

PRACTICUM REPORT

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Master of Public Health Program

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Name of the Student

Md Mahbub Hossain MBBS

Cohort 4

2016-18

Under the Guidance of

Neetu Purohit PhD

Associate Professor

IIHMR University

April 22, 2018

To Whomsoever It May Concern

This is to certify that Md Mahbub Hossain, a student of cohort 4, Master of Public Health Program, offered by Johns Hopkins Bloomberg School of Public Health in cooperation with IIHMR University, has completed his practicum training at IIHMR University Jaipur from November 1, 2017 to March 31, 2018 under my supervision.

He has successfully completed his practicum objectives and contributed to the studies in a scientific manner. Moreover, his participation in allied academic and professional activities were found satisfactory.

This practicum training fulfills the course requirements for the Master of Public Health Program in which he is enrolled.

I wish him a successful, happy and fulfilling journey in the future.

Sd-

Neetu Purohit PhD
Associate Professor
IIHMR University

April 22, 2018

Statement of the Scholar

This is to state that, I, Md Mahbub Hossain, enroll no: IIHMR-U/07/2016-2018/0019, JH ID: 4304EC a student of Master of Public Health in Johns Hopkins Bloomberg School of Public Health in cooperation with IIHMR University, have completed my practicum training at IIHMR University from November 1, 2017 to March 31, 2018 under the kind supervision of my mentor Dr Neetu Purohit.

The works and experience mentioned in this report is completely prepared by me and it has not formed the basis for the award of any degree, diploma, assistant or associateship, fellowships or titles in this or in any other organization of higher education.

In the completion of this practicum requirement, I would like to express my sincere gratitude to my mentor Dr Neetu Purohit who blessed my journey with invaluable guidance and moral support. Without her kind contributions, achieving several milestones was nearly impossible for me. I am also thankful to Mr Gowthamghosh Bheemireddy for his generous cooperation throughout the MPH program. Last but not the least, I am thankful to my respected teachers and colleagues in IIHMR for their kind support during the coursework and practicum.

Sincerely

Md Mahbub Hossain MBBS

Student of Cohort 4, Master of Public Health Program

Johns Hopkins Bloomberg School of Public Health and IIHMR University

Date: April 21, 2018

To Whom It May Concern

This is to certify that Dr Md Mahbub Hossain has worked on India Priorities Project at IIHMR University, Jaipur. In this project, IIHMRU has worked in collaboration with Copenhagen Consensus and TATA Trust to study cost-effectiveness of identified health interventions in Rajasthan and Andhra Pradesh. He was formally engaged in this project from November 1, 2017, and he successfully ended his tenure as practicum trainee on March 31, 2018. Although he was involved in the project activities since October 2017 informally. His fulltime engagement in the project during the period from November 1, 2017 till March 31, 2018, is more than the practicum requirement of 160 hours.

In this health policy research project, we focused on two domains- Health Systems and Adolescent Health. As a researcher in this project, Mahbub contributed in collecting policy and economic data, performing situational analysis, developing methodologies of econometric analysis, preparing the findings and interpretation, writing the reports and coordinating the research partnership with eminent scientists and economist within IIHMR and collaborating research partners from India and abroad. In addition, he facilitated the academic and research activities beyond his primary assignment which informs his potentials and dedication in the field of health education and research. Lastly, through his integrity and resilience during the project he has proven himself as a valuable researcher and public health leader. A person like Mahbub would be a great asset for any institution he will join in future.

I wish him a prosperous academic and professional journey.



Prof. Dr. D.K. Mangal
Dean (Research)
The IIHMR University.

