

**ADOLESCENTS ANEMIA IN NEPAL: AN OVERVIEW OF  
DETERMINANTS, EXISTING POLICIES AND PROGRAMS TO  
COMBAT ADOLESCENT ANEMIA IN NEPAL**

**A**

**Thesis submitted to  
KIT Royal Tropical Institute  
Amsterdam, Netherlands**

**For partial fulfillment of the requirements for the degree of  
Masters in international health (MIH)**

**Submitted By:**

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**August 2023**

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**By:**

Bhawana Shivakoti

**DECLARATION:**

Where other people’s work has been used (from either a printed or virtual source, or any other source), this has been carefully acknowledged and referenced in accordance with academic requirements.

The thesis **ADOLESCENTS ANEMIA IN NEPAL: AN OVERVIEW OF DETERMINANTS, EXISTING POLICIES, AND PROGRAMS TO COMBAT ADOLESCENT ANEMIA IN NEPAL** is my own work.

Signature: .....  .....

Master of Science in International Health (MIH)  
12 September 2022 – 1 September 2023  
KIT (Royal Tropical Institute)/Vrije Universiteit Amsterdam  
Amsterdam, The Netherlands  
September 2023

**Organized by:**

KIT (Royal Tropical Institute)  
Amsterdam, The Netherlands

**In cooperation with:**

Vrije Universiteit Amsterdam (VU)  
Amsterdam, The Netherlands

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## **ACKNOWLEDGEMENT**

I would like to express my sincere gratitude and thanks with deep appreciation to the Department of Public health and International Health, KIT Royal Tropical Institute, Amsterdam, Netherlands for permitting and supporting me in conducting this research study as the partial fulfillment of master's in international health (MIH).

I am grateful to my supervisors for their constant support and guidance during this research. I am grateful for their scholarly guidance on various issues that emerged during my inquiry for the thesis and in the writing phase of this study.

I would also like to heartily thank my friends from Nepal for their continuous support during the study period. My utmost acknowledgement goes to all the individuals who directly and indirectly supported me during my entire journey of my thesis period.

Bhawana Shivakoti

## LIST OF ABBREVIATIONS

COVID	Corona Virus Diseases
DoHS	Department of Health Services
GDP	Gross Development Product
HDI	Human Development Index
HIV	Human Immuno-deficiency Virus
LMICs	Lower-middle Income Countries
MDGs	Millenium Development Goals
MMR	Maternal Mortality Rate
MoHP	Ministry of Health and Population
NDHS	Nepal Demographic Health Survey
NGOs	Non-governmental organizations
NNMSS	Nepal National Micronutrient Status Survey
AMR	Adolescent Mortality Rate
LLINs	Long Lasting Insecticide Nets
SEAR	Southeast Asia Region
TB	Tuberculosis
UNICEF	United Nations Children Emergency Funds
WHO	World Health Organization

## GLOSSARY

**Anemia:** It is a condition where the number of red blood cells is lower than normal in a human body(1).

**Adolescence:** The age between the 10-19 years, a phase of life between childhood and adulthood and experiences rapid physical, cognitive, and psychosocial development (2).

**Determinants of health:** The factors that affect the health of individuals and communities (3).

**Terai:** It is the lowland region in Nepal and is characterized by the grasslands, forests. It spreads through northern India and southern Nepal(4).

**Chhaupadi:** It is a tradition followed especially in the far-western region of Nepal where menstruating girls and women are forbidden from touching other people and objects and they are required to live typically in a livestock sheds as they are considered to be “untouchables”(5).



## ABSTRACT

**Background:** Anemia is a huge public health issue among children, adolescence, and mothers in Nepal. Anemia is caused by numerous factors like nutrient deficiencies, infections, poor sanitation and hygiene, chronic diseases, and inherited blood disorders. Iron deficiency (ID) is the most common cause for anemia due to the poor intake of diet and malabsorption of foods. Twenty-one percent of adolescent girls (10-19 years) and 11% of adolescent boys (10-19 years) are suffering from anemia in Nepal according to the Nepal National Micronutrient Status Survey (NNMSS).

**Objective:** This study aims to provide a comprehensive overview of the biological, environmental, cultural, ecological, and socioeconomic determinants of adolescent anemia along with the different policies and programs implemented to reduce adolescent anemia. The study also identifies the challenges in implementing the programs and opportunities to combat adolescent anemia in Nepal and recommendations have been provided in order to address these challenges found during the study.

**Methods:** A literature review was done and guided by the *Rai. et. al.* conceptual framework on “Determinants of anemia among women with reproductive age and children in Nepal” for providing an overview of the determinants of anemia among the adolescents. Also, the policies and programs to reduce the burden of adolescent anemia in Nepal has been explained along with challenges and opportunities in the implementation of existing and future anemia programs.

**Results:** There are studies performed to address the prevalence of anemia among adolescents in Nepal, however, very few of the studies addresses the determinants of anemia among adolescents. The major determinants contributing to adolescent anemia are biological (growth and development, menstruation, inadequate nutrition, vegetarian diet), environmental (worm infestations, poor sanitation, and hygiene), cultural (Hindus, restriction on certain foods during menstruation, food choices and practices, practices during menstruation), ecological (*Terai, Hills, mountains*) and, socioeconomic (education, parent’s education, and occupation). Iron folic acid (IFA), flour fortification program, distribution of Long-lasting Insecticide Nets (LLINs), national policy on sanitation, school health program are few programs that are focused on reducing adolescent anemia in Nepal. Social inequalities, inadequate dietary diversity, healthcare access, geographical variations, diversified culture and traditions, limited research are some of the challenges faced to effectively implement the programs and policies to reduce the burden of adolescent anemia in Nepal.

**Conclusion and Recommendations:** The anemia among adolescent is major issue in Nepal. Though few studies address the determinants of anemia among adolescents, the adolescent group is being prioritized and more policies and programs are being formulated. The recommendations were about investment in research and studies, multi-sectoral integration (agriculture, education, development), private partnerships, capacity building and strengthening healthcare services which help in addressing the issue of adolescent anemia.

