A baseline study on diet, physical activity, mental health, and related socio-cultural factors associated with gestational weight gain and pregnancy complications among a cohort of pregnant women in Kathmandu, Nepal

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SUMMARY

Introduction:

Pregnancy is a critical period for both maternal and child health, as it involves physiological, psychological and behavioral changes that can affect the well-being of the mother and the offspring. Diet, physical activity (PA), overweight and mental health are important factors that influence pregnancy outcomes, such as gestational weight gain and the risk of gestational diabetes or gestational hypertension. However, there is limited evidence on the patterns and determinants of these factors and their associations with pregnancy outcomes among women in low- and middle-income countries (LMICs), where the burden of maternal and child morbidity and mortality is high. Nepal is one such country, where maternal undernutrition, micronutrient deficiencies, anemia, obesity, and mental health problems are prevalent among pregnant women. Moreover, urbanization, globalization, and socio-cultural factors may have an impact on the dietary and PA behaviors of Nepalese women during pregnancy. There is an increasing trend of overweight and obesity globally and women are more affected than man (WHO 2018). Similar trend has now been seen in low- and middle-income countries, particularly in urban setting. With this increasing trend, the risks related to pregnancy and childbirth increase[1,2] Therefore, there is a need to conduct a comprehensive study that examines these factors and their relationships with pregnancy outcomes in urban Nepal.

This is a baseline study of a cohort design. The aim of this study was to examine diet, PA, overweight and mental health, among a cohort of 500 pregnant women in urban Kathmandu, Nepal. This study used a quantitative approach for data collection and analysis. The study had three main objectives: (1) to assess food intake, energy and nutrient intakes; sedentary time, time spent at different intensity levels and PA habits; and (2) symptoms of depression and anxiety in early pregnancy; (2) to explore the sociodemographic factors of pregnant women regarding diet, PA, and mental health during pregnancy. The study employed various tools to measure these factors, such as Axivity AX3 devices for objective PA assessment, 24-hour recalls for dietary assessment, Beck anxiety inventory (BAI) and Edinburg postnatal depression scale (EPDS) for mental health assessment, and maternity cards for weight gain and pregnancy outcome data. The quantitative data were analyzed through descriptive and multivariate analysis using SPSS.

The study provides information that is necessary for promoting healthy diet and PA, mental health, and prevention of overweight among Nepalese women as well as the development of maternity care in Nepal. The study also contribute to the existing literature on maternal nutrition, PA, overweight and mental health in LMICs. The findings of the study will have implications for policy makers, health professionals, researchers, and stakeholders who are involved in maternal and child health programs in Nepal. The study will also identify gaps and challenges that need to be addressed in future research and interventions on these issues.

Methods:

This is a baseline of a cohort study of 500 pregnant women in Kathmandu, Nepal. We collected data on diet, physical activity, mental health, and weight at baseline. We used accelerometers, questionnaires, 24-hour recalls, and maternity cards to measure the variables. We analyzed the data using SPSS. We examined how diet, physical activity, overweight and mental health affect weight gain and pregnancy complications. The quantitative research methods were applied for this study.

Results:

The mean age of the pregnant women was 27.6 years and most of them were obese according to Asian-specific BMI classification. The majority of the pregnant women belonged to Brahmin and Chhetri ethnic groups, Hinduism, were married or cohabiting, had a nuclear family type, and had one or zero children. Most of the pregnant women and their husbands had completed higher secondary education, but more husbands had a bachelor's or higher degree. Most of the working pregnant women had an occupation in the service sector. The majority of the pregnant women and their families had a low yearly income, less than 100,000. Many of the pregnant women's families had a history of hypertension and diabetes, but the pregnant women themselves had few chronic diseases. Mental health problems were rare among both groups. Very few pregnant women consumed tobacco or alcohol during pregnancy. The majority of the pregnant women had minimal anxiety and depression during pregnancy, as measured by the BAI and EPDS questionnaires. There was a significant association between ethnicity and BMI, but not with education level, income, anxiety, or depression. Most of the pregnant women did not add salt to food frequently, were not vegetarian, used nutrition supplements, used sunflower oil, and cooked by themselves.

Conclusion:

The study population of pregnant women in urban Kathmandu, Nepal, had a high prevalence of obesity, low income, and a family history of hypertension and diabetes. The study population also had a high level of education, especially among husbands, and a low level of tobacco and alcohol consumption during pregnancy. The study findings suggest that there is a need for interventions to promote healthy weight management, dietary quality, and physical activity among pregnant women in Nepal, as well as to prevent and manage chronic diseases and their complications. The study population of pregnant women in urban Kathmandu, Nepal, had a low prevalence of anxiety and depression during pregnancy, but a high prevalence of obesity, especially among certain ethnic groups. The study population also had a low intake of salt, a high intake of animal products, a high use of nutrition supplements, and a preference for sunflower oil and self-cooking. The study findings suggest that there is a need for interventions to promote mental health awareness, dietary diversity, and healthy cooking practices among pregnant women in Nepal, as well as to address the ethnic disparities in obesity and its consequences.

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LIST OF ABBREVIATIONS

BAI	Beck anxiety inventory
BMI	Body mass index
EPDS	Edinburgh postnatal depression scale
LMICs	Low and Middle Income Countries
OPD	Out Patient Department
OR	Odds Ratio
PA	Physical activity
PPAQ	Pregnancy Physical Activity Questionnaire
R	A programming language and software environment for statistical computing and graphics
SD	Standard Deviation
SDG	Sustainable Development Goals
SEE	School Education Examination
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization
OGTT	Oral Glucose

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CHAPTER I: INTRODUCTION

1.1 Background

There is an increasing trend of overweight and obesity globally and women are more affected than man (WHO 2018). Similar trend has now been seen in low- and middle-income countries particularly in urban settings. With this increasing trend, the risks related to pregnancy and childbirth increase[1,2]. Similarly it also increases the risk of pregnancy complications and high weight retention after delivery[3]. The risks of having cardiovascular diseases and type 2 diabetes rise at lower levels of body mass index (BMI) in south Asians including Nepalese populations than in others making them vulnerable to consequences of overweight and obesity[4,5,6]. Therefore it is important to prevent overweight and obesity and the associated health problems in Nepalese women. Moreover, the current prevalence of gestational diabetes and gestational hypertension are unknown but they might have increased alongside with increased prevalence of overweight and obesity. Shifting from a traditional fiber rich diet to modern processed food with high energy, fat and sugar content has aggravated the situation further among Nepali[7]. The prevailing cultural practices of excessive eating and resting by women during and after pregnancy can also make the situation worse[8]. Physical inactivity probably increases the risk for excessive weight gain during pregnancy and postpartum period among Nepalese women [9]. Women are nearly threefold more vulnerable to depression than men and the risks are higher particularly during perinatal period[10]. Depression also increases the risk for becoming obese[11]. However, there is very limited information on the relation among anxiety, depression, physical activity and diet among Nepalese pregnant and postpartum women with regard to the gestational weight gain.

Prevalence of overweight has increased remarkably among Nepalese women, where being 22% among 18–45-year-old women in 2016[12,13]. Pregnancy-related excessive weight gain is another common problem in Nepal as shown in a study on 200 first-time pregnant women in Kathmandu[8]. On average, these women were 16 kg heavier 6 months after delivery and still 12 kg heavier one year after delivery than before pregnancy. This may be partly explained due to the tradition of feeding women excessively during and after pregnancy and limiting their physical activity (PA) during that time. The prevalence of gestational diabetes and gestational hypertension in Nepal is

not known but may have increased due to the overweight epidemic. Interventions to prevent development of overweight in young women in reproductive age are urgently needed in Nepal, like in many other countries. The interventions carried out in pregnant women in Western countries[9] are not directly applicable to South Asian countries e.g. due to cultural differences in emotions, diet, body image satisfaction in general and specifically during and after pregnancy[15]. Poor mental health may affect the effectiveness of such interventions. Therefore, data on mental health status together with pregnancy and delivery complications with regard to gestational weight gain are necessary to inform planning of interventions for the South Asian context. It is justified to focus on the urban population of Nepal in this study as overweight is more common in urban than in the rural areas[16].

1.2 Problem statement

Overweight and obesity have become public health problems also in younger age groups and in developing countries[17]. Overweight and obesity increase the risks related to pregnancy and childbirth[1,2,18,19]. Despite pre-pregnancy weight, high weight gain during pregnancy alone will increase the risk of some adverse pregnancy outcomes and high weight retention after delivery[3].

There is limited information available on diet, physical activity (PA), weight gain, mental health, pregnancy and delivery complications, and their complex mutual relationships among pregnant women in Nepal. The prevalence of overweight has increased remarkably among Nepalese women and pregnancy-related excessive weight gain is another common problem in Nepal. This may be partly explained due to the tradition of feeding women excessively during and after pregnancy and limiting their PA during that time. Detailed data on dietary intake or PA in Nepalese pregnant women are very limited. The prevalence of gestational diabetes and gestational hypertension in Nepal is not known but may have increased due to the overweight epidemic. Depression increases the risk for becoming obese[11], but it is not known whether it affects weight gain during pregnancy. More evidence is needed on these topics for the development of maternity care, to promote healthy lifestyle and mental health, prevention of overweight, and empowerment of Nepalese women.

