	GHODE JATRA						
8-Apr	FRIDAY	13						
9-Apr	SATURDAY	14						
10-Apr	SUNDAY	2ND SUNDAY						
11-Apr	MONDAY	15						



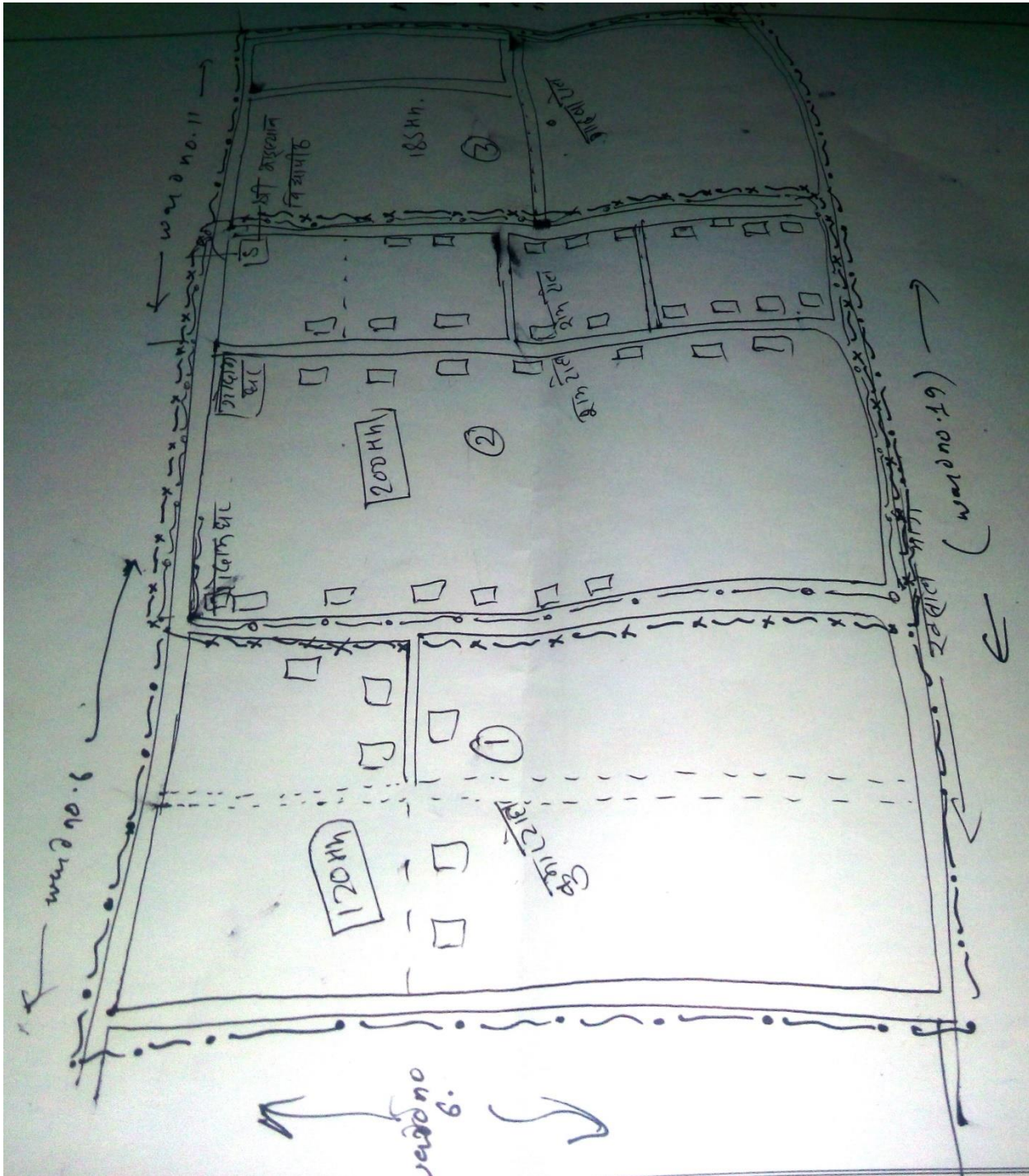
Signature of Practicum Advisor at NEW ERA