**Keywords:** Adolescence, Anemia, Nepal, Determinants, Policies, Programs

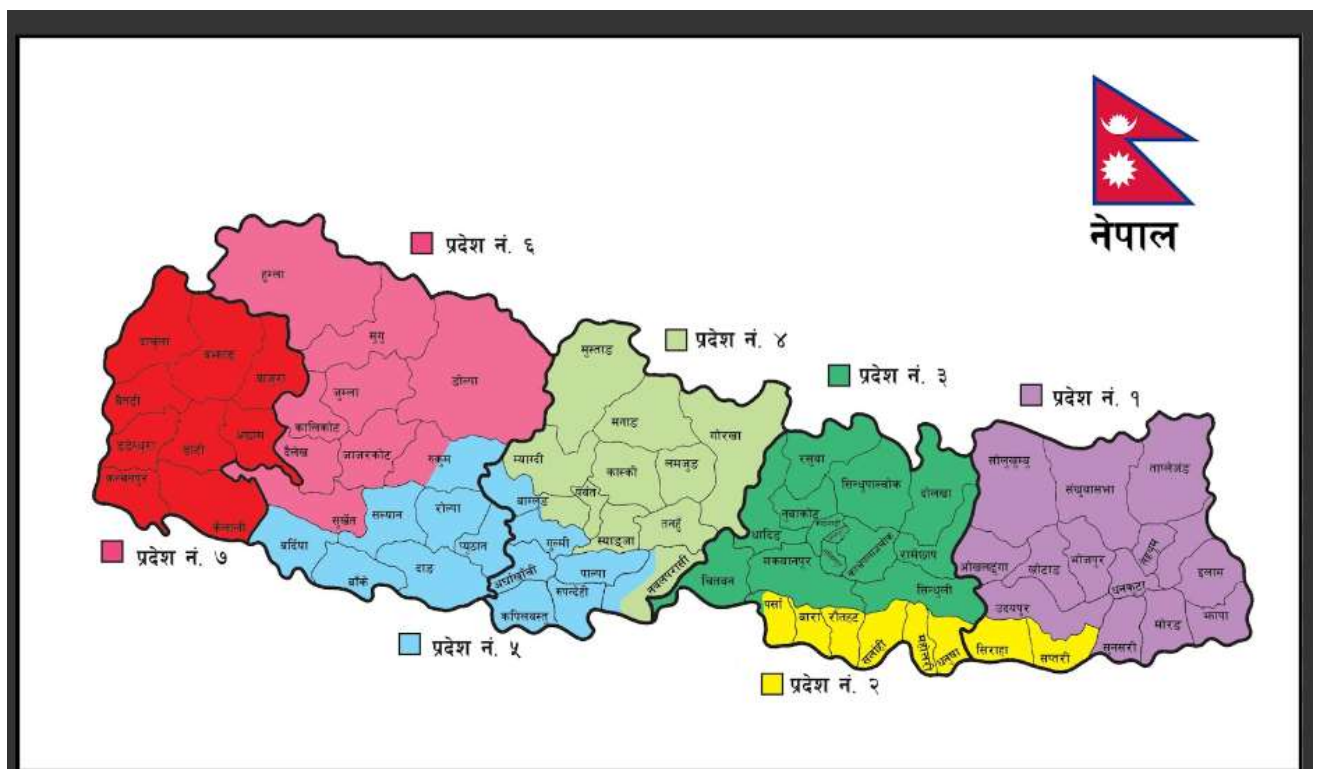
## CHAPTER ONE

### BACKGROUND

#### 1.1 Country Profile

Nepal, now called the federal Democratic Republic of Nepal, is a landlocked country in between the China and India, in a Southeast Asia Region (SEAR), with a population of 29,164,578, where 48.87% and 51.13% of them are males and females respectively(6). Out of the total population, 53.61% lives in the lowlands(Terai) region while 40.31% live in the hill and only 6.08% of them live in the mountain region(6). 66.17% of the total population reside in the urban municipality while 33.83% lives in the rural municipalities(6). The average population growth rate was 0.92% and the population density (number of people per square kilometer of area) was 198(6).

Figure 1: A Geo-political map of Nepal



A Map Of Nepal(7)

21% of the total population of Nepal are adolescence(8). According to the Global Revision of the World Population Prospects(2017), 10.6% and 10.7% of the total female adolescents are of the age group 10-14 years and 15-19 years respectively whereas 11.9% and 12% of the male adolescents are of the age group 10-14 years and 15-19 years respectively(9). Most of the people in Nepal follow Hinduism (80%) whereas Buddhism (11%), Christianity (4.8%) and Islam (4.2%) are the other religion in Nepal (36). The country has about 36 different ethnic groups and each ethnic groups and religion has their own customs and beliefs (36). Nepal still has a caste system which has been divided in a higher caste and lower caste groups (36).

According to Nepal Demographic Health Survey (NDHS) 2022 report, overall 98% of household in Nepal has access to atleast basic drinking water service, 73% of household population has at least basic sanitation service and 72% of the population has access to basic handwashing facility with soap and water (5).

### **1.2 Education**

Out of the country's total population (aged 5 years and above), the literacy rate was 65.9%, while male and female literacy rate was 75.1% and 57.4% respectively in the year 2021(6). According to the Nepal Demographic Health Survey (NDHS) 2022, 8% of men and 26% of women age 15-49 years have no education while 8% of men and 4% of women have more than secondary education(10). 89.4% of the adolescent girls aged 10-14 years attends the school(right grade) and 10.6% of them are out of school(9). For the age 15-19 years, 62.1% of them attend schools while 37.9% of the girls are out of school. For the boys aged 10-14 years, 95.2% of the boys attend schools while 4.8% of them are out of the school(9). 74.5% of the boys aged 15-19 years attend schools while 25.5% of them are out of school(9).

### **1.3 Economy**

The economy of Nepal has recovered in the fiscal year with the gross domestic product (GDP) 5.8%, which was observed due to the progress in coronavirus(COVID 19) vaccination efforts, which contributed in the normalization in economic activity(11). The country is at the high risk of natural calamities, climate change, infrastructure gaps, inadequate human capital, and political and policy uncertainty, which is associated with poor development and economic growth of the country, especially hindering the development and growth of adolescent population(11).

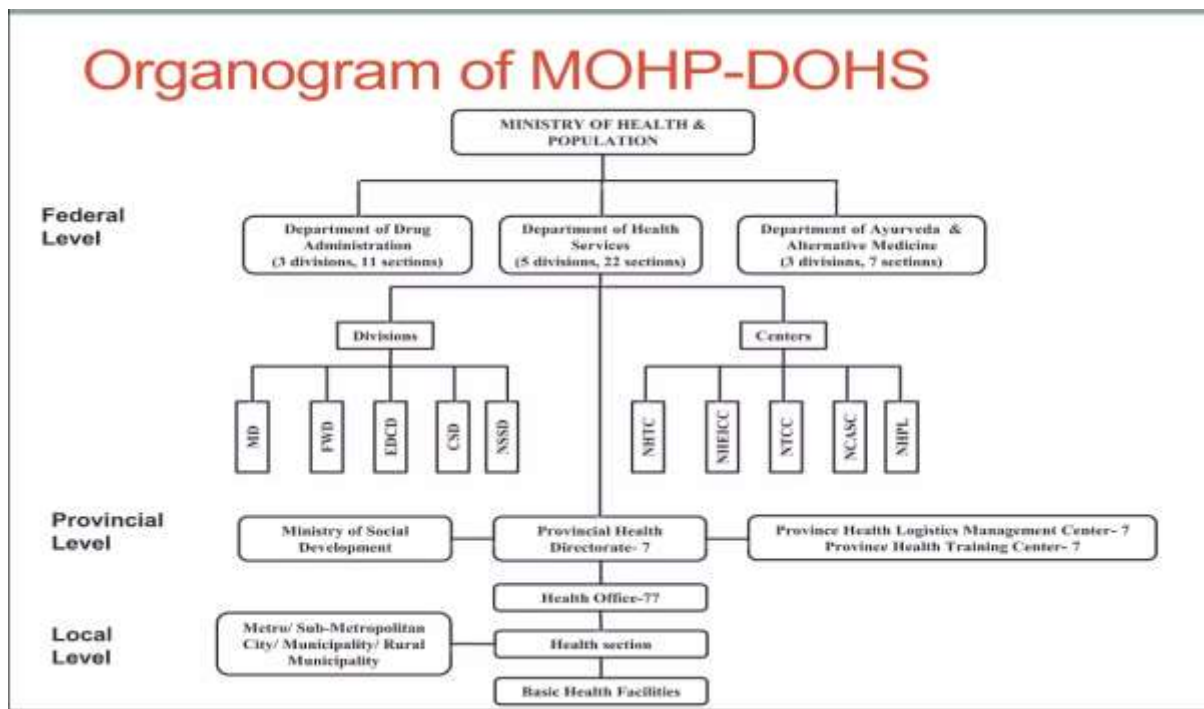
### **1.4 Human Development, Poverty, and Inequality**