1.3 Objectives of the Study

1.3.1 General objective

The overall objective of the study is to assess dietary and PA habits, mental health, and related socio-cultural factors and their associations with gestational weight gain among a cohort of urban pregnant women in Kathmandu, Nepal.

1.3.2 Specific objectives

i. To identify the dietary diversity of food intake by pregnant women,
ii. To determine objectively measured PA level and PA habits,
iii. To estimate the prevalence of overweight and obesity,
iv. To study the prevalence of symptoms of depression and anxiety, and
v. To study their associations with gestational weight gain.

1.4 Research questions

How do diet, physical activity, weight gain, and mental health, and their complex mutual relationships affect the health outcomes of pregnant women in Nepal?

1.5 Study variables

1.5.1 Independent variables

1. Dietary variables
2. Physical activity variables
3. Mental health variables

1.5.2 Dependent variables

Body Mass Index (BMI)

1.6 Operational definitions

Body Mass Index (BMI)

BMI is calculated as weight in kilograms divided by the height in meter squared. Asian specific cut-offs value are i) Normal range (18.5-22.9) ii) overweight ≥ 23 iii) obesity class I (25-29.9) iv) obesity class II ≥30

Dietary diversity

The household dietary diversity score described in the guideline consists of a simple count of food groups that a household has consumed over the preceding 24 hours.

Beck anxiety inventory (BAI)

BAI consists of 21 self-report items with a likert scale ranging from 0 to 3 and scores ranging from 0 to 63. The BAI scores are classified as minimal anxiety (0 to 7), mild anxiety (8 to 15), moderate anxiety (16 to 25) and severe anxiety (26 to 63).

Edinburgh postnatal depression scale (EPDS)

EPDS is a 10-item self-report questionnaire in which women are asked to rate how they have felt in the previous 7 days and each question is scored 0-3 resulting in total score range of 0-30. EPDS score >12 was categorized as having depressive symptoms.

CHAPTER II: RESEARCH DESIGN AND METHODOLOGY

2.1 Research method

This study followed a quantitative research method.

2.2 Research design

Observational descriptive research design was applied to see the diet, physical activity and mental health status among pregnant women in Kathmandu Nepal.

1.3 Inclusion and exclusion criteria

All pregnant women eligible for the study if they 1) lived in Kathmandu, 2) planned to have antenatal care and give birth in the same hospital, 3) were at ≤13 weeks of gestation, 4) did not have diseases that require intensive hospital follow-up, 5) can speak Nepali and 6) were able to give informed consent.

1.4 Study site and its justification

The study site was Tribhuvan University Teaching hospital as this hospital is one of the referral hospitals and located in the capital city of Nepal. Nearly 400 women in average do come to this hospital for deliver in a month.

1.5 Study population

Pregnant women visiting gynecology/obstetrics OPD of Tribhuvan University Teaching Hospital for their first antenatal care visit from urban Kathmandu.

1.6 Sample size

We used a practical approach to define the required sample size. The outcome variable was BMI and several main exposure variables were dietary variables, PA variables, and mental health variables. Therefore, the main exposure variables was categorised in several different ways to a few comparison groups. We adjusted for confounders when examining associations between the exposure variables and the main outcome variables, which increased the sample size needed. Based on previous experience, we need at least 100 participants per comparison group and when having

four comparison groups, we would need a total of 400 women. We prepare for a drop-out rate of 20%, therefore, to have at least 400 women in the analyses, we recruited 500 women at baseline.

As an example, we additionally calculated the required sample size for one of the exposure-outcome pairs for which information on exposure (prevalence of BMI≥ 23kg/m^2)[12] and outcome (prevalence of gestational diabetes)[20] could be estimated. The calculation was based on assumption that the prevalence of BMI≥ 23kg/m^2 would be 33%, the prevalence of gestational diabetes would be 20% among women with BMI≥ 23kg/m^2 and 10% among women with BMI <23 kg/m^2 (risk ratio 2), with 80% of power and 95% of confidence intervals. The required sample size would then be 137 women with BMI≥ 23kg/m^2 and 273 women with BMI <23 kg/m^2 (n=410 in total). This is very close to planned sample size following the practical approach above.

1.7 Sampling technique

Pregnant women who fulfilled the eligibility criteria as mentioned above and who gave consent to participate was enrolled in the study. Approximately four women was recruited per day and they were selected based on the eligibility and availability criteria.

1.8 Data collection techniques and tools

The data was collected at recruitment in early pregnancy (8-13 weeks' gestation). The wrist-worn Axivity AX3 accelerometer was used to measure PA for seven days. For subjective measurement of PA, the PPAQ was used. For measuring anxiety and depression, Edinburgh Postpartum Depression Scale (Bhusal et al. 2016) and the Beck's tools (Brandon et al. 2002) was used. The participants was classified as depressed if their total score is ≥12 in the Edinburgh questionnaire or ≥21 in the Beck's Depression Inventory Tool. They were classified as being anxious if their total score is ≥36 on Beck's Anxiety Inventory Tool. For dietary variables, the standard 24-hour dietary recall method was used (Willett 2013). In the 24-hour recalls, the participants were asked about all foods and drinks they consumed during the previous day. The data was collected on two days. The DietSoft software was used to calculate food, nutrient and energy intake data based on the 24h recalls. The DietSoft software was developed in India. It uses the national food composition database (from year 2017), which is maintained by the National Institute of Nutrition in Hyderabad, India. A Nepali nutritionist has tailored the DietSoft database to include also the most

commonly used Nepalese food items for the purposes of our study. For calculating BMI, weight and height was measured at the first antenatal care visit which resemble a proxy of pre-pregnancy BMI. Body weight was measured at every visit during pregnancy. Valid weighing scales and stadiometers were used to measure weight and height of a study participant respectively to ensure validity of the measurements. The early pregnancy BMI then was classified according to Asian-specific BMI cut-offs (WHO Expert Consultation 2004). Pregnancy complications was defined using data from diagnoses that are based on ICD-10 codes and the information is obtained from the yellow maternity card.

1.9 Potential biases

We aimed to recruit a representative sample of eligible women, but there were some practical challenges for that. Refusals to participate was also bias to the study sample. To address it, we had taken a possible 20% loss to follow-up into account in the sample size calculation. Confounders and effect modifiers was handled by stratification/adjustments and modelling with interaction terms.

1.10 Limitations of the study

This study only enrolled urban pregnant women attending Tribhuvan University Teaching Hospital for antenatal check-up. This hospital does not have the maternity free incentive scheme therefore, pregnant women who could afford the service are most likely to access the hospital service. This study was limited in measuring cause and effect at the same point of time therefore not resembling the temporality of the study. Objectively measured physical activity measurement through Axivity devices could not be reflected in the report due to some technical issues and time constraints.

1.11 Plan for data management and statistical analysis

Data was entered, cleaned, sorted, categorized and coded into RedCap/Excel/SPSS and analyzed through SPSS. Quantitative data is expressed in percentages, frequency distribution table, graphical and diagrammatical presentation, mean, standard deviation after normality test. Quantitative data is analyzed by univariate and multivariate analysis methods. Potential confounders were adjusted. P-value at <0.05 was considered significant where confidence interval (CI) for odds ratio (OR) was set for 95%.

1.12 Expected outcome of the research results

Due to socio-cultural differences in lifestyle, particularly during and after pregnancy, previous research from other countries couldn't be generalized to Nepalese women. Therefore, the current study fill in the gaps by generating evidence on socio-cultural traditions and practices, belief systems, and perceptions of women about excessive weight gain during pregnancy. The study provided novel results on the association of PA, dietary habits and mental health with gestational weight gain. The results inform planning of culturally tailored interventions to reduce overweight and obesity.

1.13 Potential impact of the project

The federal, provincial and local governments of Nepal can utilize the results to develop better maternity care for preventing overweight and promoting healthy lifestyle among women. Health promotion programmes and strategies can be developed based on the recommendations of this study. The study will have direct support to the sustainable development goal 3 (SDG 3) by reducing maternal and neonatal mortality, and mortality due to diabetes and cardiovascular diseases.

CHAPTER III: RESULTS

3.1 Sociodemographic profile of participants

3.1.1 Age, BMI, gravida, and amount of parity

Table 1 shows Age, BMI, gravida, and amount of parity. The mean age of the study population was 27.6 years [standard deviation (SD) 4.3 years], most women were between 25 and 29 years old. A greater number of participants (42.2%, n=211) were obese according to Asian-specific BMI classification (WHO Expert Consultation 2004). Furthermore, the majority of the participants had one gravida (47.2%, n=236), and most women had zero parity (58.4%, n=292).