Name: Mr. Jagat Basnet

Post : Executive Director (NEW ERA)

Appendix II. Sampling forms

A) Mapping of cluster



B) Cluster segmentation form

संस्था राष्ट्रिय प्रथम योजनात्मक विवरण - २०७३/७४
सङ्घ विभाजनका लागि आवश्यक फारम

संस्था/सङ्घको नाम: सिन्धुवन
संस्था/सङ्घको ठेगाना: चुस्तपुर नं. १
संस्था/सङ्घको प्रकार: ग्रामिण

संस्था/सङ्घको कोड: ११६

संस्था/सङ्घको नाम	संस्था/सङ्घको कोड	संस्था/सङ्घको प्रकार
सिन्धुवन	११६	ग्रामिण

संस्था/सङ्घको नाम	संस्था/सङ्घको कोड	संस्था/सङ्घको प्रकार
सिन्धुवन	११६	ग्रामिण

संस्था/सङ्घको नाम	संस्था/सङ्घको कोड	संस्था/सङ्घको प्रकार
सिन्धुवन	११६	ग्रामिण

C) Household census form

संस्था राष्ट्रिय प्रथम योजनात्मक विवरण - २०७३/७४
सङ्घ विभाजनका लागि आवश्यक फारम

संस्था/सङ्घको नाम: सिन्धुवन
संस्था/सङ्घको ठेगाना: चुस्तपुर नं. १
संस्था/सङ्घको प्रकार: ग्रामिण

संस्था/सङ्घको कोड: ११६

संस्था/सङ्घको नाम	संस्था/सङ्घको कोड	संस्था/सङ्घको प्रकार
सिन्धुवन	११६	ग्रामिण

संस्था/सङ्घको नाम	संस्था/सङ्घको कोड	संस्था/सङ्घको प्रकार
सिन्धुवन	११६	ग्रामिण

संस्था/सङ्घको नाम	संस्था/सङ्घको कोड	संस्था/सङ्घको प्रकार
सिन्धुवन	११६	ग्रामिण

D) Household sampling form

नेपाल राष्ट्रिय तृष्ण पोषण तन्त्र सर्वेक्षण- 2072/73
घरपरिवार सूचीकृत फारम

जिल्ला: पुर्वा गा.वि.स.: विमान्जन उपखण्ड/गण्डकी

वडा नं.: ०९ कन्स्टर नम्बर: १३२ जम्मा घरधुरी नम्बर: २००

घरधुरीको कस संख्या

घरधुरीको कस संख्या	घरधुरीको नाम	गाउँ/टोलको नाम	कन्स्टरमा रहेको घरधुरीको कस संख्या	शैथिल्य
१	पञ्चम पटेल			
२	मनमोहन श्रीवास्तव			
३	प्रतिभा शाह			
४	इन्दिरा मिश्राकोटी			
५	रिमा ओझा			
६	पञ्चम लाल शाह		१	
७	उपेन्द्र गुप्ता			
८	दिप लालकाजी मिश्रा			
९	दरिद्र शाह			
१०	नेत्रमाला शाह			
११	महेन्द्र शाह			
१२	फिरोज			
१३	दिपक चौधरी		२	
१४	गिरि चौधरी			
१५	रमण शिवालय			
१६	रञ्जना शिवालय			
१७	राजेश शिवालय			
१८	अनन्दाकाजी श्रीवास्तव			
१९	सुख शिवालय			
२०	सुप्रेम चौधरी			
२१	लाल काठ पटेल		३	
२२	नरेश कुमार अजयल			
२३	प्रमोद कुमार अजयल			
२४	प्रकाश " "			
२५	दिनेश " "			
२६	नरेश काठमिया			