Nepal achieved the lower middle-income country status in 2020 and is moving towards uplifting it's status from Least development country by the 2026(12). 17.4% of the total population in Nepal are multidimensionally poor, where 67.3% of population resides in the urban area and remaining 32.7% of them live in rural areas(13). A long and healthy life, access to knowledge and a decent standard of living are the three main basic dimensions of human development index (HDI). The HDI score of Nepal in the year 2019 was 0.587, comprising 0.647 and 0.561 HDI scores in urban and rural areas respectively(13).

### **1.5 Health System of Nepal**

Nepal was transformed into a federal state in the 2015 from a long unitary system which resulted in federal, provincial and local governance and leadership(14). Because of the federal system the healthcare system of Nepal also got restructured. Ministry of Health and Population (MoHP) being the core center of the health system which provides guidance to the Department of Health Services (DoHS) and to the provincial and local governments to deliver the healthcare services which includes promotional, preventive, diagnostic, curative, and palliative care(14). Nepal has a mixed health service delivery system, which consists of the public sector, private sector, and the non-governmental organizations (NGOs)(15).

Figure 2: Organogram of New Healthcare System of Nepal



Organogram of New Healthcare System of Nepal(16)

### 1.6 Food Insecurity

According to the NDHS report 2022, about 13% of the household population in Nepal experiences moderate or severe food insecurity(10). The moderate or severe food insecurity is higher in the rural areas (16%) while is 11% in the rural areas(10). Mountainous region experiences the higher food insecurity (21%) compared to the hill (12%) and the terai regions(12%) each(10). About 80% of the population is at risk of natural and climate-change hazards, leading to high risk of food insecurity according to the Nepal Climate Change Diagnostic Report(17). The vulnerable communities, particularly poorer households, remote, mountainous region and those relying on subsistence agriculture are at the higher risk of food insecurity(17).

An analysis from child-level food insecurity data showed that households with adolescents were twice to report some level of food insecurity(18). Evidence shows that adolescents with food insecurity, or in households with high food insecurity have higher risk of having poorer health and likely to be affected by various health reasons like Iron deficiency anemia, poor dental health, depression and suicidal ideation, dyslipidemia(18).

## CHAPTER TWO

### PROBLEM STATEMENT, JUSTIFICATION, AND OBJECTIVES

#### 2.1 Problem Statement

In Nepal, anemia continues to be a serious global public health problem affecting young children, adolescents, pregnant and lactating mothers(19). Anemia is a condition where the number of red blood cells in the hemoglobin is lower than normal (10). Fatigue, weakness, dizziness, shortness of breath is some of the symptoms of anemia. Anemia is caused by various factors like nutrient deficiencies (inadequate diet or inadequate absorption of nutrients), infections (malaria, tuberculosis, parasitic infections), chronic diseases and inherited blood disorders (10). According to World Health Organization (WHO), about 40% of children 6-59 months of age, 37% of pregnant women, and 30% of women 15-49 years of age are found to be anemic worldwide in the year 2019(19). Along with the adverse health consequences, anemia results in economic loss of the nation and the globe(20). The most common cause for the anemia is iron deficiency(ID) among all the others, which results from poor intake of diet, malabsorption of food(21).

Adolescence is an important and unique stage of human development from the ages 10 to 19 years (14). It is the phase of life from childhood to adulthood where young people experience rapid physical, psychosocial and cognitive development (14). About 20% of the population in the countries of South East Asia Region(SEAR) includes adolescent(22). Generally, adolescents are a healthy group as morbidity and mortality around this age is comparatively low. However 102 per 100000 adolescent mortality rate(AMR) in the SEAR is nevertheless significant and iron-deficiency anemia is one of the leading cause for the adolescent morbidity and mortality in the region after injury and depression(23). Anemia not only results in adverse effect on the adolescents health, it also affects the educational performance and labor productivity(24). Not only on the physical and cognitive development, anemia increases the risk for the birth complications and delivery among the pregnant girls(24). Thus, adolescent's anemia is not only the concern for today but also for both nation and global development as a whole(24).

According to the Nepal National Micronutrient Status Survey (NNMSS) 2016, 21% of adolescent girls (10-19 years) and 11% of adolescent boys (10-19 years) were found to be anemic (13). Adolescent's anemia has been identified as serious public health issue in Low and Middle-income countries (LMICs) like Nepal (14).

#### 2.2 Rational of the study

Though the Nepal Demographic Health Survey (NDHS) is the major source of national data on anemia, it provides information only on mothers and children under five years of age (3). In Nepal, there have been research among the prevalence of adolescent anemia, but limited studies have been done to address the determinants of the anemia among the adolescence group as they have been limited to a certain region like districts and hospitals (15)(16). For example, a cross-sectional community based study carried out in Morang District of Nepal showed the 65.6% of the adolescent population was anemia with 62.4% and 70.0% of them comprising rural and urban region respectively(21). Similarly, another hospital-based study done in the far western

region of Nepal shows the overall prevalence of anemia was 52% for both male and female adolescents, where the highest prevalence of anemia was generally found among the age group of 18-19 years old(25).

There is very limited data available on the determinants of anemia among the adolescent population and how the existing policies and programs on anemia are addressing the immediate, underlying and enabling determinants of adolescent anemia in general in Nepal(26). This study will review and analyze the determinants of anemia among adolescents in Nepal, identify the existing programs and policies in combating the adolescent anemia and analyze the challenges and opportunities in these policies and programs. This may support policy makers in the country or region to identify and implement concrete evidence-based interventions in reducing the burden of anemia among adolescents.

## **2.3 Study objectives**

### **2.3.1. General Objective**

1. To provide a comprehensive overview of the determinants (underlying, intermediate, and immediate) of adolescent anemia in Nepal and analyze if how current programs and policies aimed at reducing adolescent anemia address these determinants and to provide recommendations for future anemia programs.

### **2.3.2. Specific Objectives**

1. To identify and analyze the underlying, intermediate, and immediate determinants of anemia among adolescents in Nepal.
2. To identify and analyze current programs and policies implemented in Nepal to address anemia among adolescents.
3. To identify opportunities and challenges in the implementation of adolescent anemia programs and policies in Nepal.
4. To provide recommendations for improving existing and future programs and policies to effectively address adolescent anemia in Nepal.