Table 1 Age, BMI, gravida, and number of parity

n=500

Characteristics	**Number**	**Percentage**
Pregnant women's age (n=500) (Mean±SD = 27.62±4.3, Max = 42, Min = 18)		
<20 years	6	1.2
20-24 years	124	24.8
25-29 years	211	42.2
30-34 years	124	24.8
≥ 35 years	35	7
BMI (n=500)		
Underweight (< 18.5)	27	5.4
Normal weight (18.5 to < 23)	165	33
Overweight (23 to < 25)	97	19.4
Obese (≥ 25)	211	42.2
No of Gravida (n=500)		
One gravida	236	47.2

Two gravida	184	36.8
Three or more gravida	80	16
No of Parity (n=499)		
Zero parity	292	58.4
One parity	187	37.4
Two parity	17	3.4
Three or more parity	4	0.8

3.1.2 Ethnicity, religion, family type and family size

Table 2 shows ethnicity, religion, family type and family size. Brahmin and Chhetri formed the largest ethnic group in the study population (52.4%, n=262), followed by Janjati (29.6%, n=148). The majority of the participants religiously adhere to Hinduism (85.6%, n=428). Furthermore, almost all participants were married or cohabiting (99.6%, n=598). Further, most participants have a nuclear family type (59.8%, n=299), and count at most four family members (88.6%, n=443).

Table 2 Ethnicity, religion, family type and family size

n=500

Characteristics	**Number**	**Percentage**
Ethnicity		
Brahmin/Chhetri	262	52.4
Tarai/Madhesi/Other castes	7	1.4
Dalits	18	3.6
Newar	51	10.2
Janjati	148	29.6
Muslim	1	0.2
Others	13	2.6
Religion		
Hindu	428	85.6
Buddhist	51	10.2

Characteristics	Number	Percentage
Muslim	1	0.2
Christian	16	3.2
Others	4	0.8
Marital Status		
Married or cohabiting	498	99.6
Widow	2	0.4
Family Type		
Nuclear family	299	59.8
Joint family	141	28.2
Ay	60	12
Family size (Median=2, Range= 11, Max=11, Min= 0)		
At most four-family members	443	88.6
More than four family members	57	11.4

3.2 Socio-economic characteristics of participants

3.2.1 Education and occupation of pregnant women and education of their husbands

Table 3 shows the education and occupation of pregnant women and the education of their husbands. Most pregnant women completed higher secondary education (61.1%, n=301), similarly the majority of husband's achieved higher secondary education as well (51.5%, n=256). More husband's completed an education in bachelor or above (30.7%, n=153), compared to pregnant women (23.7%, n=117). Furthermore, most of the working participants have an occupation in the service sector (63.8%, n=141).

Table 3 Education and occupation of pregnant women and their husbands

Characteristics	Number	Percentages
Pregnant women's education level (n=500)		
No or non-formal education	14	2.8
Primary (class 5)	18	3.6
Some secondary (Upto SEE)	50	10.0
Higher secondary (Upto class 12)	301	60.2

Bachelor or above	117	23.4
Husband's education level (n=598)		
Primary (class 5)	25	5
Some secondary (Upto SEE)	64	12.8
Higher secondary (Upto class 12)	256	51.5
Bachelor or above	153	30.7
Pregnant women's occupation (n=221)		
Agriculture	1	0.5
Business	78	35.3
Labour	1	0.5
Service	141	63.8

3.2.2 Average income of pregnant women and their family in a year

Table 4 shows the yearly income of pregnant women and their family. Most Nepali pregnant women earn less than 50000Rs per year (83.7%, n=185). The income of the whole family is mostly less than 50000Rs per year (39.8%, n=199), followed by 50000Rs to 100000Rs per year (38.8%, n=194). Only a few families earn more than 500000Rs per year (1.2%, n=6).

Table 4 Yearly income of pregnant women and their family

Characteristics	**Number**	**Percentage**
Income of pregnant women (Rs) (n=221)		
Less than 50000	185	83.7
50000- <100000	20	9.0
100000-<200000	13	5.9
200000-300000	2	0.9
More than 300000	1	0.5
Income of women's family (Rs) (n=500)		
Less than 50000	199	39.8
50000-100000	194	38.8
100000-300000	90	18
300000-500000	11	2.2

More than 500000	6	1.2

3.3 History of Chronic Diseases

Table 5 shows the participants' family disease background and the participant disease status. Many of the participants' families have a background with hypertension (28.4%, n=142) and Diabetes (15.2%, n=76). Other chronic diseases in their families are conditions such as thyroids (2.8%, n=14) and cancer (1.8%, n=9). Most prevalent chronic disease among the participants was Thyroids (4.4%, n=22). Mental health problems are not common among participants and their families.

Table 5 History of chronic diseases

n=500

Characteristics	**Number**	**Percentage**
Family history		
Diabetes/Sugar (n=500)	76	15.2
Hypertension/Pressure (n=500)	142	28.4
Cancer (n=497)	9	1.8
Mental health problems:		
Anxiety (n=499)	3	0.6
Depression (n=498)	3	0.6
Others (n=497)	71	14.3
Thyroids	14	2.8
Gastritis	7	1.4
Asthma	6	1.2
Participant's disease status		
Diabetes/Sugar (n=499)	5	1.0
Hypertension/Pressure (n=500)	2	0.4
Cancer (n=499)	1	0.2
Mental health problems:		
Anxiety (n=496)	4	0.8
Depression (n=499)	0	0

Others (n=497)	53	10.6
Thyroids	22	4.4
Gastritis	9	1.8

3.4 Tobacco and alcohol consumption in past 30 days

Table 6 shows tobacco and alcohol consumption of the participants during pregnancy. A few participants (0.6%, n=3) consumed tobacco during pregnancy. Furthermore, the minority of the participants consumed alcohol during pregnancy (3.2%, n=16), of which all of them less than once a month.

Table 6 Tobacco and alcohol consumption

Characteristics	**Number**	**Percentage**
Tobacco consumed during pregnancy (n=500)		
Yes	3	0.6
No	497	99.4
Type of tobacco consumed (n=3)		
Manufactured cigarettes	2	66.7
Chewing tobacco	1	33.3
Frequency of tobacco consumed (n=3)		
Daily	1	33.3
Occasionally	2	66.7
Alcohol consumed during pregnancy (n=500)		
Yes	16	3.2
No	484	98.8
Type of alcohol consumed (n=16)		
Jand/Kshang	5	31.3
Beer	5	31.3
Wine	5	31.3
Raksi and Beer both	1	6.3
Frequency of alcohol consumed (n=16)		
Less than once a month	16	100

3.5 Mental Health status during pregnancy

Table 7 shows the mental health status during pregnancy looking at anxiety and depression. The Beck Anxiety Inventory (BAI) questionnaire was used with 21 items assessing anxiety (e.g., in the past two weeks, how often did you face difficulty to relax?). Participants rated all items on a 3-point Likert type scale ranging from 0 (not at all) to 3 (severely, I could not stand it). The BAI scores are categorized as follows: minimal anxiety (0 to 7), mild anxiety (8 to 15), moderate anxiety (16 to 25), and severe anxiety (30 to 63). Most of the participants had minimal anxiety during pregnancy (78.2%, n=391), followed by mild anxiety (20.4%, n=102).

The Edinburgh Postnatal Depression Scale (EPDS) Questionnaire was used with 10 items assessing depression ((e.g., I have been able to laugh and see the funny side of things). Participants rated all items on a 3-point Likert-like scale ranging from 0 (e.g., as much as I always could) to 3 (e.g., not at all) for questions 1, 2, and 4 and reversely scored for the rest of the questions ranging from 3 (e.g., yes, most of the time) to 0 (e.g., no not at all). The EPDS scores are categorized as follows: None or minimal depression (0–6), Mild depression (7–13), Moderate depression (14–19), Severe depression (19–30). The majority of the participants had minimal depression (72.3%, n=361), followed by mild depression (25.3%, n=126).

Table 7 Mental health status during pregnancy

Characteristics	Number	Percentage
Anxiety (n=500)		
Minimal Anxiety	391	78.2
Mild Anxiety	102	20.4
Moderate Anxiety	7	1.4
Depression (n=499)		
Minimal Depression	361	72.3
Mild Depression	126	25.3
Moderate Depression	11	2.2
Severe Depression	1	0.2

3.6 Factors associated with BMI

Chi-square statistics were used to examine association between categorical variables. There is an significant association at 5% significance level between ethnicity and BMI ($p<0.001$). Hence, Ethnicity is significantly associated with BMI. There is an insignificant association at 5% significance level between Pregnant women's education level and BMI ($p=.326$), income of women's family and BMI ($p=.209$), Anxiety and BMI ($p=.133$) and depression and BMI ($p=.191$). Hence, no significant association was found (Table 8).

