Swiss TPH
Swiss Tropical and Public Health Institute
Schweizerisches Tropen- und Public Health-Institut
Institut Tropical et de Santé Publique Suisse

Associated Institute of the University of Basel

AVRDC
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Vegetables go to School Project

Integrated school garden, nutrition, water, sanitation and hygiene intervention for improving nutritional and health status of schoolchildren in Nepal

Presentation: Akina Shrestha

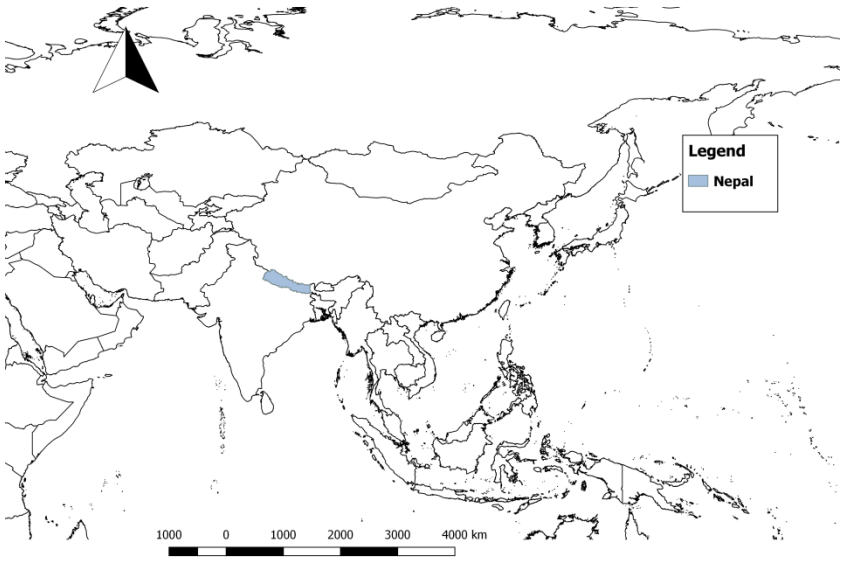
MPH, MA, Ph.D

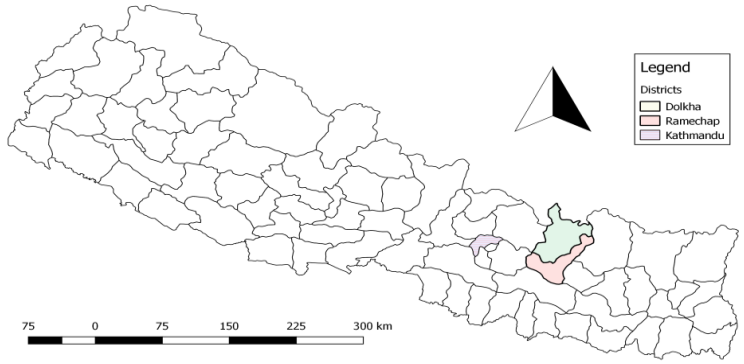
Agenda

- Rationale and Introduction
- Goals and Objectives
- Material and Methods
- Interventions
- Results (baseline and follow-up)
- Conclusion

Rationale and introduction..

- Children **dying** due to **diarrhoea** per year: 30,000 (3.3 episodes of diarrhoea per year)
- Malnutrition is the underlying cause of under five child mortality in Nepal (NDHS, 2016)
- 64% of school girls aged 14 years are anemic;
- 32% vitamin A deficiency;
- Yet, lack of implementation and evidence of the effect of nutrition-sensitive interventions incorporating agricultural, nutrition and WASH on children's nutritional and health status among schoolchildren in Nepal.





VgtS Project

Funded by the Swiss Agency for Development and Cooperation (SDC)

Vegetables go to School Project

AVRDC-World Vegetable Centre, Taiwan

University of Freiburg, Germany

Swiss Tropical and Public Health Institute, Switzerland

Countries: Burkina Faso, Nepal, Bhutan, Indonesia, Philippines

Determinants of child under-nutrition,
UNICEF 2013

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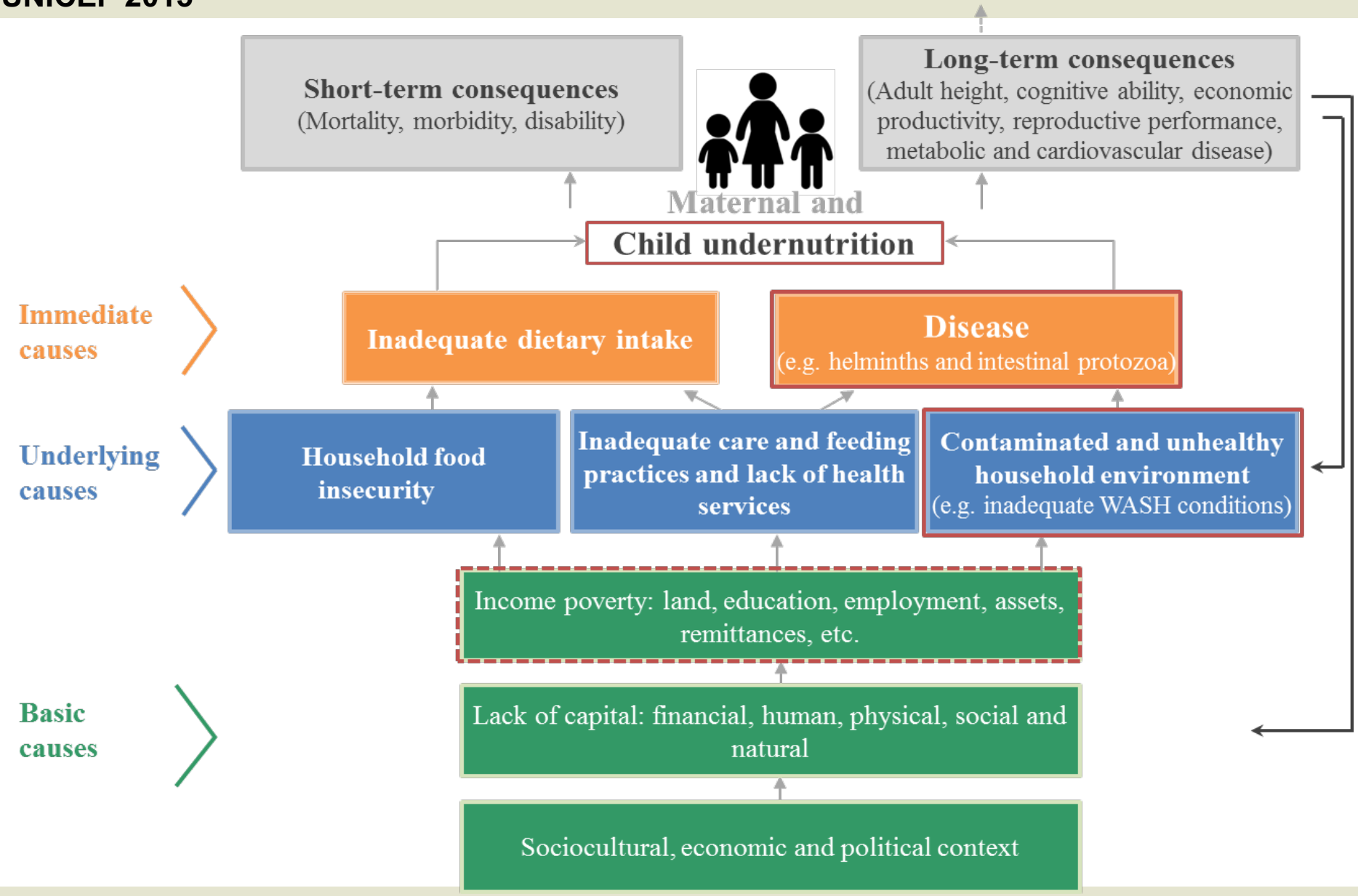
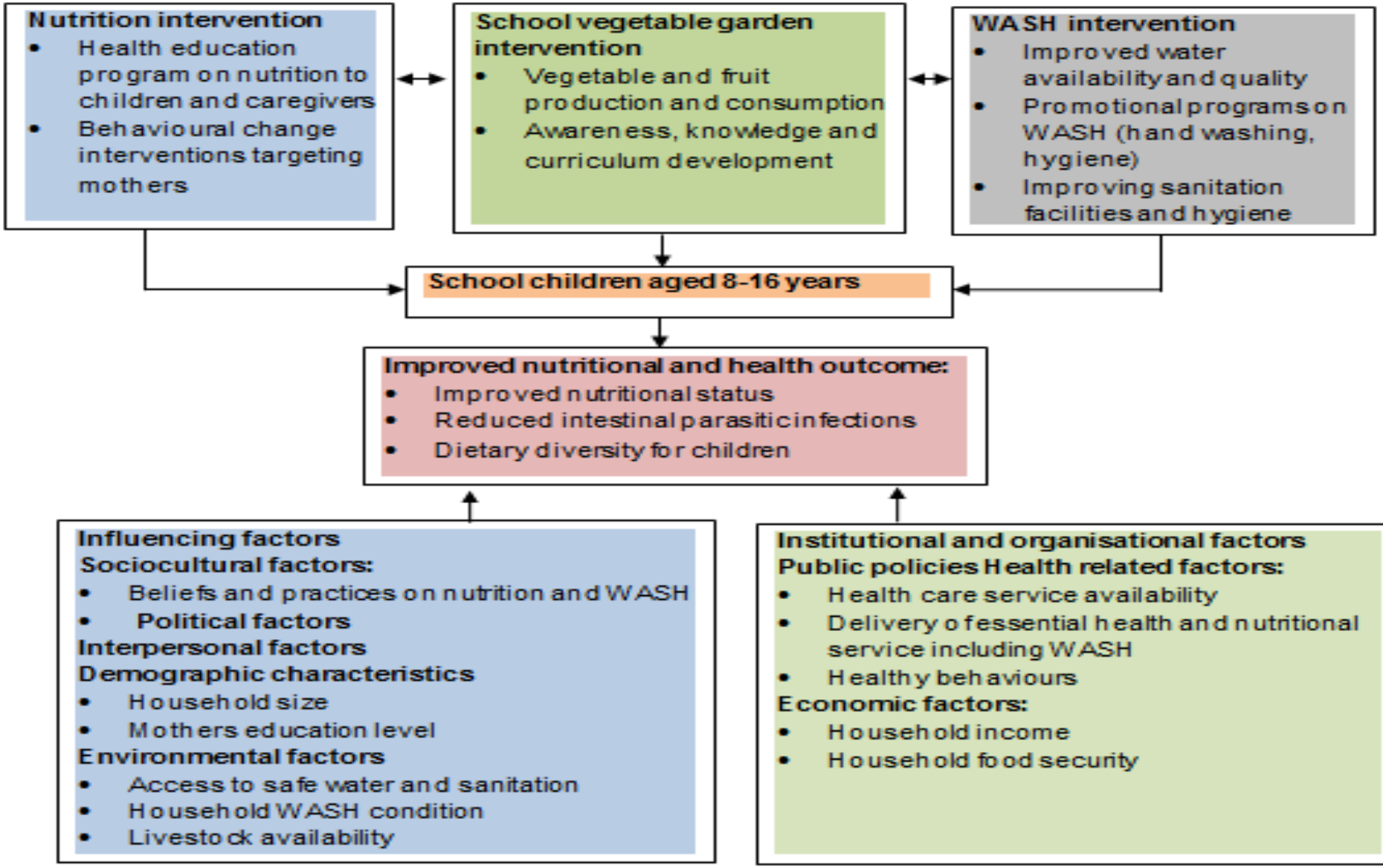