E) Respondent's form

नेपाल राष्ट्रिय तृष्ण पोषण तन्त्र सर्वेक्षण- 2072/73
घरपरिवार सूचीकृत फारम

जिल्ला: पुर्वा गा.वि.स.: विमान्जन उपखण्ड/गण्डकी

वडा नं.: ०९ कन्स्टर नम्बर: १३२ जम्मा घरधुरी नम्बर: २००

घरधुरीको कस संख्या

घरधुरीको कस संख्या	घरधुरीको नाम	गाउँ/टोलको नाम	कन्स्टरमा रहेको घरधुरीको कस संख्या	शैथिल्य
१	पञ्चम पटेल			
२	मनमोहन श्रीवास्तव			
३	प्रतिभा शाह			
४	इन्दिरा मिश्राकोटी			
५	रिमा ओझा			
६	पञ्चम लाल शाह		१	
७	उपेन्द्र गुप्ता			
८	दिप लालकाजी मिश्रा			
९	दरिद्र शाह			
१०	नेत्रमाला शाह			
११	महेन्द्र शाह			
१२	फिरोज			
१३	दिपक चौधरी		२	
१४	गिरि चौधरी			
१५	रमण शिवालय			
१६	रञ्जना शिवालय			
१७	राजेश शिवालय			
१८	अनन्दाकाजी श्रीवास्तव			
१९	सुख शिवालय			
२०	सुप्रेम चौधरी			
२१	लाल काठ पटेल		३	
२२	नरेश कुमार अजयल			
२३	प्रमोद कुमार अजयल			
२४	प्रकाश " "			
२५	दिनेश " "			
२६	नरेश काठमिया			

Appendix III: Laboratory forms

A) Sample Processing form

SPECIMEN CONTROL FORM B- LABORATORY TECHNICIANS- NEPAL NATIONAL MICRONUTRIENT SURVEY 2016 SPECIMEN RECEIPT, PROCESSING, TEMPERATURE MONITORING, TRANSFER, AND BOX INVENTORY

Instructions for Laboratory Technicians:

- 1.) Place each participant's label in box below and mark specimen with "X" if specimen type was received from Staff Nurse.
- 2.) Obtain all remaining labels from Phlebotomist for processing (except the MRDR Purple Top label and some extra labels).
- 3.) Transfer stool specimens to the Pathologist.
- 4.) Place vacutainers/urines in the cold box until they are processed (NEVER PLACE UNPROCESSED SPECIMENS IN THE FREEZER).
- 5.) Mark box with an "X" after specimen has been processed. If specimen type is available, mark box with an "X".
- 6.) Place specimens in boxes according to specimen type. Box numbers will be assigned by an assigned Laboratory Technician. The Laboratory Technician for each district who will assign box numbers, should be assigned by the Survey Laboratory Coordinator.
- 7.) Record temperature of cold box/freezer each time the lid is opened.
- 8.) Be sure to only open lid of the cold box/freezer when placing specimens inside.
- 9.) Replace thawing gel packs with frozen gel packs inside the cold box when the temperature is -6°C .
- 10.) The temperature of the cold box should remain $<8^{\circ}\text{C}$ and the temperature of the freezer should remain between -5°C and -20°C .
- 11.) Transfer all BD purple top vacutainers to Kathmandu for further processing and transport (Do not process these vacutainers).

		Specimen Received		Processing Complete		Specimen Available		Box #
1		Blue Top		Blue Top		Serum Vial 1		
		Purple Top		Red Top		Serum Vial 2		
		Red Top		Purple Top		RBC Fol Vial 1		
		MRDR-Purple		MRDR		RBC Fol Vial 2		
		Urine Cup		Urine Cup		Plasma Vial		
		BD Purple Top				PCR Tube		
						MRDR Vial 1		
						MRDR Vial 2		
hh mm								
Time Received Vacutainers								
Cold Box Temperature								
Freezer Temperature								
Time Received Urine								
Cold Box Temperature								
Freezer Temperature								
Time Received MRDR								
Cold Box Temperature								
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Time Received MRDR								
Cold Box Temperature								