## CHAPTER THREE

### METHODOLOGY AND CONCEPTUAL FRAMEWORK

#### 3.1 Methodology

##### 3.1.1. Research Strategy

A literature review was performed by searching PubMed, Vrije University (VU) online library and Google scholar. The study explored the determinants of adolescent anemia, analyzed how the existing programs and policies addresses these determinants to reduce the burden of adolescent anemia in Nepal. Grey literature, National programs, and policies, surveys, and reports from national and international organizations and websites such as Ministry of health (MoH), Department of health services (DoHS), Nepal Demographic Health Survey (NDHS), World Health Organization (WHO), United Nations children emergency fund (UNICEF), Global Nutrition Report, annual Reports have been used.

The MeSH terms were used to perform the search in PubMed and snowballing technique for the selection of the articles was performed based on the inclusion and exclusion criteria of the study. The keyword along with the combination of words (OR/AND) in this study includes “Anemia”, “Adolescent”, “Nepal”, “Determinants”, “Biological”, “culture” and many more. The list of the sources and keywords used for the search has been described briefly in **Table 1**.

##### **Inclusion criteria:**

1. Peer-reviewed, qualitative, and quantitative studies published within the last 20 years as these studies provide the information’s along with the undergoing changes (new constitution, federal system, policy change) in the Nepal’s health system.
2. The literatures in both English and Nepali languages (English was the main language for the search of literatures, while Nepali was used to access more information which were not available in English).
3. The studies including women of reproductive age (which includes older adolescent girls).

##### **Exclusion criteria:**

1. Articles that do not provide access to the full texts.
2. Papers targeting high-income countries.

Table 1: A search strategy applied for the study

Objectives	Sources	Type of source	Keywords
Objective 1	Scientific Publications Peer-reviewed Literatures	VU Library PubMed Google Scholar	Adolescent, Anemia, Nepal, Determinants, Biological, Age, Sex, Diet, Environmental, infections, sanitation, hygiene, culture, traditions, menstruation, food choices, ecological, education, parent's education, parent's occupation, developing countries, India, Pakistan, Bangladesh, Indonesia.
Objective 2,3, and 4	Grey Literature Surveys Reports (Annual Report of Nepal, NDHS Repots)	National and International websites	Policies, programs, strategies, projects, interventions, challenges, effectiveness, lessons learnt.

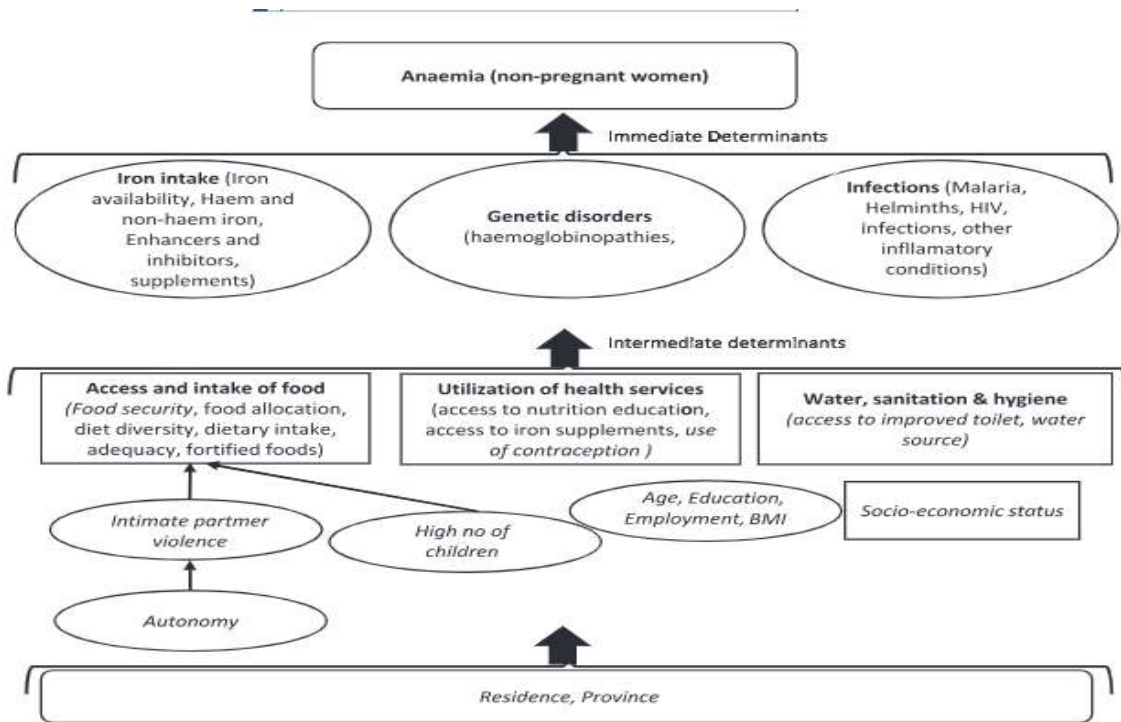
### 3.2 Conceptual Framework

A Rai's framework on the determinants anemia of anemia among reproductive age women in Nepal has been used for this study which has been shown in the **Figure 3**(27). This framework has been adapted from the UNICEF conceptual framework on the determinants of maternal and child nutrition(28). *The Rai.et.al's* framework has been tailored according to her findings in the study in Nepal. This framework was preferred over other frameworks such as WHO conceptual framework for determinants of anemia as it is context specific and recent framework. The objective of this study is on the determinants of anemia among adolescents and this framework guides in identifying those layers of determinants in adolescents. The UNICEF conceptual framework and WHO conceptual framework are more focused on the broader aspect of nutrition which do not meet the objective of this study.

The *Rai.et.al's* framework describes the different layers of determinants as underlying, intermediate, and immediate determinants(29). The immediate determinants of anemia include iron intake through supplements, genetic disorders, and infections. The intermediate level of determinants comprises of access to intake of food (food security, food allocation, dietary intake, diet diversity, fortified foods), access and utilization of health services, and water, sanitation, and hygiene. The underlying determinants is comprised of age, education, sex, socio-economic status, number of children, domestic violence.



Figure 3: Conceptual Framework for determinants of anemia among women and children



Rai.et.al. Conceptual Framework for determinants of anemia among women and children(27)

## **CHAPTER FOUR RESULTS**

### **4.1. Determinants of adolescent anemia in Nepal**

The determinants of anemia among adolescents have been described in the different layers as guided by the conceptual framework below as underlying, intermediate, and immediate determinants:

#### **4.1.1. Immediate determinants**

##### **4.1.1.1. Age and Sex**

In a cross-sectional community based study conducted among 204,72 adolescent girls in three schools in Bhaktapur district, 35.3% of them were found to be anemic(30). 34.2% of them were between the age group 13-15 years and mild anemia was found in the age group 16-19 years(30). Another community-based study conducted in rural and urban areas of Morang district, 52.3% of male adolescent was found to be anemic and 78.3% of female were found to be anemic out of 308 adolescents(31). In another study conducted among the adolescent boys and girls of age 10-19 years old in Nepal, the age was associated with anemia among girls but not boys(32). Another study conducted among adolescent girls in eastern part of Nepal, the age group was divided into 10-13 years(early adolescence), 14-15 years(mid adolescence), and 16-19 years(late adolescence), where 65.4% of anemia was found in early adolescent group as compared to 45.5%(late adolescence) and 31.6% (mid adolescence) respectively(33). Another nationally represented cross-sectional study conducted in Nepal among adolescents shows that the prevalence of anemia was higher among female adolescents (38%) than in males(24%)(24). Also, the prevalence was significantly higher among older females compared to younger and males respectively(24). Another study conducted in Indian adolescents at national and regional levels in 2021, the prevalence of anemia was higher among adolescent girls aged 15-19 years(47.5%) and lowest among adolescent boys aged 10-14 years(17.1%)(34).