Conceptual Framework



Goal of the study

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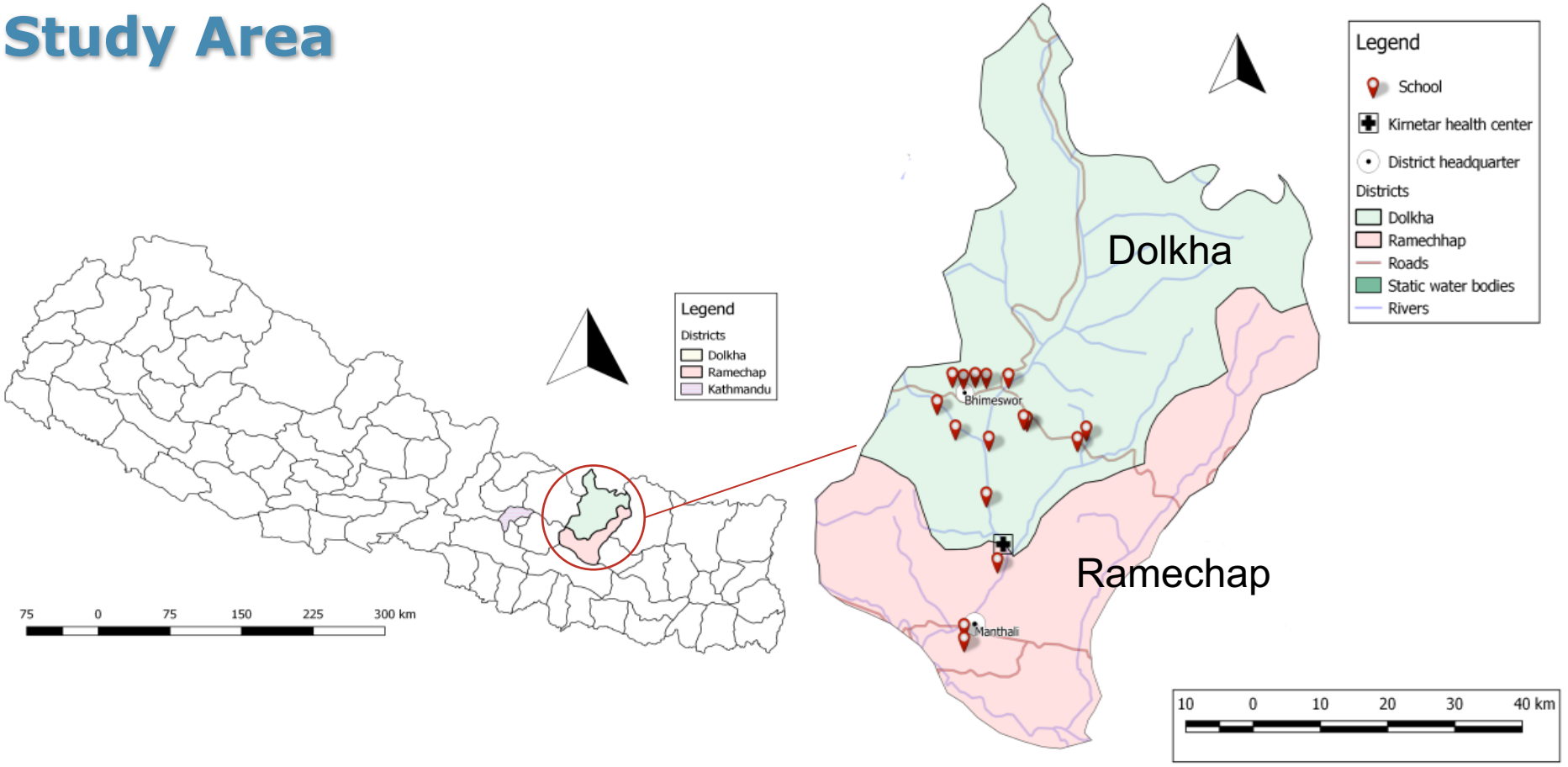
To evaluate the effect of complementary school gardens, nutrition and water, sanitation and hygiene interventions on nutritional and health status of schoolchildren in Dolakha and Ramechhap districts.

Materials and methods...

Study Area

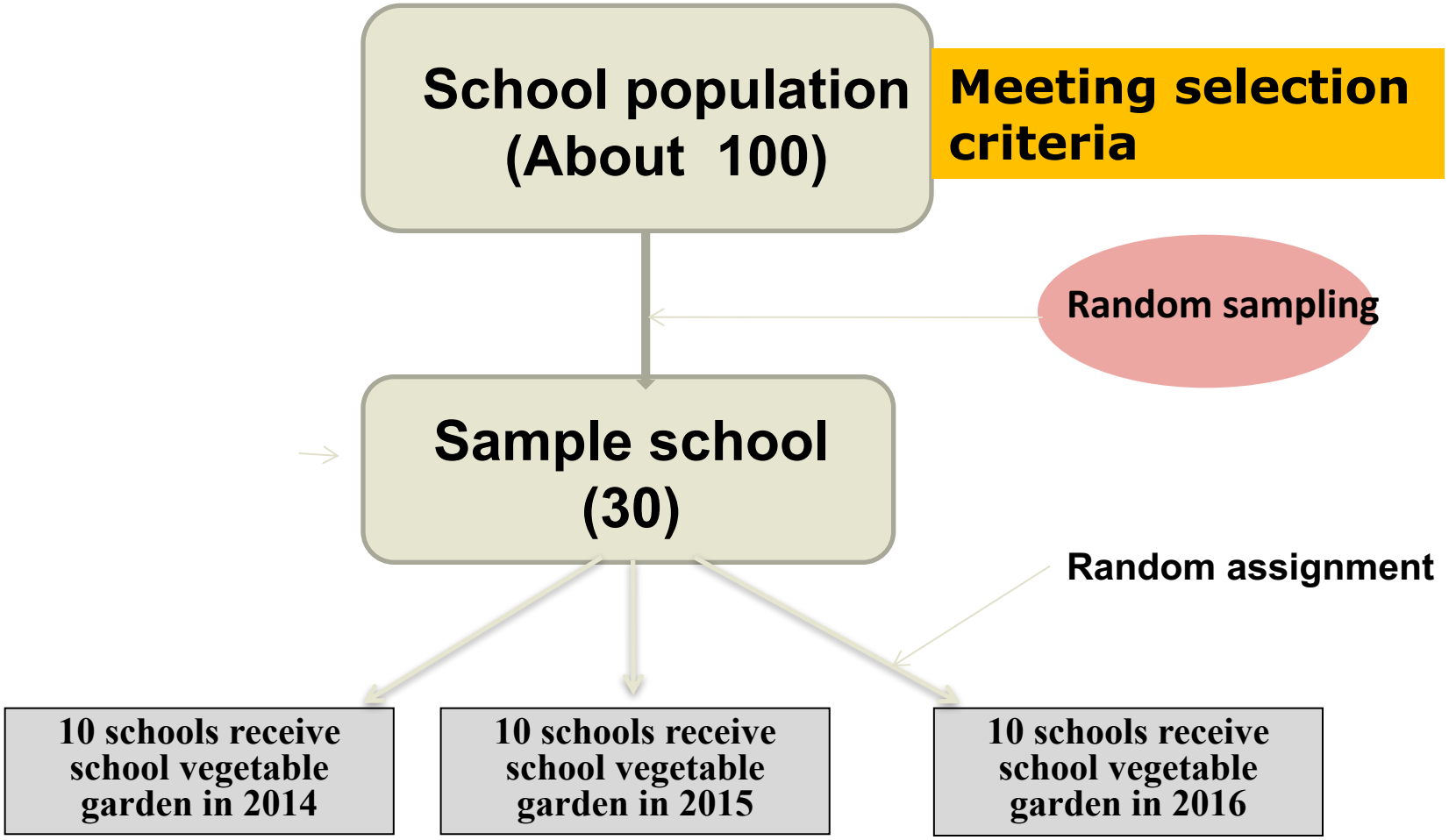


Baseline survey: March-May 2015

Follow-up: June 2016

Research design (a)