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About the Organization

Since 1984, Indian Institute of Health Management Research, also known as IIHMR, has been working in educating public health scholars from India and abroad and conducting ground breaking research in the realm of public health management (1). It is the World Health Organization's Collaborating Centre for strengthening Health Systems based on Primary Care which has already completed more than 500 research projects on different dimensions of health, social and developmental systems and policies (1). Although It started as a research institute based in the city of Jaipur in Rajasthan, later it emerged as a fully accredited University. Currently it offers runs four full-time MBA programs in Health/Hospital Management, Pharmaceutical Management, Rural Management and Doctor of Philosophy (PhD). IIHMR University also offers a unique Master of Public Health degree jointly with Johns Hopkins University, Baltimore, USA (2). I am a student of that program which I perceived as a blend of western education and eastern values that can create future leaders in the world of public health. My perceptions, ideas and takeaway messages about IIHMR cannot be described within the scope of this report, therefore, I would continue to write about the partner organization "Copenhagen Consensus" with whom IIHMR undertook cost-benefit analysis of health interventions for two Indian states- Andhra Pradesh and Rajasthan.

The Copenhagen Consensus Center is a think-tank that researches cost-effective solutions for the global problems and advises policy-makers, donors and development partners to make better investments for the wellbeing of the population in large (3). It is an independent Institute of the Danish government which provides economic and environmental cost-benefit analyses for nations around the world. In India, Copenhagen Consensus partnered with TATA Trust, a leading philanthropic organization to initiate a research initiative for analysing cost-effective public policies named "India Consensus" (4). This venture aims to identify the smartest solutions to some of India's most pressing development crises. Studies are being conducted across a wide range of areas from education, health and governance infrastructure development, and energy – through state-specific prioritization projects (4). India Consensus will use the Copenhagen Consensus approach which is being used now in Rajasthan and Andhra Pradesh. IIHMR has been working on two thematic areas of this initiative- health systems and adolescent health. As a researcher in this project I worked on both of the areas,

however, I would describe significant parts of my research activities on adolescent health which was done as a part of this project.

Learning Objectives of the Practicum

Throughout my practicum I intended to achieve four of the core public health competencies which are analytical skills, cultural competencies, communication skills and public health advocacy and leadership skills. The learning objectives to accomplish the same are given below:

- Assessment of the status of the adolescent health and health systems of two large Indian states- Andhra Pradesh and Rajasthan
- Critical analysis and identification of key health challenges as well as health interventions for the target population
- Collaborative academic and research activities with colleagues within IIHMR and co-researchers from Copenhagen Consensus TATA Trust
- Writing reports for implemented programs for adolescents as well as the health systems a part of the documentary research
- Performing economic assessment of public health interventions identified by the key stakeholders
- Preparing four scientific publications on health outcome evaluation on above-mentioned states of India.

Description of Research Activities Conducted During the Practicum Training

Although IIHMR worked on analyzing cost-effectiveness of health systems and adolescent health interventions, much of my efforts were focused on adolescent health intervention compared to the health systems interventions where I assisted my colleagues to accomplish the project deliverables. Hence, in following sections, I will describe the background of the problems in adolescent health that we worked upon, review of literature on past and ongoing efforts to address the same, proposed policy interventions addressing the problems adopting

the perspectives of key stakeholders, methodologies of how we calculated the benefit-cost ratio and sensitivity analysis and the preliminary findings of the entire exercise.

Background of the Adolescent Health in Andhra Pradesh and Rajasthan

Adolescence is a transitional stage of life from puberty to adulthood which ranges between 10 to 19 years of age (5). A spectrum of physical, psychological, social and spiritual development occurs during this period. Globally, there are more than 1.2 billion adolescents in the world who are around 18 per cent of the total global population (6). It indicates that nearly one in every six persons in this world is an adolescent. Among them, 88% live in developing countries and 16% adolescents live in least developed countries (6). India is home to more than 243 million adolescent which is nearly one fifth of the total population (6,7). With the 16.29 million adolescents among the total population of the state 84.58 million, Andhra Pradesh mirrors the national proportion of one fifth adolescents (8). This large number of adolescent offer enormous demographic dividend to the economy presuming their optimum health and productivity is ensured during their adolescence. Although adolescence is not considered as a risk period for most of the infectious diseases in this time, but the health status of adolescents is often affected by varying conditions emerging from their transitional state as well as diverse social determinants of health (9). Critical health problems start or aggravate during this period of life which includes early marriage and subsequent health hazards, anaemia and related consequences, and behavioural as well as mental health disorders (10). Each of these health issues can affect the development of an adolescent in becoming a healthy and productive adult, resulting higher disease as well as economic burden to the affected individual, their caregivers, families, communities, the state population and the entire nation. Therefore, adolescent health requires separate attention to understand the changes that can affect the individual and population health, now and in the future.