Adolescent girls undergo a massive body and hormonal changes and the menstruation phase for them starts during this age. Heavy menstrual bleeding is also a common cause of anemia among the adolescent girls (29). Another study conducted in Nepal shows that, menarche resulting in blood loss makes the adolescents girls more vulnerable in being anemic (19).

#### **4.1.2. Intermediate determinants**

##### **4.1.2.1. Diet and lifestyle**

With the growing age, adolescent's demand for the micronutrients (such as iron and folic acid) as they are undergoing rapid physical growth making them more vulnerable to become anemic(24). One of the major contribution of anemia among the adolescent is poor dietary intake (especially food enriched in iron)(35). With a nutritional transition due to urbanization and globalization, there has been a massive change in the dietary habits among the adolescents resulting from various factors like peer pressure, behavioral and social changes, resulting in the poor choices of food(increase in food choices like processed foods)(35). For example, a study cross-sectional study conducted in Nepal among the 3780 adolescents aged 10-19 years, 34% of adolescents who consumed food from less than four food groups(such as grains, fruits and vegetables, eggs, poultry and meat, legumes and nuts, fish, and dairy products) were found to

be anemic compared to the ones who consumed meals consisting more than the four food groups per day which was found to be 25%(24). Another study conducted in the specific schools of *Kavrepalanchok*, Nepal among the adolescent girls, the vegetarian diet was the strongest predictor of anemia(36). In another study conducted in the among the adolescent girls in eastern part of Nepal, the prevalence of anemia was higher among the vegetarian girls (69.6%) than in the nonvegetarian girls(33). In another study conducted in Morang district in Nepal, shows that the prevalence of iron deficiency anemia was higher among adolescent female(78.3%) than in males (52.3%)(31).

#### **4.1.2.2. Environmental Determinants**

Nepal is a bio-diverse country where the people especially from the rural areas are directly dependent on the natural resources for survival(37). With different topographic regions and seasonal variations, Nepal is a home to various natural calamities which leads in outbreak of various infections(38). Poor sanitation and hygiene leading to anemia has been found by various studies conducted in similar context like Nepal(27)(35)(39).

A study conducted in Nepal shows that adolescents who walked barefoot(48%) were more likely to be affected by anemia than those who wore shoes outdoors(30%)(24). Another study shows that chronic exposure to the arsenic via contaminated groundwater contributes in anemia as exposure of arsenic leads to the increased erythrocytes hemolysis and reduced heme metabolism causing anemia(32). The NNMSS report shows that 50% adolescents in Nepal have intestinal worms making them more vulnerable in being anemic(40). In a study conducted in eastern part of Nepal among adolescent girls, the prevalence of anemia was higher among the one who had a history of worm infestation (52.7%) than the girls with the no history of worm infestation(50.9%)(33).

#### **4.1.2.3. Ecological Determinants**

In a cross-sectional study conducted, the adolescents residing in the lowlands(*Terai*) region had the highest prevalence of anemia(38%) as compared to the adolescents living in the hills(24%) and mountains(23%)(24). Another study also shows the prevalence of anemia among the adolescents girls is higher in *Terai* regions(Adjusted Odds Ratio:0.42,95% CI) as compared to the hilly and mountainous region (Adjusted odds ratio:0.28, 95%CI)(32).

#### **4.1.3. Underlying determinants**

##### **4.1.3.1. Socio-economic Determinants**

In a study conducted among adolescent girls in eastern part of Nepal it was found that there was no significant association between parent's education with the prevalence of anemia(33). In a nationally represented study conducted in Nepal, the socio-economic, education, parents literacy, occupation of parents are not found to be significantly associated with adolescent anemia(24)(32)(25). However, similar study conducted in India among adolescent in national and regional levels, the prevalence of anemia was lower among the adolescents who were in schools, were from higher socio-economic status, high parental literacy than with the ones who were out of schools, from poor socio-economic households and parental illiteracy(41). In another study conducted among adolescent females in Bhaktapur, Nepal, the prevalence of anemia was higher among the those whose parents were farmers and laborer than others(30).

#### 4.1.3.2. Cultural Determinants

In a study conducted in Nepal, the prevalence of anemia was high among the adolescent who were Hindus (31%) and the disadvantaged ethnic groups (34%) as compared to non-Hindus and the elite ethnic groups (19). The adolescent girls, especially Hindus, experience severe stigmatization around menstruation, which limits their participation in household chores, restrictions in certain food items, limiting their access to food and hygiene and sanitation (19). Also, another study conducted in Nepal, shows that the *Janajati* adolescent girls were at a higher odd of risk of being anemic (3.04 times) compared to girls from the Muslim ethnicity (27).

#### 4.2. Policies and Programs to reduce the burden of anemia among adolescents in Nepal

The health policies and programs have been extensively focused on the maternal, child and nutrition as a whole historically, neglecting the adolescent groups largely until recently(42). The Government of Nepal (GoN) is committed in providing the healthcare services to its citizens living all over the country and “Universal Health Coverage” is one of the major priority agenda of the National Health Policy(NHP) 2071 and the fifteen Plan-Health and Nutrition 2019/20-2023/24(14). The Ministry of Health (MoH) has initiated and implemented various nutrition programs in order to improve the nutritional status of the country especially mother and children among which programs to reduce anemia among adolescents(14). The series of nationwide implemented nutrition programs have been mentioned in the **Table 2** and the number pf programs focused on the anemia control are mentioned in the **Table 3** respectively(14).

Table 2: Nationwide Implemented Nutrition Programs

SN	Programs
1	Maternal, Infant and Young Child Nutrition
2	Growth Monitoring and Promotion
3	Control and Prevention of Iron Deficiency Anaemia
4	Control and Preventions of Vitamin A Deficiency Disorders
5	Control and Prevention of Iodine Deficiency Disorders
6	Control of Intestinal Helminths Infestations
7	Promotion of Food Based Dietary Guideline
8	Roller Mill Fortifications/Flour Fortification with Micro-nutrients
9	School Health and Nutrition Program (Adolescent IFA distribution)

Nationwide Implemented Nutrition Programs(14)

Table 3: Anemia control programs and policies in Nepal

S.N.	Policies and programs	Target population
1.	National Strategy for Anemia Control for women and children	Children, women with reproductive age (15-49 years).
2.	Control and Prevention of Iron Deficiency Anemia	Children, adolescent girls, pregnant mothers.
3.	Control and prevention of vitamin A deficiency disorders	Children (6-59 years)
4.	Control of intestinal helminths infestations (Deworming)	Children
5.	Promotion of food based dietary guideline	Households
6.	Roller Mill fortifications/Flour fortification with micro-nutrients	Households
7.	Schools' health and nutrition program	Adolescents' girls and boys

These nutrition programs are majorly focused mainly on maternal and child nutrition however some strategies are focused on lowering the burden of anemia among children and mothers. As anemia is caused by various things like inadequate diet, poor sanitation and hygiene, culture, education, multiple strategies have been implemented by MoH in Nepal to improve the anemia status of vulnerable populations including young children, adolescents, and pregnant and lactating mothers(40). The MoH developed “National Strategy for the Control of Anemia among women and children” in 2002, where the distribution of iron and folic acid supplements to pregnant mothers were initiated. Along with the Vitamin A distributions, deworming medications were also distributed resulting in the improvement of child and maternal’ s health(40). The national nutrition programs that exist in Nepal under the Multi Sector Nutrition Plan (MSNP) are includes steps taken to reduce the burden of anemia however not all strategies are focused into reducing anemia among the adolescents. The programs that are mainly focused into reducing the adolescent anemia in Nepal are categorized into nutrition specific and nutrition sensitive programs and have been explained below.