Randomized Controlled Trial (RCT)



Materials and methods…

Study design

2 districts (Dolakha and Ramechhap) 12 schools, district, Nepal

Assessment - Intervention - Assessment

Study arms	Number of schools	Number of children
School garden, nutrition and WASH intervention Group 1	4 schools	n=176
School garden programme (Group 2)	4 schools	n=176
No interventions (control)	4 schools	n=176
	12 schools	n=528

Timeline

Baseline Survey
March-May 2015

Integrated Intervention
New School Year 2015/2016

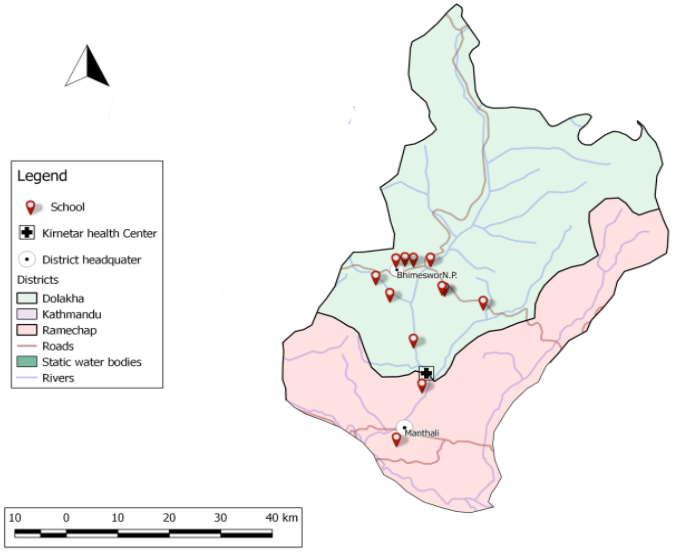
Follow-up Survey
June 2016

Materials and methods…

Sample size

Schools:

- **4** with **school garden** only **(SG)**;
- **4** with **school garden + nutrition+ WASH** intervention **(SG+WASH)**;
- **4 control (Control)**



Children:

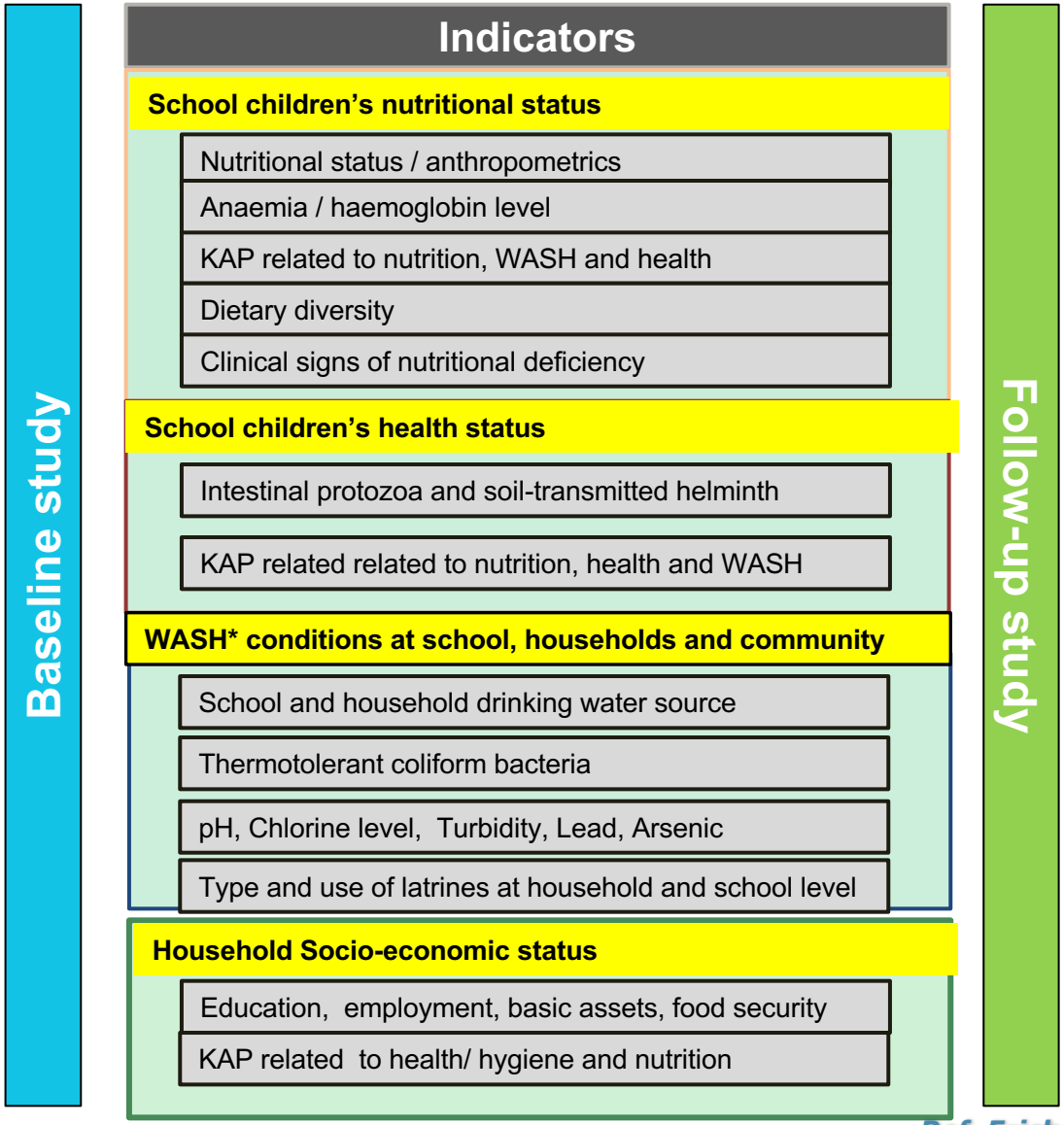
- **708 children (min 176 children and their respective households per school)**

Households:

- **562 households**

Materials and methods…

Indicator



Ref. Erishmann et. al.

Material & methods…

Study procedure

1. Mapping (Objective 1)
2. School and households observation (Objective 1)
3. Drinking water quality analysis (Objective 1)
4. Anthropometric measurements (Objective 2)
5. Haemoglobin examination (Objective 2)
6. Clinical examination (Objective 2)
7. Dietary diversity analyses (Objective 2)
8. Parasitological analyses (Objective 2)
9. Questionnaire survey/interview /Focus Group discussion and in-depth interviews (Objective 3)

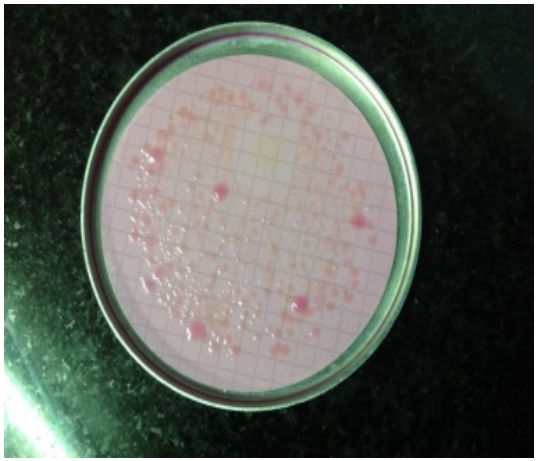
Material & methods….WASH

Swiss TPH

1. Drinking water quality survey

- **Community** : 43 water points
- **School** : 16 water points
- **Household** : 562 point-of-use

- ***DelAgua*** **field kit**
- **Flame atomic absorption method**



Material & methods….WASH

Swiss TPH

2. Water supplies assessment (observation)

e.g., storage device, water collection point

3. Sanitation facilities (observation)

e.g., type of latrine and sharing

4. Hygienic behaviour (observation and interview)

e.g., hand washing behaviour, availability of soap in the household for hand washing.

Material & methods...