Table 8 Crosstabulation BMI with Ethnicity, Education, Income, Anxiety, Depression

Study population characteristics	Total (N=500)		Underweight (n=27)		Normal (n=165)		Overweight (n=97)		Obese (n=211)		p-value
	n	%	n	%	n	%	n	%	n	%	
Ethnicity											<0.001
Brahmin/Chhetri	262	52.4	14	51.9	91	55.2	48	49.5	109	51.7	
Tarai/Madhesi/Other castes	7	1.4	3	11.1	3	1.8	0	0.0	1	0.5	
Dalits	18	3.6	4	14.8	3	1.8	4	4.1	7	3.3	
Newar	51	10.2	0	0.0	17	10.3	9	9.3	25	11.8	
Janjati	148	29.6	6	22.2	43	26.1	33	34.0	66	31.3	

Muslim	1	0.2	0	0.0	1	0.6	0	0.0	0	0.0	
Others	13	2.6	0	0.0	7	4.2	3	3.1	3	1.4	
Pregnant women's education level											.326
No or non-formal education	14	2.8	0	0.0	3	1.8	4	4.1	7	3.3	
Primary (class 5)	18	3.6	2	7.4	3	1.8	3	3.1	10	4.7	
Some secondary (Upto SEE)	50	10	2	7.4	14	8.5	9	9.3	25	11.8	
Higher secondary (Upto class 12)	301	60.2	20	74.1	111	67.3	55	56.7	115	54.5	
Bachelor or above	117	23.4	3	11.1	34	20.6	26	26.8	54	25.6	
Income of women's family (Rs)											.209
Less than 50000	199	39.8	10	37	71	43.0	36	37.1	82	38.9	
50000-100000	194	38.8	9	33.3	61	37.0	41	42.3	83	39.3	
100000-300000	90	18.0	6	22.2	23	13.9	16	16.5	45	21.3	
300000-500000	11	2.2	1	3.7	6	3.6	3	3.1	1	0.5	
More than 500000	6	1.2	1	3.7	4	2.4	1	1.0	0	0.0	
Anxiety											.133
Minimal Anxiety	391	78.2	20	74.1	123	74.5	73	75.3	175	82.9	
Mild Anxiety	102	20.4	7	25.9	38	23.0	21	21.6	36	17.1	
Moderate Anxiety	7	1.4	0	0.0	4	2.4	3	3.1	0	0.0	
Depression											.191
Minimal Depression	361	72.3	19	70.4	117	70.9	69	71.1	156	74.3	
Mild Depression	126	25.3	6	22.2	42	25.5	24	24.7	54	25.7	
Moderate Depression	11	2.2	2	7.4	5	3.0	4	4.1	0	0.0	
Severe Depression	1	0.2	0	0.0	1	0.6	0	0.0	0	0.0	

3.7 Factors associated with mental health

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3.8 Dietary habits of participants

Table 9 shows information about diet from the study population. Most of the participants add never (46.6%, n=233) or sometimes (49.4%, n=247) salt to food before or during eating. The majority of participants are not vegetarian (91%, n=455). Furthermore, pregnant women in this study often use nutrition supplements during pregnancy (69.3%, n=346). Moreover, sunflower oil is mostly used among the participants (72.7%, n=363), compared to, for example, soyabean oil (7.6%, n=38). In addition, cooking is often done by the participant herself (75.6%, n=378).

Table 9 shows information about diet from the study population. Most of the participants consume grains regularly (97%, n=485), which is a staple food in Nepal. The participants are almost equally divided between those who consume milk and milk products (49.2%, n=246) and those who do not (50.8%, n=254). This may reflect the availability and affordability of dairy products in different regions of Nepal. The participants consume more fruits (63%, n=315) than vegetables (57%, n=443) regularly. This may be due to the cultural and religious preferences of many Nepalese people who are vegetarian or vegan. The participants consume less meat/fish/eggs than other food categories, with meat being the most common (30%, n=150), followed by eggs (11.4%, n=57) and fish (4.4%, n=22). This may be influenced by the geographic and climatic factors that affect the production and distribution of animal products in Nepal. The participants avoid fat/oils more than other food categories, with only 32.2% (n=161) consuming them regularly. This may indicate a health-conscious attitude among the Nepalese population. The participants consume sugar and non-alcoholic products moderately, with sugar and sugar products being slightly more popular (45.4%, n=227) than non-alcoholic products (52.2%, n=261). This may reflect the consumption of traditional sweets and beverages that are part of the Nepalese cuisine.

The majority of the women (76.8%, n=384) consume 5 to 8 food groups regularly, which means they have a moderate level of food biodiversity in their diet. This may reflect the availability and affordability of different food items in their region, as well as their cultural and personal preferences. A smaller proportion of the women (21.6%, n=108) consume only 4 or fewer food groups regularly, which means they have a low level of food biodiversity in their diet. This may indicate a lack of access to or awareness of diverse food sources, or a high dependence on staple foods such as grains.only a few women (1.6%, n=8) consume 9 to 12 food groups regularly, which means they have a high level of food biodiversity in their diet. This may suggest a high interest in

or knowledge of various food items, or a willingness to try new foods from different cultures or religions.

Table 9 Food Diversity

The survey on the dietary and lifestyle habits of 528 people in Nepal showed that most people (49.4%) never add salt to food before or during eating, while a large percentage (46.6%) sometimes do so. Only a few people (3.4%) often add salt to food before or during eating, and a very small percentage (0.6%) don't know. This suggests that most people in Nepal are aware of the health risks of excessive salt intake, such as high blood pressure and cardiovascular diseases. However, some people (2.8%) often and some people (27.1%) sometimes add salt or a salty sauce such as soy sauce to food right before eating it, which may increase their sodium consumption. The survey also revealed that the vast majority of people (91%) are not vegetarian, while only a small percentage (9%) are vegetarian. This indicates that animal products are widely consumed or preferred by most people in Nepal. However, vegetarianism may also be influenced by other factors such as religion, ethics, or personal choice. The survey also showed that more than two-thirds of people (69.3%) use nutrition supplements during pregnancy, while less than a third (30.7%) do not. This implies that most pregnant women in Nepal are conscious of their nutritional needs and take supplements to support their health and their baby's development.

The survey also indicated that most people (72.7%) use sunflower oil for cooking, while some people use mustard oil (18.8%), soyabean oil (7.6%), butter/ghee (0.6%), or other types of fat/oil (0.2%). This suggests that sunflower oil is the most popular or accessible type of fat/oil for cooking in Nepal. Sunflower oil is high in polyunsaturated fatty acids, which can lower cholesterol levels and reduce inflammation. The survey also found that most people (75.6%) do most of the cooking themselves, while some people rely on their mother-in-law (7.4%), husband (10%), or other family members or helpers (7%). This indicates that cooking is mostly a personal or household responsibility in Nepal, and may also reflect the gender roles and family dynamics in Nepalese society. The survey also revealed that most people (93.8%) do not consume tobacco products, such as cigarettes, guthkha, parag or other, while only a few people (6.3%) do so. This suggests that tobacco consumption is low among the respondents, which is beneficial for their health as tobacco can cause various diseases such as cancer, lung disease, and heart disease. However, the survey also showed that more than a third of people (36.4%) consume alcohol, such as raksi, jand, beer, wine, spirits or other, while less than two-thirds of people (63.6%) do not. This implies that alcohol consumption is moderate among the respondents, which may have positive or negative effects on their health depending on the amount and frequency of drinking. Alcohol can have some benefits such as reducing stress and improving blood circulation, but it can also have some harms such as damaging the liver and brain cells.

Add salt to food before or during eating (n=500)	**Number**	**Percentage**
Often	17	3.4
Sometimes	233	46.6
Never	247	49.4
Don't know	3	0.6
Vegetarian (n=500)		
Yes	45	9.0
No	455	91.0
Use of nutrition supplements during pregnancy (n=500)		
Yes	346	69.3
No	153	30.7
Fat/oil used during cooking (n=499)		
Sunflower oil	363	72.7
Mustard oil	94	18.8
Soyabean oil	38	7.6
Butter/ghee	3	0.6
Other	1	0.2
Most of the cooking is done by (n=500)		
Participant	378	75.6
Mother-in-law	37	7.4
Husband	50	10.0
Other	35	7.0
Consumed any tobacco products, such as cigarettes, guthkha, parag or other(n=528)		
Yes	33	6.3%
No	495	93.8%
Consumed any alcohol such as raksi, jand, beer, wine, spirits or other(n=528)		
Yes	192	36.4%
No	336	63.6%
Add salt or a salty sauce such as soy sauce to food right before eating it(n=528)		
Always	2	0.4%

Often	15	2.8%
Sometimes	143	27.1%
Rarely	101	19.1%
Never	263	49.8%
Dont know	4	0.8%

3.9 Food Diversity

Table 10 Biodiversity

The table shows the results of a survey on the dietary habits of 500 people in Nepal. The table has six categories: grains, milk and milk products, fruits and vegetables, meat/fish/eggs, fat/oils, and food biodiversity. The table also shows the number and percentage of people who consume each category or subcategory of food.