### **1. Nutrition Specific Programs**

- a. Iron Deficiency Anemia Control Program
  - i. Weekly Iron Folic Acid (IFA) supplementation program to adolescent girls 10-19 years
  - ii. Fortified flour promotion program
- b. Other Integrated nutrition intervention focusing on stunting reduction.
  - i. Suaahaara integrated nutrition program (focus on essential nutrition along with water, sanitation, and hygiene. Homestead food production).

### **2. Nutrition Sensitive programs**

- a. Knowledge-based integrated sustainable agriculture and nutrition (KISAN) project
- b. Hand washing with soap promotion program
- c. Open Defecation free (ODF) campaign
- d. Improvised stove promotion to control indoor pollution.
- e. School health and Nutrition program

The MoH, Nepal have recently introduced a weekly iron folic acid distribution program to adolescent girls in 12 of its 77 districts ensuring adequate iron consumption among adolescent girls(43). The USAID-funded Suaahara project along with the MoH and UNICEF is working towards reducing adolescent anemia especially among girls by expanding the IFA program and improving the health and nutrition behaviors of adolescents through school health program, research, adolescent empowerment, media mobilization, and capacity building(43).

Along with IFA program, various other approaches like Iron and/or folic acid fortification legislation, Long-lasting insecticidal nets (LLINs) for household use to reduce the malaria incidence, National policy on sanitation, Malaria diagnosis and treatment, and KISAN project are the other initiatives taken by MoH along with the collaboration with organizations like UNICEF, UNDP, USAID, and, World Food program (WFP), to reduce the anemia among the adolescents(44). KISAN is a five-year project initiated by Government of Nepal (GoN) which brings a change in the agricultural sector by including climate-smart intensification of staple crops and diversification, strengthening of local markets, and improving the enabling environment for agricultural and market systems development(45). The improvement in the agricultural sector improves the economic status of the people and country, improving their

living standard and reducing the food insecurity issue which is linked to the anemia among adolescents in Nepal (37).

#### **4.3 Challenges and Opportunities to strengthen programs and policies to reduce adolescent anemia.**

##### **4.3.1 Challenges to effectively implement programs on reducing anemia among adolescents**

As Nepal has gone into federal system and the major changes have been seen in the health sector of Nepal like fragmented prioritization of health issues in different provinces, distribution of budget, mobilization of resources(14). As Nepal is committed in achieving Universal Health Coverage (UHC) strategy, it is facing challenges in the new health system especially in the prioritization of health sectors and implementation of policies and programs, especially addressing the adolescent health and anemia(14). Some of the challenges are that have been found during the study are discussed below:

##### **1. Socioeconomic inequalities**

Nepal is a multi-diverse, multi-cultural and multi-ethnic country(46). With different culture, ethnicity, language, religion, caste comes different customs, beliefs, traditions leading to socioeconomic inequalities within the community. Nepal faces a huge problem of caste and religious differences till date which results in the unequal distribution and access for adolescent populations to healthcare services, and are deprived from right care, being one of the challenges to the policy makers and the government.

##### **2. Inadequate dietary Diversity**

Though Nepal is rich in diversity, with the own beliefs towards different foods, food practices, food choices, the group of adolescents are deprived of various foods leading them to become vulnerable to be anemic.

##### **3. Healthcare access**

Nepal is comprised of different ecological and geographical regions making the access of health care services in different parts difficult. The unavailability of proper healthcare services, especially in geographically challenging areas, makes the screening and diagnosing of health problems like anemia in adolescents difficult in early detection and treatment leading to mortality and morbidity.

##### **4. Culture and traditions**

Nepal is highly enriched with culture and traditions. Food taboos, restrictions of certain foods during menstruation, “*chhaupadi*” practice, influences highly on being vulnerable to being anemic and culturally sensitive approaches is required to address such issues resulting in longer period to tackle the issue of anemia among adolescents.

## **5. Limited data and research**

Despite being the most vulnerable groups, there is not much data and studies on adolescent anemia which results in poor and inadequate planning of the programs and projects which brings a huge disparity in the country.

### **4.3.2 Opportunities to strengthen programs on reducing adolescent anemia**

As Nepal has undergone a federal system, along with challenges like prioritization of health issues, budget planning, mobilization of resources, it has brought many opportunities to uplift the health status of Nepal and contribute to lowering the burden of anemia especially among adolescents. Some of the opportunities to combat adolescent anemia are described below:

#### **1. Education and awareness**

Integrating nutrition and anemia education in the school health program can be a way to reach larger population and empowering older adolescents both girls and boys as they are the most vulnerable groups to be anemic according to the studies and aware and educate their peers can be impactful in reducing adolescent anemia in Nepal.

#### **2. Community engagement**

The local governments and community people can be highly engaged in promotional activities to reduce the burden of anemia and prevention program of adolescent anemia, resulting in combating adolescent anemia together. Also, the female community health workers (FCHVs) can be mobilized in different activities initiated to reduce the burden of anemia among adolescents.

#### **3. Strengthening programs and projects**

The already existing programs and projects need to be strengthened by regular monitoring, evaluation, and reporting. The effectiveness of the programs needs to be measured constantly to meet the target of reducing adolescent anemia in Nepal.