Malnutrition and anaemia

1. **Anthropometric measurement**
   i.e., height and weight

2. **Haemoglobin measurement**
   i.e., using haemoque device

3. **Clinical examination**
   i.e. nutritional deficiency
   - Skin and eyes infections;
   - Wasted appearance;
   - Loss of hair pigment;
   - White foamy spotting cornea;
   - Oedema;
   - Angular stomatitis, pale conjunctiva;
   - Enlargement of liver;
   - Diarrhoea; and
   - Fever

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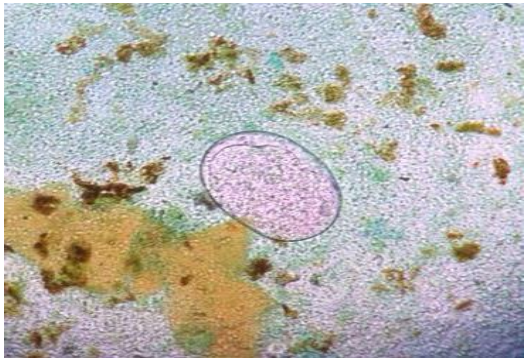
Dietary diversity and intestinal parasites

Dietary diversity

- 24-h recall
- Food frequency questionnaire

Intestinal parasite survey

- Kato-Katz technique
- Wet mount method
- Formal ether concentration method



Material & methods…

Knowledge, attitudes and practices

1. Questionnaire survey

School : schoolchildren, teachers
Household: caregivers
Community: District health/education officers community stakeholders

2. Focus group discussion

School: schoolchildren
Household: caregivers

3. In-depth interviews

School: teachers
Household: caregivers
Community: district health/education officer community stakeholders

Study protocol

STUDY PROTOCOL Open Access

Complementary school garden, nutrition, water, sanitation and hygiene interventions to improve children's nutrition and health status in Burkina Faso and Nepal: a study

BioMed Central

BMC Public Health

Jana Gerold[1,2], Ramona Herz[1,2], Yang[6], Jürg Utzinger[1,2]

STUDY PROTOCOL | OPEN ACCESS | OPEN PEER REVIEW

Complementary school garden, nutrition, water, sanitation and hygiene interventions to improve children's nutrition and health status in Burkina Faso and Nepal: a study protocol

Séverine Erismann, Akina Shrestha, Serge Diagbouga, Astrid Knoblauch, Jana Gerold, Ramona Herz, Subodh Sharma, Christian Schindler, Peter Odermatt, Axel Drescher, Ray-yu Yang, Jürg Utzinger and Guéladio Cissé

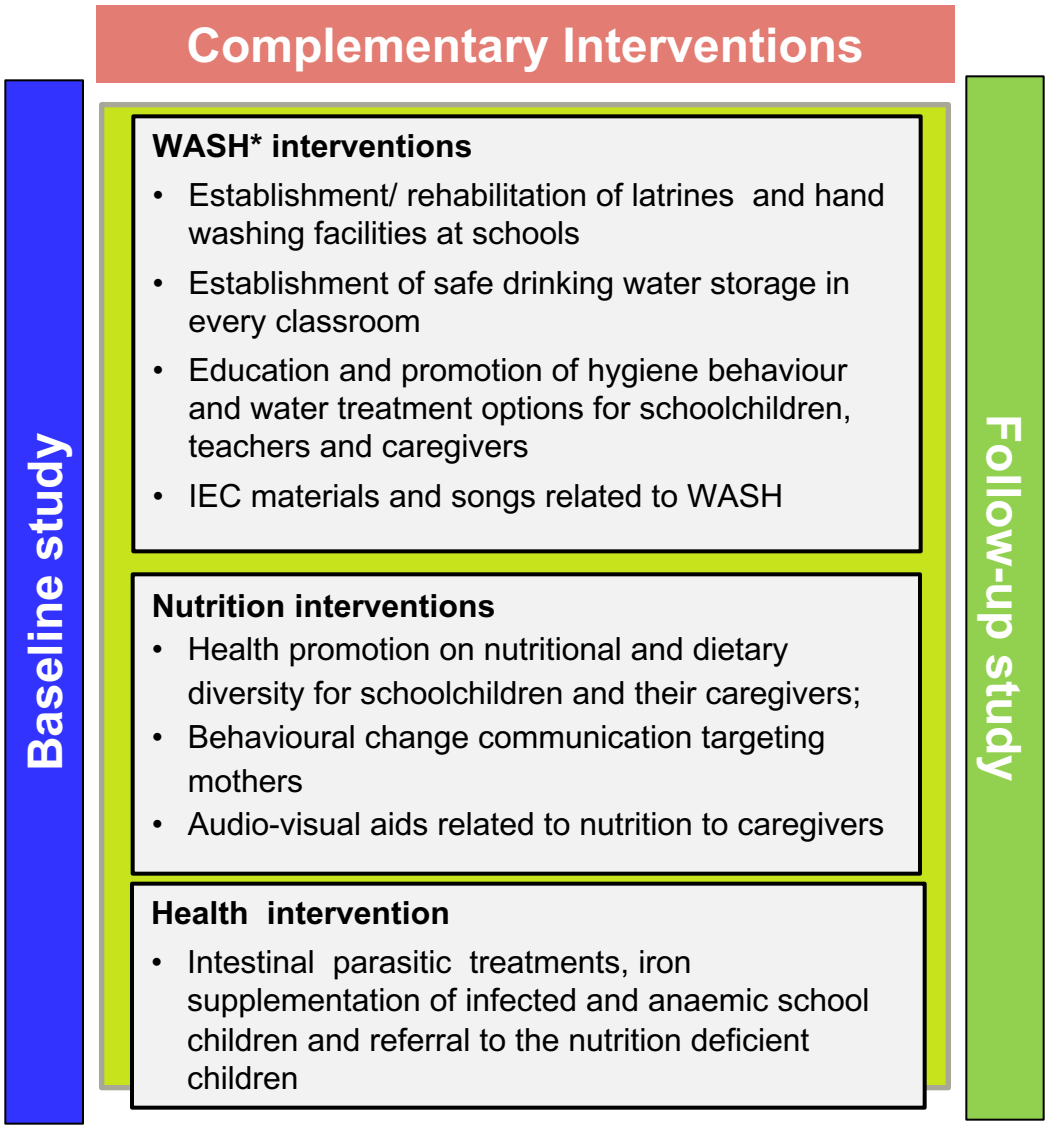
BMC Public Health BMC series – open, inclusive and trusted 2016 **16**:244 | **DOI:** 10.1186/s12889-016-2910-7

Received: 25 January 2016 | **Accepted:** 26 February 2016 | **Published:** 9 March 2016

Intervention 1: School garden

- **13 varieties** of vegetables seeds;
- **23 weeks curriculum**;
- **One week** implementation and refresher training on school garden for teachers;
- **Lecture and practical sessions each** week for children;
- **Seeds distribution for home garden**; and
- School garden project briefing to **caregivers**.

Intervention 2: Integrated intervention



Ref. Erishmann et. al.

Intervention 2: WASH

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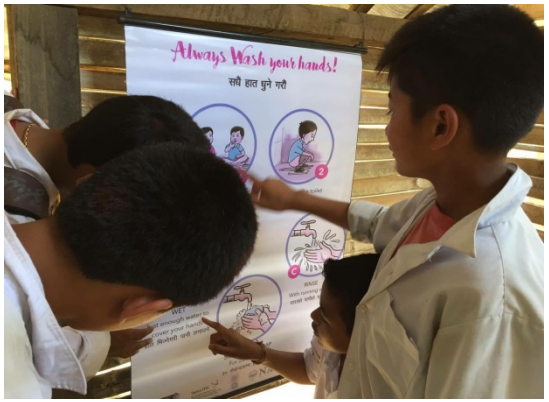
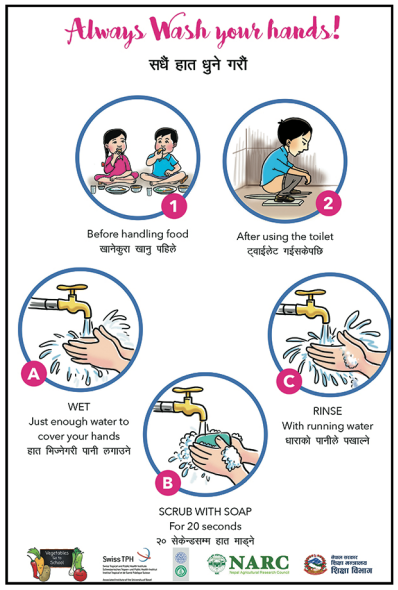
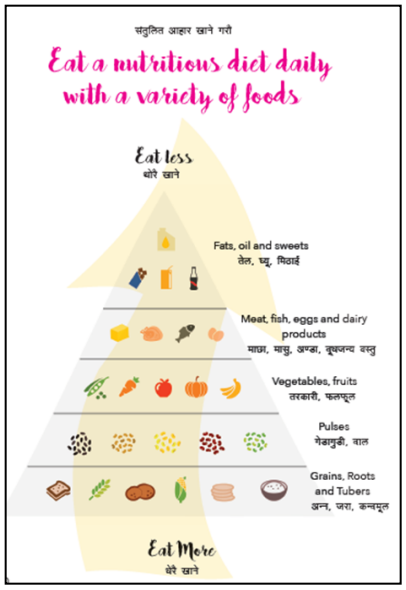
Intervention 3: Nutrition and Health







Baseline Result: WASH…

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1. Contamination with TTC:

- 75% at schools
- 40% in community
- 27% point-of-use at household

2. pH

- 6.8–7.6 (school, community and household)

3. Residual chlorine

- 0.1–0.5 mg/L (school, community and household)

4. Lead and Arsenic concentration

- 0.01 and 0.05 mg/L (school, community and households)

5. Domestic animals roaming inside **households significantly associated** with **drinking water contamination** (aOR 1.64; 95% CI: 1.08–2.50; *p* = 0.02).