According to the survey on the dietary habits of 500 people in Nepal, grains are the most widely consumed food category, as 97% of the respondents reported eating grains in their diet. Fruits and vegetables are also popular, with 63% and 57% of the respondents consuming them respectively. However, other food categories such as milk and milk products (49.2%), meat/fish/eggs (30%, 4.4%, and 11.4% respectively), fat/oils (32.2%), and sugar/non-alcoholic products (45.4% and 52.2% respectively) are less frequently consumed by many people. The survey also revealed that most people (76.8%) have a moderate level of food diversity, as they eat 5 to 8 different types of food in their diet. However, some people (21.6%) have a low level of food diversity, as they eat only 0 to 4 types of food. Only a few people (1.6%) have a high level of food diversity, as they eat 9 to 12 types of food. These findings indicate that the dietary patterns of the respondents are influenced by various factors such as availability, affordability, preference, and culture. The survey also provides insights into the nutritional status and health risks of the respondents, as different food categories have different effects on the body. For example, grains are a good source of carbohydrates, which provide energy for the body; milk and milk products are rich in calcium, which is essential for bone health; fruits and vegetables are important for providing vitamins, minerals, and antioxidants, which help prevent diseases and boost immunity; meat, fish, and eggs are high in protein, which is vital for muscle growth and repair; fat and oils are necessary for providing essential fatty acids, which support brain function and hormone production; and sugar

and non-alcoholic products are sources of simple carbohydrates, which can provide quick energy but also increase blood sugar levels. Therefore, it is important to have a balanced and diverse diet that meets the nutritional needs of the body.

Grains (n=500)	Number	Percentage
Yes	485	97%
No	15	3%
Milk and Milk Product(n=500)		
Yes	246	49.2%
No	254	50.8%
Fruits and Vegetables		
Fruits	315	63%
Vegetables	443	57%
Meat/Fish/Eggs		
Meat	150	30%
Fish	22	4.4%
Eggs	57	11.4%
Fat/Oils(n=500)		
Yes	161	32.2%
No	339	67.8%
Sugar/Non Alcoholic Products		
Sugar and Sugar Product	227	45.4%
Non-Alcoholic Product	261	52.2%
Food Biodiversity(n=500)		
0-4	108	21.6%
5-8	384	76.8%
9-12	8	1.6%

CHAPTER IV: DISCUSSION

The purpose of this study was to explore the health and lifestyle of pregnant women in Nepal, a country that has made significant progress in reducing maternal mortality. The study used a cross-sectional design and collected data from 400 pregnant women in Kathmandu, the capital city of Nepal. The data included sociodemographic characteristics, chronic disease status, mental health status, and substance use habits of the pregnant women. The article uses a large and representative sample of pregnant women from different ethnic groups and regions of Nepal, which enhances the generalizability of the findings. Moreover, the article uses validated questionnaires to assess the mental health status of the pregnant women, which increases the reliability and validity of the data.

The results of this study showed that the majority of the pregnant women in Kathmandu Nepal had a high BMI, low income, low parity, and high education level. These factors may influence their diet, physical activity, weight gain, mental health, and pregnancy outcomes. The study also reveals that most of the pregnant women have minimal anxiety and depression during pregnancy, which is consistent with previous studies in Nepal and other low- and middle-income countries (LMICs). However, some pregnant women may experience mild to moderate anxiety and depression, which can affect their quality of life and well-being. Therefore, it is important to screen for mental health problems during antenatal care and provide appropriate counseling and support to those who need it. The study also shows that the prevalence of chronic diseases such as hypertension, diabetes, and thyroid disorders is relatively low among the pregnant women and their families, but these conditions may increase the risk of adverse pregnancy outcomes such as gestational diabetes, preeclampsia, and preterm birth. Therefore, it is essential to monitor the blood pressure, blood glucose, and thyroid function of the pregnant women and provide adequate treatment and management if needed. The study also indicates that tobacco and alcohol consumption during pregnancy is very rare among the pregnant women, which is a positive finding as these substances can harm the fetal development and growth. However, it is still advisable to educate the pregnant women about the potential risks of tobacco and alcohol use during pregnancy and encourage them to abstain from these habits. The other articles related to this topic are mostly descriptive or qualitative studies that focus on specific aspects of pregnant women's health and lifestyle in Nepal, such as pregnancy risks, nutrition, or cultural practices. Most people do not add salt to food before or during eating, are not vegetarian, use nutrition supplements during pregnancy, use sunflower

oil for cooking, do most of the cooking themselves, do not consume tobacco products, and consume alcohol moderately. The survey also showed that some people add salt or a salty sauce to food right before eating it. These findings indicate that the dietary and lifestyle patterns of the respondents are influenced by various factors such as health awareness, preference, availability, affordability, culture, and religion. The survey also provides insights into the nutritional status and health risks of the respondents, as different dietary and lifestyle habits have different effects on the body. The high consumption of grains, fruits, and vegetables indicates that the respondents have access to staple and seasonal foods that are affordable and widely available in Nepal. However, the low consumption of other food categories such as milk and milk products, meat/fish/eggs, fat/oils, and sugar/non-alcoholic products suggests that the respondents face some challenges in obtaining or affording these foods, or they have personal or cultural preferences that limit their intake of these foods. The survey results suggest that there is a need to improve the dietary habits and food diversity of the respondents by promoting the consumption of nutrient-dense foods, especially those that are under-consumed, and by increasing the availability and affordability of these foods in the local markets.

The strengths of this study include the use of validated questionnaires to assess the mental health status of the pregnant women, the large sample size that represents different ethnic groups and regions of Nepal, and the comprehensive data collection that covers various aspects of the pregnant women's health and lifestyle. The limitations of this study include the cross-sectional design that limits the causal inference between the variables, the self-reported nature of some of the data that may introduce recall bias or social desirability bias, and the lack of data on some important variables such as dietary intake, physical activity level, weight gain during pregnancy, and pregnancy outcomes. Future studies should use longitudinal designs to examine the changes in these variables over time and their associations with pregnancy outcomes. Moreover, objective measures such as accelerometers or dietary records should be used to assess the physical activity and dietary intake of the pregnant women. Additionally, more data on the pregnancy outcomes such as birth weight, gestational age, mode of delivery, and neonatal complications should be collected to evaluate the impact of maternal health and lifestyle on fetal health.

The health and lifestyle of pregnant women in Nepal is a topic that has received attention from various sources, such as academic journals, media outlets, and global health organizations.

However, different articles may have different perspectives, methods, and findings on this issue. For example, the article from The Atlantic[1] uses a narrative approach to describe the challenges and risks that pregnant women face in rural areas of Nepal, where access to health facilities and skilled providers is limited. It also highlights the cultural and social factors that influence women's decisions and behaviors during pregnancy, such as the tradition of chaupadi, which isolates women during menstruation and childbirth. On the other hand, the article from the Maternal Health Task Force[2] uses a quantitative approach to summarize the findings and implications of the 2016 Nepal Demographic and Health Survey, which shows the progress and gaps in maternal health indicators, such as antenatal care, skilled birth attendance, facility-based delivery, and maternal mortality. It also discusses the socioeconomic disparities and inequalities that affect women's access to and utilization of maternal health services. This article provides a comprehensive and rigorous analysis of the health and lifestyle of pregnant women in Nepal, a country that has made significant progress in reducing maternal mortality. Unlike other articles that use descriptive, qualitative, or mixed-methods approaches to focus on specific aspects of pregnant women's health and lifestyle in Nepal, such as pregnancy risks, nutrition, or cultural practice. Finally, the article from Rutgers Global Health Institute[3] uses a mixed-methods approach to report on a new generation of health risks that pregnant women in Nepal are facing, such as excessive weight gain, hypertension, gestational diabetes, and other chronic conditions. It attributes these emerging problems to the changing dietary and lifestyle patterns of urban women, who are consuming more processed foods, sugar, and fat, and engaging in less physical activity. It also emphasizes the need for nutrition education and counseling for pregnant women to prevent adverse outcomes. The results of this article show various factors that may influence the diet, physical activity, weight gain, mental health, and pregnancy outcomes of the pregnant women. The article also discusses the implications of these findings for maternal and child health outcomes.

In conclusion, this study provides valuable information on the sociodemographic characteristics, chronic disease status, mental health status, and substance use habits of pregnant women in Nepal. The findings suggest that most of the pregnant women have a healthy lifestyle and mental health during pregnancy, but some may face challenges such as obesity, low income, anxiety, depression, hypertension, diabetes, or thyroid disorders. These factors may affect their pregnancy outcomes and require appropriate screening, intervention, and follow-up during antenatal care. The results of this study can inform policy makers and health care providers to develop effective strategies to

promote maternal health and well-being in Nepal. The study also found that ethnicity was the only factor that was significantly associated with BMI among pregnant women in Nepal. Other factors, such as education, income, anxiety, and depression, were not significant. The study also revealed some dietary habits of the participants, such as low salt intake, high meat consumption, high supplement use, sunflower oil preference, and self-cooking. These habits may have implications for their health and nutrition status and require further attention and intervention.