#### **4. Multi-sectoral collaboration**

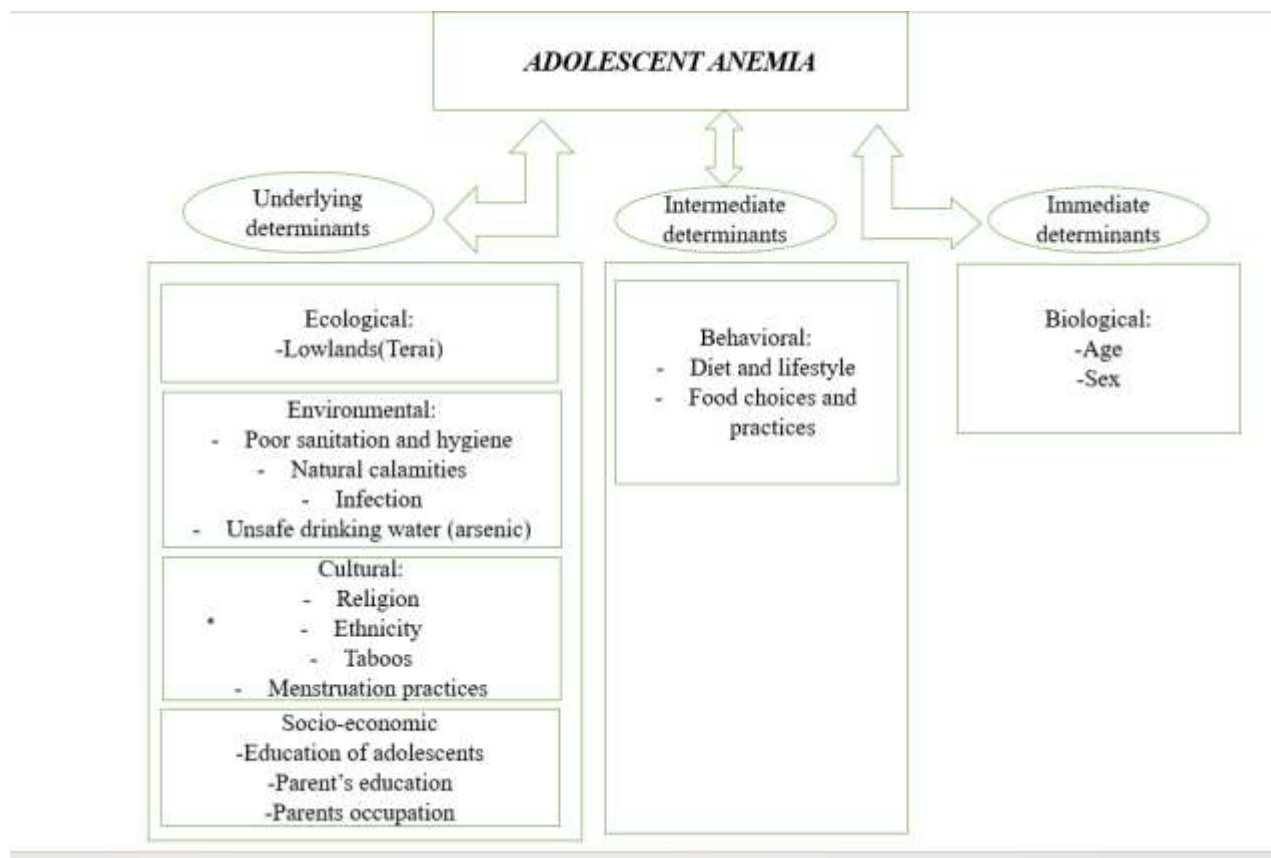
Anemia alone cannot be tackled as it requires a multi-sectoral collaboration with other sectors (agriculture, education, environment) as well. Hence, the government, local authorities must collaborate with different sectors to lower the adolescent anemia in Nepal as the various programs need to be integrated in a multi-sector among each other.

## CHAPTER FIVE DISCUSSION

This study aimed to review the comprehensive determinants of anemia among adolescents in Nepal. It also aimed to review the programs and policies implemented in the country to reduce the burden of adolescent anemia in Nepal, address the challenges and opportunities in the existing policies addressing the determinants and provide evidence-based recommendations for improving existing and future anemia programs in Nepal.

Adolescent anemia is a huge public health issue in Nepal and the limited studies and programs to address the determinants have made the issue more complicated. Without enough evidence, data and research, the programs, policies, and actions taken to combat the issue remains to be challenging and undergoing the same vicious cycle. Though iron deficiency (inadequate diet, genetic disorder) remains a major determinant on the risk of adolescent anemia, there are multi-level determinants playing role. The different determinants have been categorized into underlying, intermediate, and immediate determinants and have been illustrated in **Figure 4**.

Figure 4: Illustration of determinants of anemia among adolescents in Nepal



**Illustration of determinants of anemia among adolescents in Nepal**

The risk of anemia is higher among older female adolescents, adolescent from the Terai regions and adolescents consuming less than four food groups per day(24)(32). Nepali girls, particularly Hindus undergo various severe taboos, violence, “*chhaupadi*” practice and stigmatization during menstruation resulting in inadequate access to nutritious food, poor access to proper sanitation and hygiene, contributing hugely in the onset of anemia(24)(47).



Also the studies shows that the prevalence of anemia is higher among the *Terai* regions compared to hilly and mountain regions(32)(21). The study also shows that there is an association between ethnicity and religion and adolescent anemia. However, they might not be the determining factors, rather they are determined by food beliefs, practices, food choices. Also, onset of anemia is determined by various infections due to poor sanitation and hygiene, outbreaks of diseases during natural calamities, resulting in poor or malabsorption of nutrients. Also, the prevalence of anemia is higher among the poor socio-economic status of the parents, literacy level of parents.

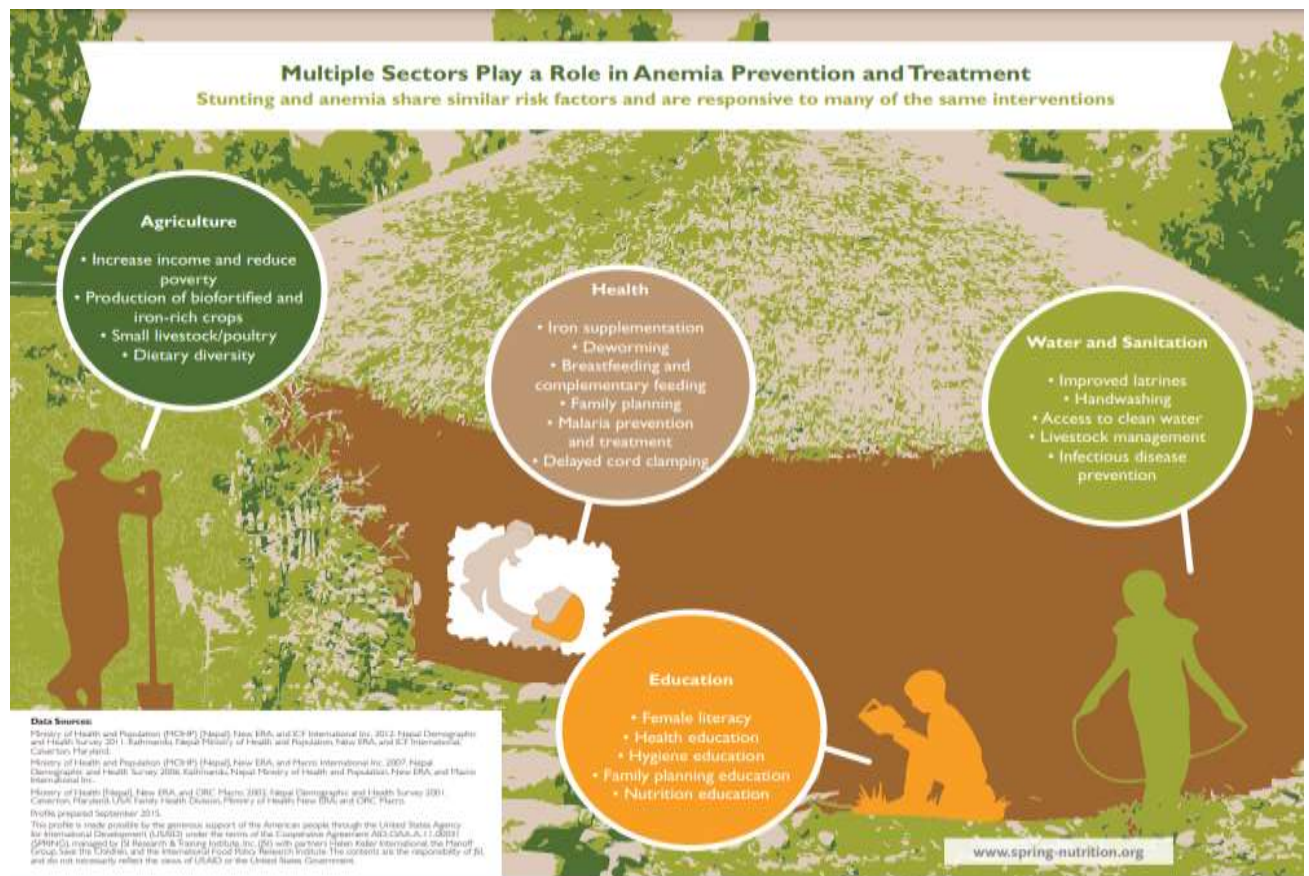
In Nepal, a “*Chhaupadi*” is practiced where adolescents and women are considered untouchables and are isolated during their menstruation (35). The word “*chhau*” means “menstruation” and “*padi*” means “women” in the local dialect and this is mostly prevalent in the western part of the country and during these girls and woman undergo various violations and results in low or less access to nutritious food, basic sanitation and hygiene, lack of proper rest, increasing the risk of infections (35). Though there have not been studies associating “*Chhaupadi*” and anemia among the adolescents and women, this can be a major factor resulting in anemia prevalence among the adolescent girls. Also, sickle cell anemia particularly among the *Tharu* community in Nepal can be one of the major contributors in the burden of anemia among adolescents(48). However, the onset of anemia is beyond the addressed determinants.