Water, Sanitation and Hygiene (WASH)

Swiss TPH

http://www.mdpi.com/1660-4601/14/1/89

International Journal of *Environmental Research and Public Health*

Volume 14, Issue 1

Article Versions

- Abstract

Int. J. Environ. Res. Public Health **2017**, *14*(1), 89; doi:10.3390/ijerph14010089

Open Access | Article

Water Quality, Sanitation, and Hygiene Conditions in Schools and Households in Dolakha and Ramechhap Districts, Nepal: Results from A Cross-Sectional Survey

Akina Shrestha [1,2,3] ✉, **Subodh Sharma** [4] ✉, **Jana Gerold** [1,2] ✉, **Séverine Erismann** [1,2] ✉, **Sanjay Sagar** [1,2] ✉, **Rajendra Koju** [3] ✉, **Christian Schindler** [1,2] ✉, **Peter Odermatt** [1,2] ✉, **Jürg Utzinger** [1,2] ✉ and **Guéladio Cissé** [1,2,*] ✉

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Academic Editor: Sayed M. Hassan

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Baseline Result: malnutrition and anaemia

Swiss TPH

1. Malnutrition

- Stunting: 27%
- Wasting: 11%
- Nutritional deficiency: 55%

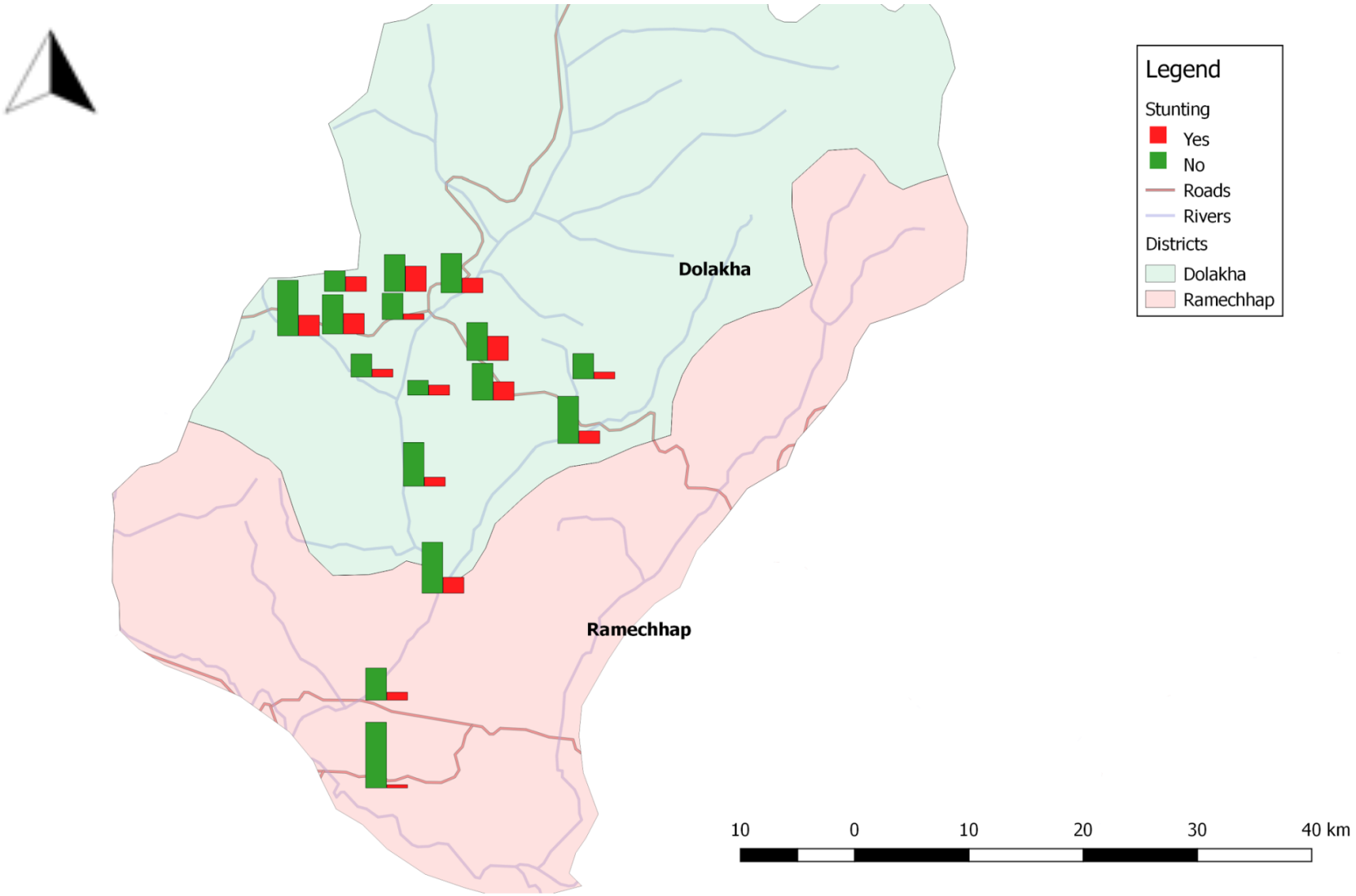
2. Anaemia

- Overall: 24%
- Severe: 16%
- Moderate: 61%

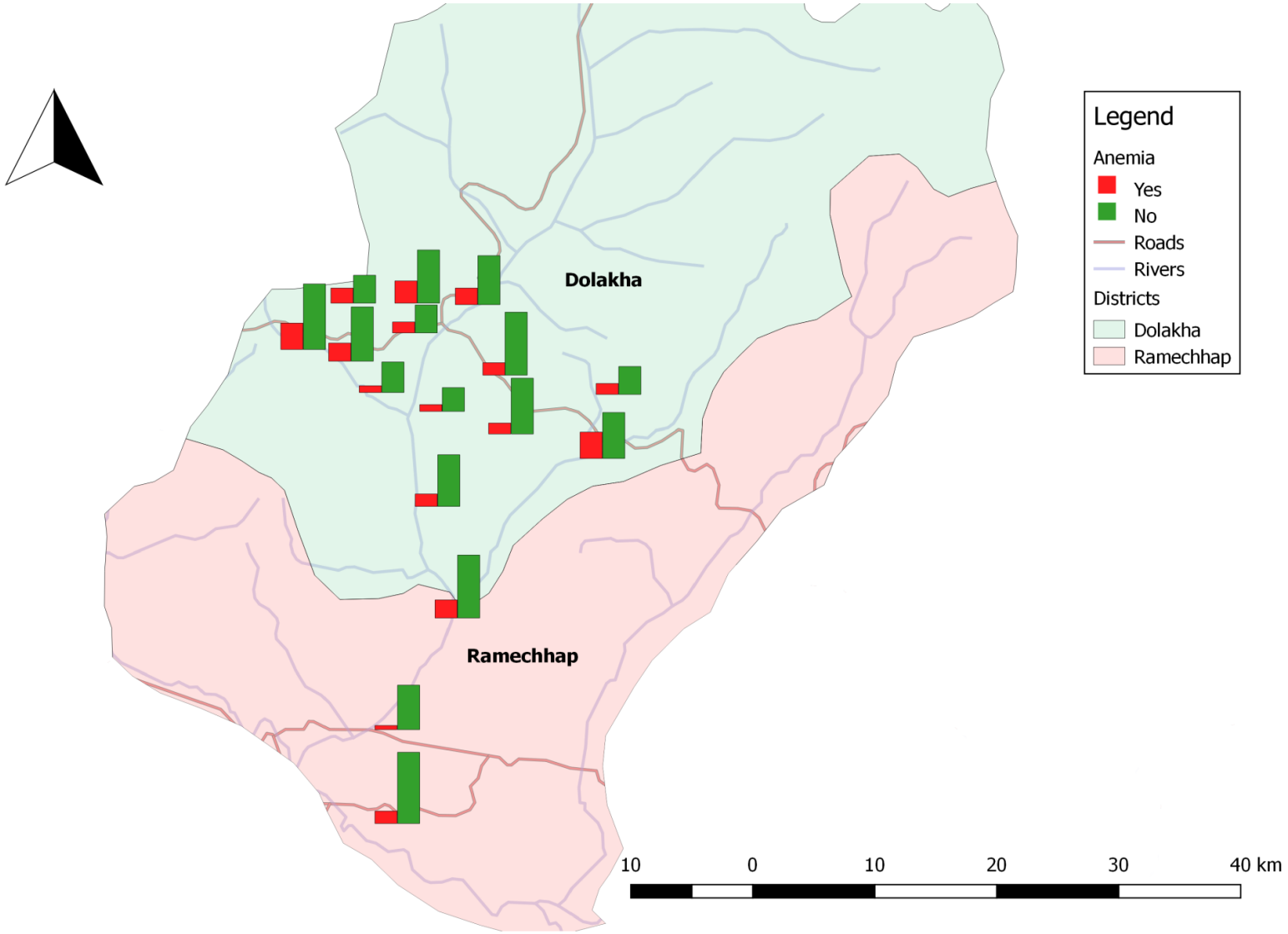
3. Underlying risk factors of anaemia:

- Lack of meals prepared (OR =2.36, 95% CI:1.14-4.92; *p*=0.01); and
- Not having supper (OR=3.46, 95% CI: 1.09-11.03; *p*=0.04).