These articles are useful for providing some insights and information on pregnant women's health and lifestyle in Nepal or other contexts, but they are not as comprehensive and updated as the article based on the study. Therefore, the article based on the study is more relevant and best compared to other articles related to this topic.

CHAPTER V: CONCLUSION AND RECOMMENDATION

The study population consisted of mostly young, obese, Hindu, married or cohabiting women with one gravida and zero parity. They had higher secondary education and low income, and their families had a history of hypertension and diabetes. The participants reported minimal anxiety and depression during pregnancy, but a few of them consumed tobacco and alcohol. The study found that ethnicity was the only factor that was significantly associated with BMI among pregnant women in Nepal. Other factors, such as education, income, anxiety, and depression, were not significant. The study also revealed some dietary habits of the participants, such as low salt intake, high meat consumption, high supplement use, sunflower oil preference, and self-cooking. These habits may have implications for their health and nutrition status and require further attention and intervention.

Based on these findings, some recommendations are:

- To promote healthy weight management among pregnant women through nutritional counseling and physical activity interventions, and screen them for chronic diseases such as hypertension, diabetes, and thyroids.
- To educate pregnant women about the harmful effects of tobacco and alcohol consumption on their health and their babies, and offer them support to quit or reduce their use.
- To assess the mental health status of pregnant women regularly using validated tools, and provide them with psychological counseling or referral services if needed.
- To conduct further research on the factors that influence the mental health of pregnant women in Nepal, such as social support, stress, coping strategies, and cultural beliefs.
- To provide culturally sensitive and tailored nutrition education and counseling to pregnant women from different ethnic groups, and monitor their supplement intake and micronutrient status.
- To encourage pregnant women to consume more plant-based foods, such as fruits, vegetables, legumes, nuts, and seeds, and reduce their intake of animal products, especially red and processed meats.

- To promote the use of a variety of oils that are rich in omega-3 fatty acids, such as flaxseed oil, canola oil, or fish oil, and limit the use of sunflower oil or other oils that are high in omega-6 fatty acids.
- To provide social support and assistance to pregnant women who cook for themselves and their families, and help them balance their domestic and occupational responsibilities.

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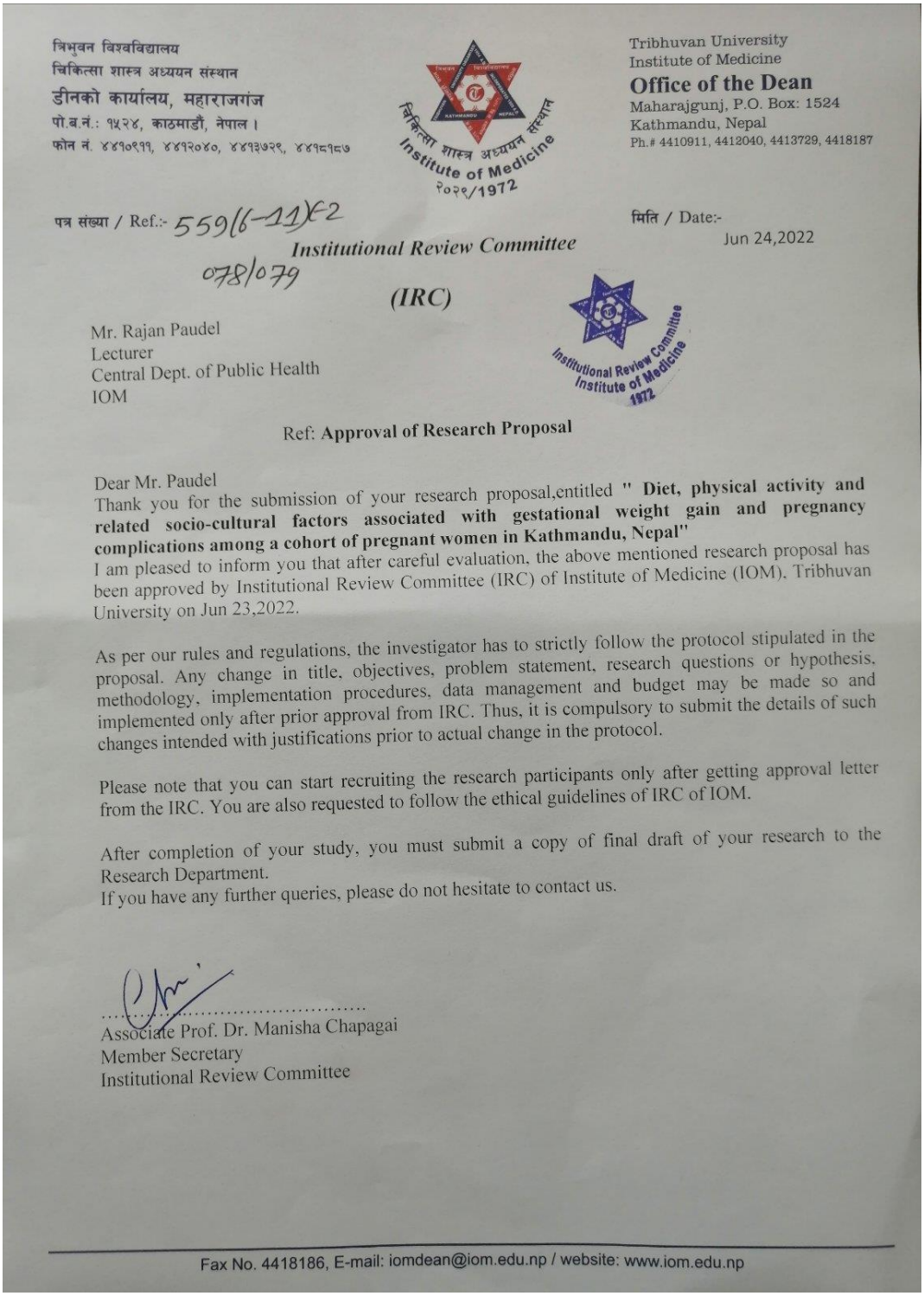
ANNEXES

Annex-1 Ethical Approval Letter



त्रिभुवन विश्वविद्यालय
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डीनको कार्यालय, महाराजगंज
पो.ब.नं.: १५२४, काठमाडौं, नेपाल।
फोन नं. ४४१०९११, ४४१२०४०, ४४१३७२९, ४४१८१८७

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पत्र संख्या / Ref.:- 559(6-11)E2 078/079

मिति / Date:- Jun 24,2022

Institutional Review Committee

(IRC)

Mr. Rajan Paudel
Lecturer
Central Dept. of Public Health
IOM

Ref: **Approval of Research Proposal**

Dear Mr. Paudel
Thank you for the submission of your research proposal,entitled **" Diet, physical activity and related socio-cultural factors associated with gestational weight gain and pregnancy complications among a cohort of pregnant women in Kathmandu, Nepal"**
I am pleased to inform you that after careful evaluation, the above mentioned research proposal has been approved by Institutional Review Committee (IRC) of Institute of Medicine (IOM), Tribhuvan University on Jun 23,2022.

As per our rules and regulations, the investigator has to strictly follow the protocol stipulated in the proposal. Any change in title, objectives, problem statement, research questions or hypothesis, methodology, implementation procedures, data management and budget may be made so and implemented only after prior approval from IRC. Thus, it is compulsory to submit the details of such changes intended with justifications prior to actual change in the protocol.

Please note that you can start recruiting the research participants only after getting approval letter from the IRC. You are also requested to follow the ethical guidelines of IRC of IOM.

After completion of your study, you must submit a copy of final draft of your research to the Research Department.
If you have any further queries, please do not hesitate to contact us.