The MoHP is determined in addressing Universal Health coverage and is working towards achieving Sustainable Development Goals (SDGs) and various policies and programs have been implemented in reducing anemia among adolescents in the country. Weekly distribution of Iron and Folic Acid for adolescents aged 10-19 years, flour fortification, school health program, Water and Sanitation hygiene program are some the programs and policies initiated by Nepal government to reduce the burden of adolescent anemia. Though the effectiveness of the anemia control program is rising among the children and mothers as shown by the NDHS reports, there is limited evidence on adolescent’s anemia. This brings various challenges to address issues like lack of awareness and knowledge among adolescents, inadequate dietary diversity, equal access to healthcare, culture and traditions, lack of research.

The main gap identified in addressing the adolescent anemia in Nepal during the review is inadequate research in addressing different determinants of it. Most of the programs to reduce the burden of anemia are focused on mothers and children. There is an issue related to incorporating adolescent anemia into the national health policy though few major strategies have been taken to address the issue. Though the IFA program is playing a major role in reducing the burden of anemia among adolescent girls, the focus should also be on addressing both boys’ and girls’ adolescents. The fragmented health structure of Nepal with limited infrastructure and resources can be one of the challenging aspects to effectively implement the programs and strategies on reducing adolescent anemia. However, a multi-sectoral collaboration between different sectors has been initiated to combat the burden of anemia among adolescents. Agriculture, health, nutrition, water and sanitation, education, all these sectors are collaborating with each other, and strategies are being implemented to address the issue of adolescent anemia and combat this issue in Nepal. Also, the Nepal government has initiated the Female Community Health Volunteer programs(FCHVs) in all the 77 districts of Nepal(49). The major role of FCHVs is to advocate on different health issues mostly on maternal and child health, sexual and reproductive health and other community-based health

issues and service delivery. Thus, FCHVs can be a great asset in the health system of Nepal in reducing the burden of anemia among adolescents.

Figure 5: Multi-sectoral approach in reducing burden of anemia in Nepal



Multi-sectoral approach in reducing burden of anemia in Nepal(44).

The approach is majorly focused on stunting and anemia as they share similar risk factors however this guideline helps in identifying the areas that can be collaborated and develop strategies and plans to combat the ongoing issue of anemia among adolescents in Nepal. Along with the focus on iron and folic acid supplementation programs, which is especially focused for adolescent girls, other sectors need to be also addressed as the onset of anemia is interlinked with various casual factors like poverty, food insecurity, education, dietary diversity, culture, and traditions.

### Limitation of the study:

There are limited number of studies done on the determinants of adolescent anemia in Nepal and these studies have been limited to certain regions, districts, hospitals, and sample size which makes the overall generalization of the study difficult. The analysis has been performed based on the studies available and many levels of determinants is not included in the study like family history, “*chhaupadi*” practice during menstruation period of adolescent girls, sickle cell anemia among adolescents in Tharu communities. Also, the study does not measure the effectiveness of the existing programs and policies which makes it difficult to address the success and failure of the programs and policies.

**Strengths of the study:**

This study addresses the different levels of determinants and have identified major gaps and challenges that are hindering in the implementation of programs to lower the burden of anemia among adolescents in Nepal. Also, the study addresses the issues that can be a major factor contributing to adolescent anemia.

## **CHAPTER SIX**

### **CONCLUSION AND RECOMMENDATIONS**

#### **6.1 Conclusion**

The study found that the many determinants are influencing anemia among adolescents in Nepal. The biological, environmental, cultural, ecological, and socioeconomic determinants are interlinked with each other and contribute majorly to the onset of adolescent anemia and has been categorized into underlying, immediate, and intermediate determinants of anemia. Though there are various programs on maternal and child anemia in Nepal, only a few of them are focused on adolescents which makes the population more vulnerable on being anemic. The studies show the prevalence of anemia is higher among females and programs and strategies are focused on reducing the burden of anemia among adolescent girls. The federal system of Nepal is affecting in the prioritization of health sectors due to different prioritization on the diseases at different provinces however the government is trying to integrate various sectors to lower the incidence of adolescent anemia.

The federal system of Nepal has brought many challenges like prioritization on diseases, limited resources within the health system while it has also brought many opportunities along with itself such as mobilization of resources, investing in research and studies. Although the government is trying to prioritize the adolescent population into the health system, yet more is to be done.



#### **6.2 Recommendations for policies and programs**

The following recommendations have been suggested based on the findings of the study.

1. The government should invest in more research at a national level to collect evidence to address the various determinants of adolescent anemia.
2. Integration of adolescent anemia control program should be done with a multi-sectoral collaboration for better outcomes.
3. The government should invest in regular monitoring, evaluation and reporting of the effectiveness of the programs and policies that are addressing anemia among adolescents.
4. Community engagement should be encouraged to provide promotional and prevention activities related to adolescent nutrition and anemia.
5. The healthcare infrastructures should be strengthened especially in remote and rural areas and adequate health professionals should be allocated.
6. Advocacy for adolescent health and nutrition should be prioritized and budgets for adolescent anemia control and prevention programs must be allocated.
7. Collaboration with private sectors, different governmental and non-governmental agencies should be done to ensure policy formulation and implementation.
8. Adolescent empowering programs should be initiated to make them aware of their informed rights and help them in decision making process.
9. The Community Health Volunteers (CHVs) and Female community health volunteers (FCHVs) must be given trainings and skills to contribute to the community engagement as they are a huge asset for the country's health system.

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