Distribution of stunting in surveyed schools



Distribution of anaemia in the surveyed schools



Baseline Result: Diet diversity

24-h recall :

- Starchy staples: 60%
- Legumes : 59%;
- Animal products: 5%;
- DDS was ≤4 among the anaemic and stunted schoolchildren.

FFQ household:

- Diet comprised of starchy staples and legumes;
- Mean consumption of animal product was 1.1 times per week;
- Five dietary patterns score : cereals, vegetables, milk product, salty snacks, and processed food;
- Vegetables and lentils pattern score protective against stunting (aOR 0.84; 95% CI: 0.66-1.08, *p*=0.17).

Baseline Result: intestinal parasites

Swiss TPH

Intestinal parasite:

- Overall prevalence: 40%
- Predominant soil-transmitted helminth: *Trichuris trichiura* (31%)
- Predominant intestinal protozoa : *Giardia intestinalis* (31%)

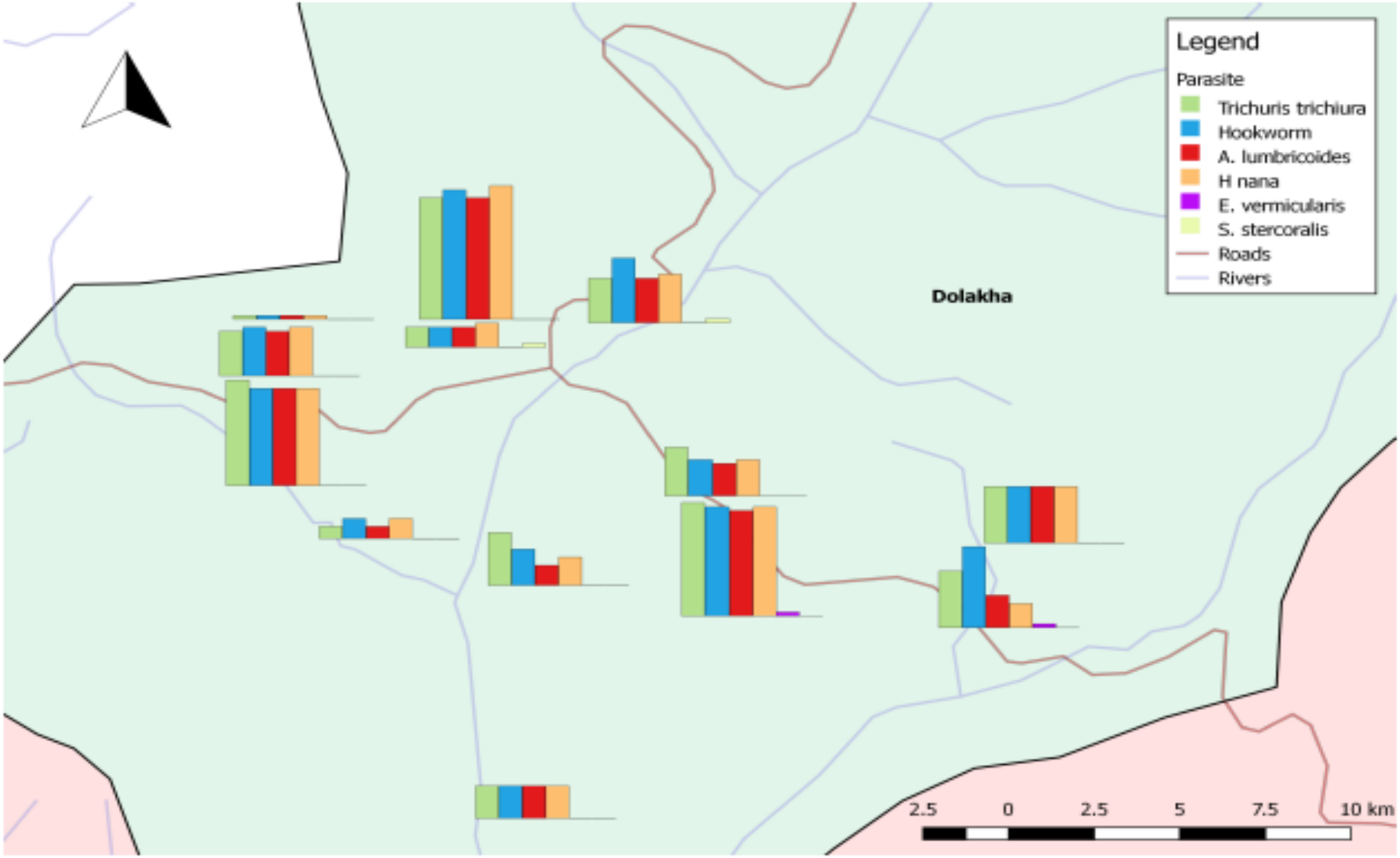
Underlying risk factors:

- Lack of soap for hand washing (aOR 1.81; 95% CI: 1.13-2.89; *p*=0.01);
- Households without freely roaming domestic animals (aOR 0.52; 95% CI: 0.33-0.83; *p*=0.01);

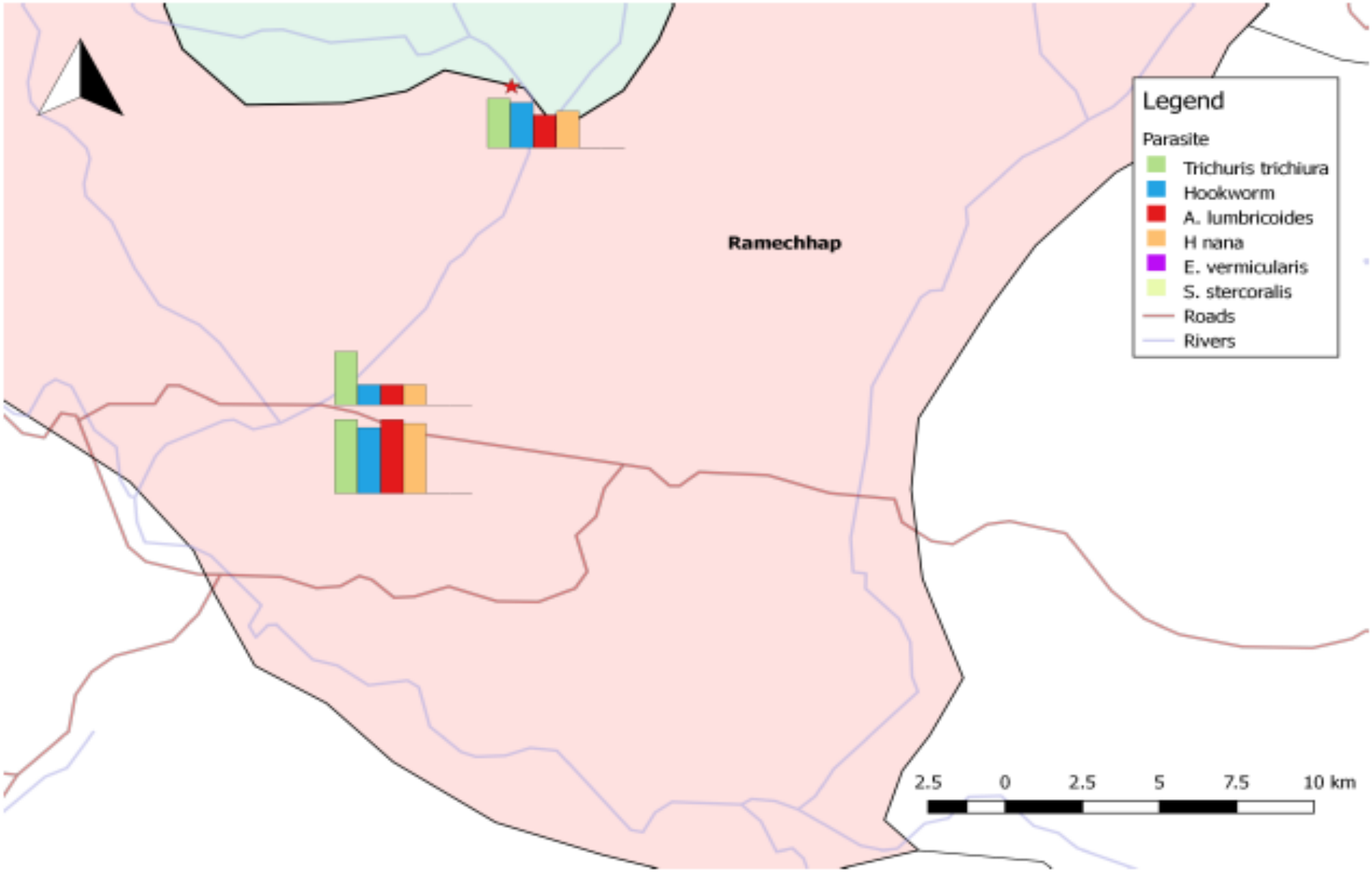
Morbidity:

- Fever: 31%
- Watery diarrhoea: 22%

Intestinal parasites in schools of Dolakha district



Intestinal parasite in Ramechhap district



Baseline Result: KAP

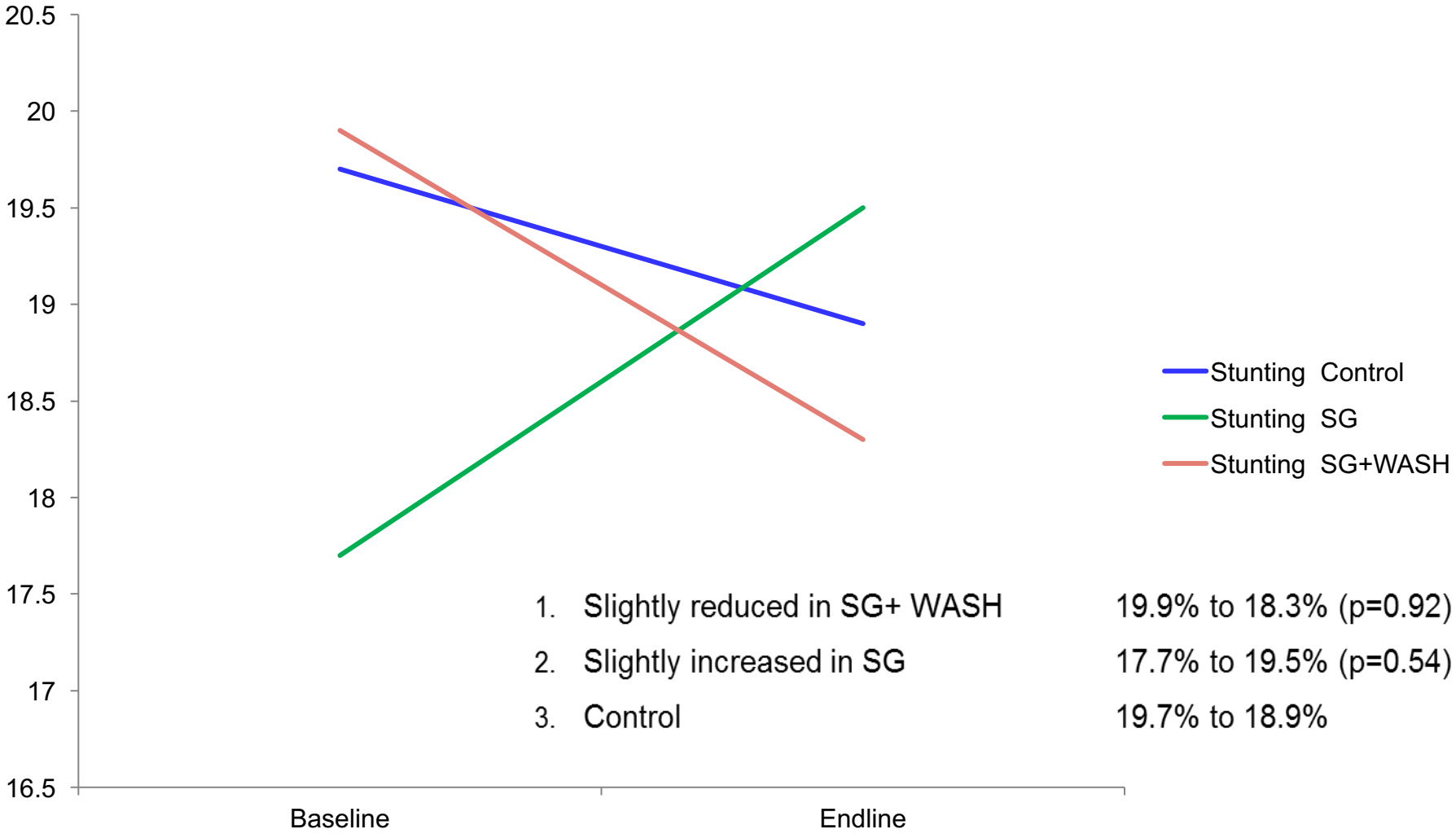
Schoolchildren:

- **Not washing hands** with soap before **eating and defecation**: 12% each
- Heard about **dirty water causing illness**: 90%
- Awareness about **water-borne diseases**/ mode of transmission : 3%
- Heard about **malnutrition**: 31%
- Awareness about lack of healthy food as a cause of malnutrition: 1%
- Misconception about **adequacy of two portions of vegetables** per day: 75%

Caregivers:

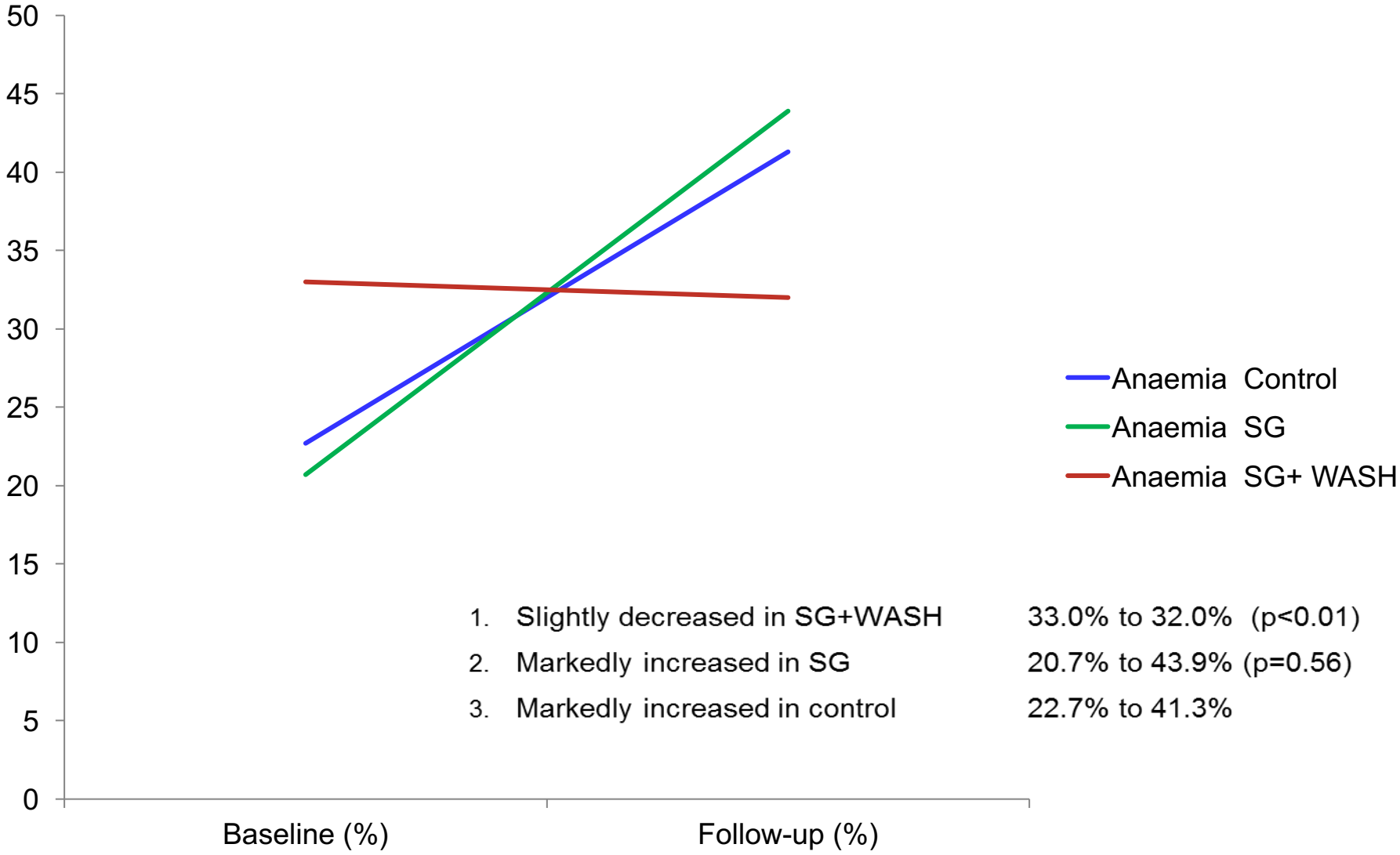
- Awareness of **malnutrition**: 28%
- Awareness of **anaemia**: 25%