Despite presence of numerous adolescent health challenges, child marriage has been central to the discussion in the realm of adolescent health and allied social policies. There are more than 700 million women around the globe who got married before 18 years of age and most of them are living in the low and middle-income countries (11). The number continues to increase by 37000 each day and nearly 15 million each year (11,12). More than one third girls become victims of child marriage in the developing countries which contributes to a spectrum of health

hazards and allied socioeconomic consequences (11). Child marriage primarily affects the education of adolescent girls and their future economic opportunities during later adulthood. This affects the income of the quality of living of the girls, the earnings of the households and the economy of the nation. A study conducted on 15 low and middle-income countries revealed that early marriage often leads to teenage pregnancy which results higher fertility and population growth (12). This also affects the maternal health outcomes to varying extent. Adolescent girls under 15 years of age are nearly five times more likely to die during childbirth compared to the women in their 20s (13). Also, they experience higher risk of pregnancy-related injuries like obstetric fistula, unsafe sexual practices leading to unsafe abortion and sexually transmitted infections and so on. Moreover, teenage pregnancies contribute to the mortalities and morbidities of the offspring which is a serious concern for population health. Children born to teenage mother also suffer from low birthweight, stunting and other nutritional disorders (14).

According to earlier studies child marriage contribute to 6.3% of under-five stunting which revalidates the impact of child marriage across the generations (15). Earlier research suggests a loss in productivity of more than 2% for each percent loss in adult height with similar results found for various micronutrient deficiencies (16). Another estimation revealed that undernutrition may lead to a loss of more than 10% of Gross Domestic Product in sub-Saharan Africa and South Asian countries due to lost productivity (17). In addition to these physical impacts, child marriage also affects the brain development and cognitive capabilities of the offspring with lasting consequences in their adulthood (18). Moreover, girls who get married at early age often lack autonomy and become victims of historical maldistribution of power in conjugal life leading to intimate partner violence (19). Such violence affects the physical and psychological wellbeing of the victim to a greater extent (20). Also, this intimate partner violence can affect the development of offspring in utero who experience worse health outcomes (21). Household violence may also affect schooling of the child as well as increase the risk of future violence during adulthood (22). All these hazardous consequences of child marriage inform the severity of this public health problem which results violations in fundamental human rights of the victims, their children and the entire population exposed the continued risk of the same (12,23). During 2005-06, 47.4% of married women aged 20-24 years reported to have married before the age of 18, which is the legal age at marriage for women in India (24). With the pace of socioeconomic development and increasing educational status and improved awareness about the adverse outcomes and impacts of child marriage, the

rate has been decreased by 2015-16 but still 26.8% of married women are victims of child marriage (25). Moreover, the median age of marriage among 25 to 49 years of rural women is 1.7 years lesser than urban women belonging to the same age group, which indicates a higher burden of child marriage among the rural population (25). In addition, the median age at first marriage is 22.7 years for women with 12 or more years of schooling compared to 17.2 years among women without any schooling indicating the significance of education in preventing child marriage. However, many improvements in educational as well as other health indicators are evident in nationwide surveys which also draw attention to a high rate of child marriage as 40% among the respondents aged between 20 to 49 years resembling a varying yet persistent presence of child marriage across different age groups in India (25). The rate of this social disease is even higher in Andhra Pradesh compared to the national average. 33% women aged 20 to 24 years informed about getting married before completing 18 years of age and this rate goes up to 35.7% among the rural women of Andhra Pradesh (26). In Rajasthan, the rate of child marriage is much higher than the national rates. Among the respondents within same age group the rate of those who got married before the legal age of marriage is 35.4% (27). The can be as high as 40.5% among the women living in rural Rajasthan (27).