.....
Associate Prof. Dr. Manisha Chapagai
Member Secretary
Institutional Review Committee

Fax No. 4418186, E-mail: iomdean@iom.edu.np / website: www.iom.edu.np

Annex-2 Questionnaires

MatriPoshan Study

Tampere University/Tribhuvan University

ID

_____

Anthropometric measurements

Weight measurement 1: _____ kg (with one decimal point)

Weight measurement 2: _____ kg

Weight measurement 3, if needed: _____ kg

Height measurement 1: _____ cm (with one decimal point)

Height measurement 2: _____ cm

Height measurement 3, if needed: _____ cm

Tool 1: Questionnaire for Background Information

Date of interview (YYYY/MM/DD)_____

Section 1: Demographic and socio-economic information			
	Questions	**Categories**	**Coding**
1.1	Which district are you originally from?	Name of district:	
1.2	How long have you been living in Kathmandu?	Years (>12 months)_____ Month(>6mths to 11 months) _____	
1.3	What is your date of birth?	Nepali date YYYY/MM/DD: _____ English date YYYY/MM/DD: …… Reported Don't know	
1.4	What is your age (completed years)?	_____ Years	
1.5	What is your marital status?	Married or cohabiting	1
		Unmarried	2
		Divorce	3
		Separated	4

		Widow	5
1.6	What is your ethnicity? (See details in the annex)	Brahmin/Chhetri	1
		Tarai/Madhesi Other Castes	2
		Dalits	3
		Newar	4
		Janjati	5
		Muslim	6
		Other, please specify: _____	7
1.7	How many members are there in your family?(living together in the same house/apartment, using the same kitchen)	……persons	
1.8	What is the type of your family?	Nuclear	1
		Joint	2
		Extended	3
1.9	What is your religion?	Hindu	1
		Buddhist	2
		Muslim	3
		Christian	4
		Other, please specify: _____	5
1.10	Have you had any education?*(if not, go to the question 1.13)*	Yes=1 No=0	
1.11	If yes, how many years of education have you completed?	_____ Years	
1.12	What is your completed highest level of education?	Non-formal education	1
		Primary (class 5)	2
		Lower secondary (class 8)	3
		High school/secondary (class 10)	4
		School Education Examination (SEE) or equivalent	5
		Higher secondary (class 12)	6
		Bachelor	7
		Master and above	8
1.13	Do you work, study, or are you a homemaker? (Multiple responses possible)	Work	1
		Study	2
		Homemaker	3
1.14	What is your main occupation?	Agriculture	1
		Business	2
		Labour	3
		Service	4
		Other, please specify:_____	5
1.15	On average, how much do you earn?	NRs…… per month	1

		or NRs……..…. per year	
		None	2
1.16	On average, how much does your family, with whom you live, earn in total?	NRs…… per month or NRs……..…. per year	
1.17	What is the completed highest level of education of your husband?	Non-formal education	1
		Primary (class 5)	2
		Lower secondary (class 8)	3
		High school/secondary (class 10)	4
		School Education Examination (SEE) or equivalent	5
		Higher secondary (class 12)	6
		Bachelor	7
		Master and above	8

Section 2: Household work and decision making			
2.1	Does anyone help with your household work?	Yes=1 No=0	
2.2	If yes, what kind of work do they help with? (Multiple answers possible)	To cook food	1
		To clean house	2
		To help in the kitchen garden	3
		To look after cattle	4
		To bring water	5
		To clean/wash utensils	6
		To shop for grocery	7
		To cut grass or wood	8
		Other, Please specify ……	9
Who will make decision on the following occasions? (you can choose <u>multiple options</u> if needed)			
2.3	To buy basic or regular foods (rice, lentils, vegetables, fruits etc.)	You	1
		Husband	2
		Mother-in-law	3
		Father-in-law	4
		Other, please specify……	5
2.4	To buy animal source food (meat, fish, egg, milk, ghee)	You	1
		Husband	2
		Mother-in-law	3
		Father-in-law	4
		Others please specify……	5
2.5	To eat in a restaurant	You	1
		Husband	2
		Mother-in-law	3

		Father-in-law	4
		Other, please specify……	5
2.6	To participate in social activities	You	1
		Husband	2
		Mother-in-law	3
		Father-in-law	4
		Other, please specify……	5
2.7	To participate in exercise/hobbies/recreation	You	1
		Husband	2
		Mother-in-law	3
		Father-in-law	4
		Other, please specify……	5
2.8	To decide about health care for yourself	You	1
		Husband	2
		Mother-in-law	3
		Father-in-law	4
		Other, please specify……	5
2.9	To make major household purchases	You	1
		Husband	2
		Mother-in-law	3
		Father-in-law	4
		Other, please specify……	5

Section 3: Health and behaviour			Yes/No
3.1	Age at first pregnancy ……. years		
Please record sections 3.2-3.6 from the yellow card as far as applicable			
Reg.No of the woman from the yellow card: _____			
3.2	a. Last menstrual period (LMP) ☐☐ ☐☐ ☐☐ Year Month Day	b. Expected date of delivery (EDD) ☐☐ ☐☐ ☐☐ Year Month Day	
3.3	☐☐ a. Gravida	☐☐ b. Parity	
3.4	Number of miscarriages: ……		
3.5	a. Weight (kg) on the first page of the yellow card: ……	b. Height (cm): ……..	
3.6	Date: _____ (Date recorded in the upper right corner of the yellow card)		
The following questions will be asked by interviewing the participant:			
3.7	Does any of your family member have any of the following diseases?	Diabetes/Sugar	1 / 0
		Hypertension/Pressure	1 / 0

		Cancer	1 / 0
		Mental health problems:	
		Anxiety	1 / 0
		Depression	1 / 0
		Other, please specify:	1 / 0
3.8	If yes, who has such a disease?	…….	
3.9	Has the disease been diagnosed by a doctor?	Member 1: Member 2: Member 3: Member 4:	1 / 0 1 / 0 1 / 0 1 / 0
3.10	Do you have any of the following diseases?	Diabetes/Sugar	1 / 0
		Hypertension/Pressure	1 / 0
		Cancer	1 / 0
		Mental health problems:	
		Anxiety	1 / 0
		Depression	1 / 0
		Other, please specify:	1 / 0
3.11	Has the disease been diagnosed by a doctor?		1 / 0
3.12	What are your main sources of health information? (Multiple answers possible)	Radio Television Social media/internet Newspapers Health Personnel Other, please specify: ……	1 2 3 4 5 6

4. Smoking

4.1 Have you ever consumed any tobacco products, such as cigarettes, guthkha, parag or other? (If No, skip to Q.N.5)

1 = Yes

0 = No

4.2 If yes, did you consume tobacco products before this pregnancy? (If No, skip to Q.N.5)

1 = Yes

0 = No

4.3 If yes, which of the following products did you consume before this pregnancy? (Multiple answers possible)

1. Manufactured cigarettes
2. Chewing tobacco
3. Other, please specify: ……

4.4 How frequently did you consume them before this pregnancy?

1. Daily
2. 1-6days a week
3. Occasionally

4.5 Have you consumed any tobacco products, such as cigarettes, guthkha, parag or other during the past 30 days? (If No, skip to Q.N.5)

1 = Yes

0 = No

4.6 If yes, which of the following have you consumed most during the past 30 days?

1. Manufactured cigarettes
2. Chewing tobacco
3. Other, please specify: ……

4.7 How frequently did you consume that type of tobacco during the past 30 days?

1. Daily
2. 1-6 days a week
3. Occasionally

4.8 How many sticks (or packets etc.) did you consume daily, weekly or monthly during the past 30 days?

Tobacco products	**Number / day**	**Number / week**	**Number / month**
Manufactured cigarette sticks			
Chewing tobacco packets			
Other, please specify_____			

5. Alcohol

5.1 Have you ever consumed any alcohol such as raksi, jand, beer, wine, spirits or other? (If No, skip to Q.N. 6)

1 = Yes

0 = No

5.2 If yes, did you consume these products before this pregnancy? (If No, skip to Q.N. 6)

1 = Yes

0 = No

5.3 If yes, which one did you consume before this pregnancy? (Multiple answers possible)

1. Raksi (local)

2. Jand/Kshang
3. Beer
4. Wine
5. Spirits (harddrinks)
6. Other, Please specify_____

5.4 How frequently did you have at least one standard alcoholic drink before this pregnancy? (Any type of alcohol) (Fig of 1 standard drink)

1. Less than once a month
2. 1-3 days per month
3. 1-2 days per week
4. 3-4 days per week
5. 5-6 days per week
6. Daily

5.5 Have you consumed any alcohol such as raksi, jand, beer, wine, spirits or other during the past 30 days? (If No, skip to Q.N.6)

1 = Yes

0 = No

5.6 If yes, which one have you consumed during the past 30 days? (Multiple answers possible)

1. Raksi (local)
2. Jand/Kshang
3. Beer
4. Wine
5. Spirits (harddrinks)
6. Other, Please specify_____

5.7 How frequently did you have at least one standard alcoholic drink during the past 30 days? (any type of alcohol) figure of 1 standard drink

1. Less than once a month
2. 1-3 days per month
3. 1-2 days per week
4. 3-4 days per week
5. 5-6 days per week
6. Daily

6. Some dietary questions

6.1 How often do you **add salt or a salty sauce such as soy sauce** to your food right before you eat it or as you are eating it?