Follow-up result : Stunting



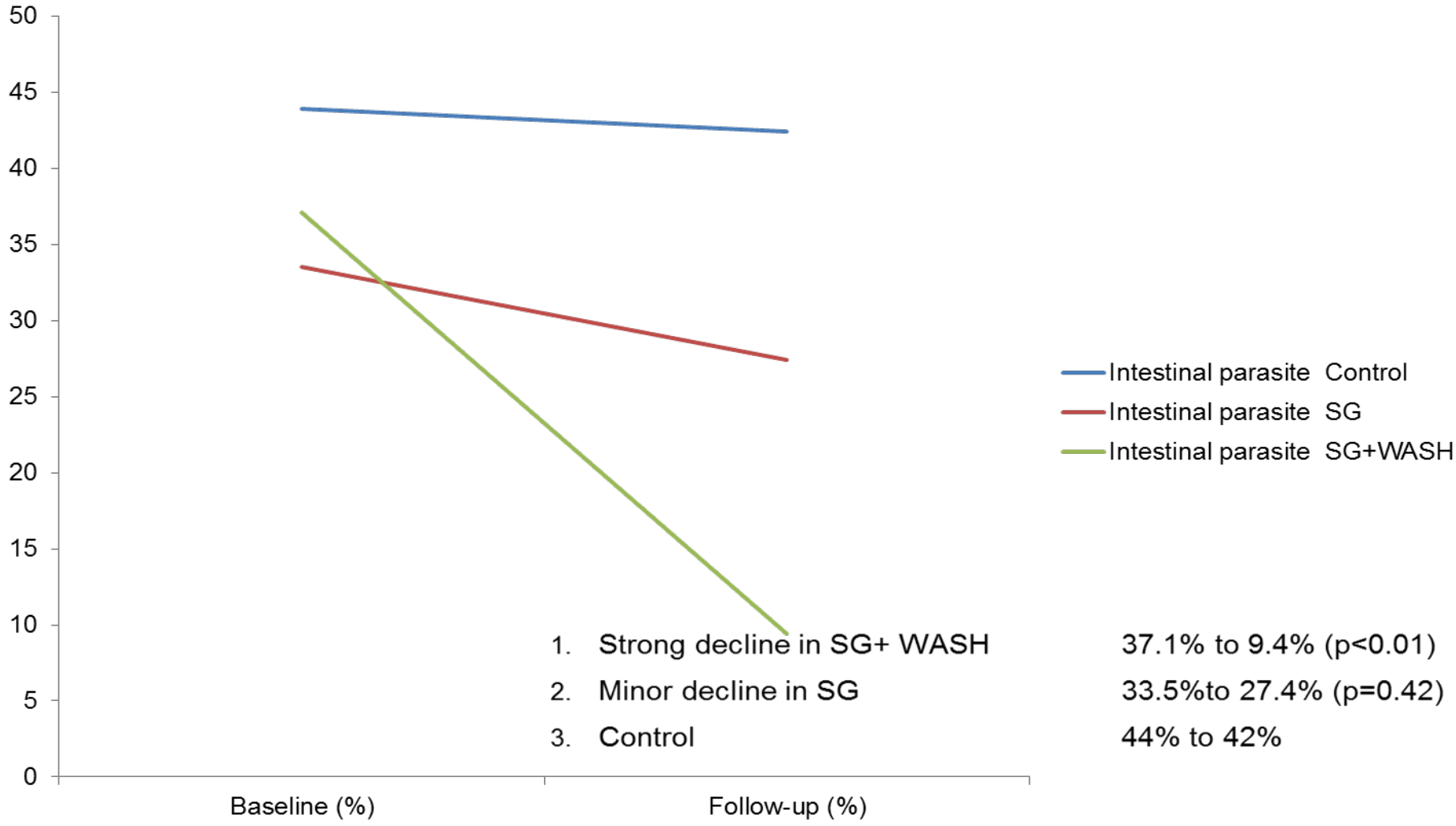
1. Slightly reduced in SG+ WASH 19.9% to 18.3% (p=0.92)
2. Slightly increased in SG 17.7% to 19.5% (p=0.54)
3. Control 19.7% to 18.9%

Follow-up result: Anaemia



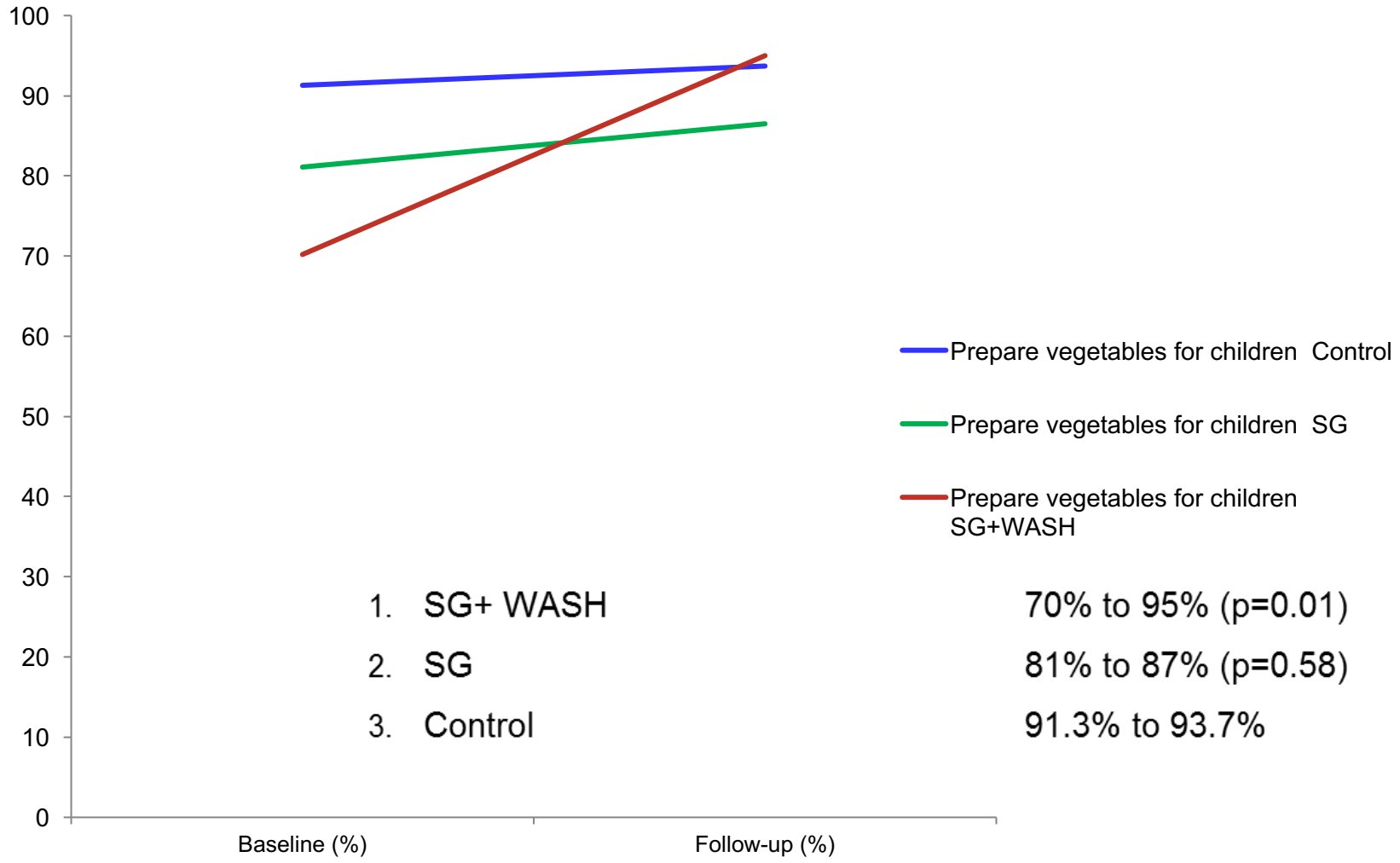
1. Slightly decreased in SG+WASH 33.0% to 32.0% (p<0.01)
2. Markedly increased in SG 20.7% to 43.9% (p=0.56)
3. Markedly increased in control 22.7% to 41.3%

Follow-up results : Intestinal parasite

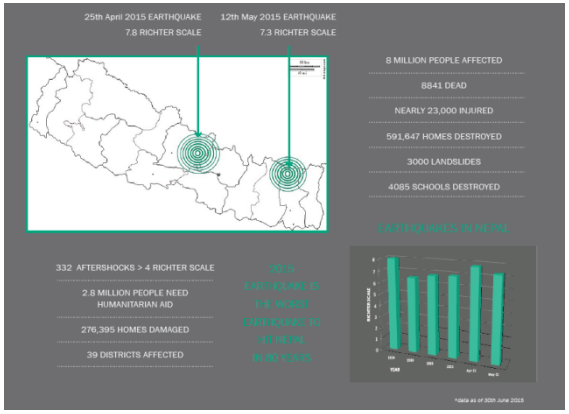


1. Strong decline in SG+ WASH — 37.1% to 9.4% (p<0.01)
2. Minor decline in SG — 33.5%to 27.4% (p=0.42)
3. Control — 44% to 42%

Follow-up result: vegetable preparation



Challenges


25th April 2015 EARTHQUAKE
7.8 RICHTER SCALE
12th May 2015 EARTHQUAKE
7.3 RICHTER SCALE
8 MILLION PEOPLE AFFECTED
8841 DEAD
NEARLY 23,000 INJURED
591,647 HOMES DESTROYED
3000 LANDSLIDES
4085 SCHOOLS DESTROYED
332 AFTERSHOCKS > 4 RICHTER SCALE
2.8 MILLION PEOPLE NEED HUMANITARIAN AID
276,395 HOMES DAMAGED
39 DISTRICTS AFFECTED


KOMATSU

Conclusion

Positive and significant effect of complementary interventions on **anaemia, intestinal parasitic infections and preparation of vegetables.**

Acknowledgements

Swiss TPH

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Schools, Children and Caregivers

Taiwan

The World Vegetable Center

Thank you very much

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