B) Sample processing form

SPECIMEN TRANSFER FORM- PHLEBOTOMISTS TO LAB TECHS- NEPAL NATIONAL MICRONUTRIENT SURVEY 2016														
**Phlebotomists complete all sections. Use this form to transfer specimens to Laboratory Technicians.														
GENERAL INFORMATION														
District:				Date										
					Day	Month	Year							
Team Number:														
Write participant ID or place an EXTRA label for all participants in blocks provided below and on next page														
					Blue Top		Purple Top		Red Top		MRDR Purple Top			
Total number of participant samples transferred														
					BD Purple Top		Urine Cup		Stool Cup					
Phlebotomist Name					Phlebotomist Signature									
Write Participant Number or Place Extra Label in Box					Specimen Type Transferred					Collection Time				
1.			Blue Top		hh		mm		hh		mm			
			Purple Top											
			Red Top		Venous Collection				MRDR Collection					
			BD Purple		hh		mm		hh		mm			
			MRDR-Purple											
			Urine Cup		Urine Collection				Stool Collection					
			Stool Cup											
2.			Blue Top		hh		mm		hh		mm			
			Purple Top											
			Red Top		Venous Collection				MRDR Collection					
			BD Purple		hh		mm		hh		mm			
			MRDR-Purple											
			Urine Cup		Urine Collection				Stool Collection					
			Stool Cup											
3.			Blue Top		hh		mm		hh		mm			
			Purple Top											
			Red Top		Venous Collection				MRDR Collection					
			BD Purple		hh		mm		hh		mm			
			MRDR-Purple											
			Urine Cup		Urine Collection				Stool Collection					
			Stool Cup											
4.			Blue Top		hh		mm		hh		mm			
			Purple Top											
			Red Top		Venous Collection				MRDR Collection					
			BD Purple		hh		mm		hh		mm			
			MRDR-Purple											
			Urine Cup		Urine Collection				Stool Collection					
			Stool Cup											
5.			Blue Top		hh		mm		hh		mm			
			Purple Top											
			Red Top		Venous Collection				MRDR Collection					
			BD Purple		hh		mm		hh		mm			
			MRDR-Purple											
			Urine Cup		Urine Collection				Stool Collection					
			Stool Cup											

C) Stool collection form

SPECIMEN CONTROL FORM C- PATHOLOGISTS- NEPAL NATIONAL MICRONUTRIENT SURVEY 2016									
**Pathologists complete all sections.									
GENERAL INFORMATION									
District:				Date	Day	Month	Year		
Team Number:									
Place labels for all participants on the next pages									
Total # of participant stool cups received and processed:				Stool Cup					
Pathologist Name				Pathologist Signature					
SPECIMEN RECEIPT, PROCESSING, TEMPERATURE MONITORING, TRANSFER, AND BOX INVENTORY									
Instructions for Pathologists:									
1.) Place each participant's label in box below and mark specimen with "X" if specimen type was received from Staff Nurse.									
2.) Obtain all remaining labels from Laboratory Technician for processing.									
3.) Stool specimens will be first transferred to the Laboratory Technician, who will then deliver the stool to the Pathologist.									
4.) Place stool cups in the cold box until they are processed (NEVER PLACE SPECIMENS IN THE FREEZER).									
5.) Mark box with an "X" after specimen has been processed. If specimen type is available, mark box with an "X".									
6.) Place labeled microscope slides in slide box after counting the eggs on each slide.									
7.) Record temperature of cold box/freezer each time the lid is opened.									
8.) Be sure to only open lid of the cold box/freezer when placing specimens inside.									
9.) Replace thawing gel packs with frozen gel packs inside the cold box when the temperature is ~6 °C.									
10.) The temperature of the cold box should remain <8 °C and the temperature of the freezer should remain between -5°C and -20°C									
11.) Read the number of eggs per slide per species									
12.) Calculate the Total # Eggs in 2 Slides divided by 2 x 20 eggs per gram (epg)									
13.) Transfer <u>all</u> Stool Vials to a cryovial box and place in the portable freezer.									
1	Specimen Received		Processing Complete		Specimen Available		Slide Box #		
	Stool Cup		Kato Katz		Kato Katz 1				
			Stool Vial 1		Kato Katz 2				
	hh mm Time Stool Received		Cold Box Temperature	°C		Freezer Temperature	°C		
Kato Katz Slide 1		Kato Katz Slide 2		Total # Eggs in 2 Slides/2 x 20 epg					
STH # Eggs		STH # Eggs		Eggs per Gram (epg)					
Ascaris lumbricoide _____		Ascaris lumbricoide: _____		Ascaris lumbricoide: _____					
Trichuris trichiura: _____		Trichuris trichiura: _____		Trichuris trichiura: _____					
Hookworms: _____		Hookworms: _____		Hookworms: _____					
Comments:									

Appendix IV: Photo Gallery