1. Always

2. Often
3. Sometimes
4. Rarely
5. Never
6. Don’t know

6.2 Are you a vegetarian?

1 = Yes

0 = No

6.3 Have you been using any nutrition supplements (pills/powder/liquid) during the last 30 days?

1 = Yes

0 = No

6.4 If yes, which product (s) have you been using? (Please tell me the brand(s), included nutrients, the dose or other details you can remember)

(Please ask to bring the package or write down the information for the next visit)

Brand/product	Nutrient(s)	Dose(s) for each nutrient	Frequency of use (1=daily or almost daily, 2=weekly, 3=less often than weekly)

6.5 What kind of fat/oil do you mainly use for cooking?

1. Sunflower oil
2. Mustard oil
3. Soyabean oil
4. Butter/ghee
5. Other, please specify_____

6.6 Who does most of the cooking in your household?

1. You
2. Mother-in-law

3. Husband
4. Other, please specify_____

Annex: 3 Consent form

सहभागी सूचना सिट

अनुसन्धान शिर्षकः काठमाडौंमा वस्ने गर्भवती महिलाहरुको पोषण, शारीरिक कृयाकलाप, मानसिक स्वास्थ्य तथा सामाकि रितिरिवाजले गर्भवती आवस्थामा तौल बृद्धि र स्वास्थ्यमा हुने जटिलता सम्वन्धी अध्ययन (मातृपोषण अध्ययन)

परिचय

त्रिभुवन विश्वविद्यालय, नेपाल र टाम्परे विश्वविद्यालय, फिनलेण्डको संयुक्त प्रयासमा यो मातृपोषण कोहर्ट अध्ययन गरिदै छ। म यस अध्ययनको लागि अनुसन्धान सहयोगी हु। यस अध्ययन परियोजनामा यहांको सहभागीताको लागि अनुरोध गर्दछु।

सहभागी हुने वा नहुने भन्ने निर्णय लिनु पूर्व तपाईले यस अध्ययन किन गरिदै छ र यस अध्ययनको आवश्यकता के छ भन्ने बारे जान्नु महत्वपूर्ण हुनेछ । कृपया आफ्नो समय दिएर सूचना बारे सुन्नुहोस्/पढ्नुहोस वा आवश्यक परे अरुसंग छलफल गर्नुहोस । यदि कुनै कुरा अष्पष्ट भएमा वा अन्य थप जानकारी चाहेमा हामीलाई सम्पर्क गर्नुहोस् ।

यस अध्ययनको उद्धेश्य के हो ?

अन्य देशहरुमा भएका अध्ययनहरुले गर्भवती महिलाहरुको स्वस्थ खानपिन, शारीरिक कृयाकलाप र मानसिक स्वास्थ्यले गर्भवती महिला तथा जन्मने वच्चाहरुको स्वास्थ्यमा महत्वपुर्ण हुन्छ भन्ने देखाएको छ। हामीले यस अध्ययनद्धारा खानपिन, शारीरिक कृयाकलाप र मानसिक स्वास्थ्य कसरी गर्भावस्था र नवजात शिशुसंग सम्बन्धित छ। यस अध्ययनको परिणामले नेपालमा मातृस्वास्थ्य सम्वन्धी निर्देशिका तयार पार्नुको साथै गर्भवस्थाको स्वास्थ्य सेवा प्रदानको लागी समेत सहयोग हुनेछ ।

कसले यस अध्ययनलाई स्वीकृत गरेको छ ?

चिकित्सा शास्त्र अध्ययन संस्थानको इन्स्टिच्युटनल रिभ्यु कमिटिले यस अध्ययनलाई स्वीकृत गरेको छ भने, अब्सटेट्रिक्स तथा गाइनेकोलोजी विभागले यस अध्ययन संचालनको लागी अनुमति दिएको छ ।

मैले कुन सूचना प्रवाह गर्नु पर्ने हो र यसको लागी कति समय लाग्दछ ?

तपाईलाई हामीले आफ्नो बारेमा, तपाईको खानपिन, शारीरिक कृयाकलाप र मानसिक स्वास्थ्य बारे सुचना सोध्नेछौं । तपाईले एक हप्तासम्म शारीरिक कृयाकलाप सही मापन गर्नकोलागि घडि जस्तो व्याण्ड नारिमा लगाउनु पर्नेछ । तपाई एक हप्ता पछि घडि फर्काउन आउदा फेरि तपाईलाई खानपिन र शारीरिक क्रियाकलाप सम्वन्धि प्रश्नावली सोधिने छ । खानपिन, शारीरिक कृयाकलाप र मानसिक स्वास्थ्य सम्बन्धी उस्तै प्रश्नावली गर्भावस्थाको अन्तिम समय (३६-३७ हप्ता) मा सोधिने छ। तपाईले फेरी घडीजस्तो व्याण्ड एक हप्ता लगाउनु हुनेछ र सो घडी फर्काउने वेला पून खानपिन र शारीरिक कृयाकलाप सम्वन्धि प्रश्नावली सोधिने छ ।

सारमा तपाईलाई चार पटक अन्तर्वाता लिइने छ । तपाईलाई आजको पहिलो अर्न्तवार्ताको लागी ६०-९० मिनेट समय लाग्नेछ तर हप्ता दिन पछिको अन्तर्वार्ता आधा घण्टाको हुनेछ । त्यसैगरि तेश्रो अन्तर्वार्ताको लागी ६० मिनेट लाग्नेछ भने गर्भावास्थाको अन्त्यतिर लिइने चौथो अन्तर्वार्ता आधा घण्टाको हुनेछ ।

हामीले तपाईको गर्भावस्था, सुत्केरी र नवजात शिशुको सूचनाको विवरण तपाईलाई दिएको पहेलो कार्ड र अस्पतालको रेकर्डवाट पनि लिने छौं ।

सहभागी हुंदा हुने फाइदा तथा जोखिमहरु के के छन् ?

तपाई यस अध्ययनमा सहभागी भएको कारणले प्रत्येक्ष लाभ त हुदैन तर तपाइलाई स्वास्थ्य सम्वन्धी गम्भिर समस्या देखिएमा सम्वन्धित डाक्टरकोमा प्रेशण गर्नेछौं । यस अध्ययनवाट श्रृजित नतिजाले सुरक्षित मातृसेवा सम्वन्धी निर्देशिका तयार पार्नुको साथै महिलाहरुको खानपिन, शारीरिक क्रियाकलाप र स्वास्थ्य प्रवर्धनको लागि सहयोग गर्नेछ । नाडिमा लगाउने व्याण्ड घडी लगाएको जस्तो सुविधाजनक हुनेछ । तपाईले यो व्याण्ड लगाएको वेला अन्य दिनहरुमा गरिने सामान्य कृयाकलाप वा वानी घरभित्र वा

वाहिर गर्न सक्नु हुनेछ । तपाईले यस अध्ययनमा सहभागी भएकोमा र घडी लगाएको कारणले कुनै नराम्रो असर पार्ने छैन ।

के सहभागी हुदा गोपनियता कायम हुन्छ ?

तपाईको नाम कुनै प्रिन्ट मिडियामा आउने छैन र तपाईवाट लिएको सूनाहरु सवै गोप्य राखिने छ । तपाईको व्यक्तिगत सूचनाहरुमा अनुसन्धान कर्ता र अनुसन्धान सहायकले मात्र पहुच राख्नेछन् । तपाई यस अध्ययनमा सहमागी हुने वा नहुने तपाईकै इच्छामा निर्भर गर्दछ। यदि तपाई सहभागी हुन चाहनुभयो भने तपाईले कुनै कारणबिना कुनैपनि समयमा स्वतन्त्र रुपले छाड्न सक्नुहुनेछ। तपाई यस अध्ययनमा सहभागी हुने या नहुने कारणले तपाईलाई दिने सेवामा कुनै फरक पर्ने छैन ।

यस अध्ययनको परिणाम कसरी प्रयोग हुन्छ?

यस अध्ययनको समाप्ती पछि अध्ययनको परिणामहरु बैज्ञानीक जर्नलमा प्रकाशित गरिने छ र अध्ययनको शारांस यस अध्ययनमा सहभागीहरुले मागेको खण्डमा दिनइने छ । कुनै पनि तरिकाले यस अध्ययनमा सहभागी व्यक्तिहरुको सुचना थाहा हुने छैन ।

थप जानकारीको लागि म के गर्न सक्छु ?

यदि यस अध्ययनसंग सम्वन्धित थप जानकारी र सूचना चाहेमा मातृपोषण टीमलाई सम्पर्क गर्न सक्नुहुनेछ :

राजन पौडेल
डक्टोरल रिसर्चर
फोन : ९८५१०२५९७५
जनस्वास्थ्य केन्द्रीय बिभाग, त्रि.वि.

प्रेम लाल बसेल
डक्टोरल रिसर्चर
फोन : ९८५११७५३६१
महाराजगंज चिकित्सा क्याम्पस, त्रि.वि.

अन्य अनुसन्धानकर्ता:

मूख्य अनुसन्धानकर्ता: टार्या किनुनेन, पि.एच.डी, टाम्परे बिश्वविद्यालय, फिनलेण्ड

सह अनुसन्धान कर्ता: आमोद पौड्याल, पि.एच.डी, जनस्वास्थ्य केन्द्रीय बिभाग त्रि.वि., काठमाडौं

... ... धन्यवाद ... ...