Another critical adolescent health problem is anaemia. It is a globally prevalent public health problem which is affecting the lives of billions in both developing and developed countries. It is characterized by reduced haemoglobin concentration, red cell count or packed cell volume which subsequently affects oxygen delivery at the tissue level (28). World Health Organization defines anaemia based on haemoglobin concentration which varies in different population groups as following- for children aged 12 to 15 years and non-pregnant women aged more than 15 years, the threshold level of haemoglobin used to define anaemia is less than 12 gm/dL whereas the level is considered as less than 11 gm/dL for children up to 5 years and pregnant women, for men aged more than 15 years, a haemoglobin concentration less than 13 gm/dL is considered as anaemic (29). To assess anaemia in different population based surveys, strategies like measuring direct and indirect cyanomethaemoglobin, using portable haemoglobin photometers are commonly used (28). Anaemia is also assessed through several symptoms including fatigue, faintness, headache, exertional dyspnoea, palpitation, angina, cold intolerance and menstrual irregularities and clinical signs including generalised or localized pallor in conjunctiva, nailbed, tongue or palmer surface, tachycardia, raised arterial or papillary pulsation, bruits and other cardiological manifestations. Moreover, specific signs are also found in different variants of anaemia as jaundice in haemolytic anaemia, koilonychia in iron

deficiency anaemia and bone abnormalities in thalassemia (28). Several factors determine the status of anaemia in an individual including age, sex, smoking habit, altitude, pregnancy status etc. In addition to these internal factors, several external factors play vital role in serum haemoglobin level. Access to food which contains good quality and quantity of iron and other nutrients, access to timely health services to take therapeutic and preventive measures against anaemia, level of awareness about anaemia, availability of safe water and sanitation, external exposure to different infections and physical factors like radiation etc. influence erythrocyte production and maintain the same within the body (28).

However, there are several reasons which result anaemia in an individual. First, nutritional anaemia can occur due to inadequate bioavailability of essential nutrients like iron, folic acid and Vitamin B12 that are required for the biosynthesis of haemoglobin and red blood cells (30). Further, factors which affect the absorption and transportation of these nutrients are also critical for the optimal supply of these nutrients. Among all the nutrients, iron is considered as most essential nutrient which is central to the synthesis of haemoglobin. Lack of iron in the diet, decreased absorption, transportation or utilization in the process of erythrocytosis results iron deficiency anaemia. Moreover, folic acid is another important nutrient which contributes in production and maturation of erythrocyte (31). Therefore, the deficiency of folic acid can affect the haemoglobin level resulting anaemia to varying extent. Also, the role of vitamin A is found critical for erythropoiesis and improving the haemoglobin concentration (32). In addition to these nutritional dimensions of anaemia, there are several intrinsic factors that influence the anaemia status. Genetic disorders like thalassaemia, different haemoglobin variants and glucose 6 phosphate dehydrogenase deficiency affect the haemoglobin level among the individuals (33). Furthermore, many infectious diseases have haematological consequences like anaemia. This scenario is common among the patients infested with helminths, schistosomiasis, acquired immunodeficiency syndrome (AIDS), pulmonary tuberculosis, malabsorption syndrome and other gastrointestinal disorders (28,34,35). Due to varying levels of all the above mentioned etiological aspects of anaemia, the magnitude of the same varies among different population living in different geographic regions. It is estimated that the prevalence of anaemia is 25% among the global population which includes 56 million pregnant and 468 non-pregnant women and adolescents (36). This scenario does not reflect the severity of anaemia among adolescent girls in low and middle-income countries which have enormous burden of nutritional deficiencies and infectious diseases, lack of awareness and adequate preventive measures resulting higher prevalence of anaemia. African and South Asian

countries are considered as regions of greater anaemia burden which remains true for India as well (37). The prevalence of anaemia is measured in large scale population based studies like National Family Health Surveys. During 2005-06, the prevalence of any anaemia (haemoglobin level <12 gm/dl) among the women aged 15 to 49 years was 55.3% which included 38.6% cases with mild anaemia (haemoglobin level between 10 to 11.9 gm/dl), 15% cases of moderate anaemia (haemoglobin level between 7 to 9.9 gm/dl) and 1.8% cases with severe anaemia (haemoglobin level less than 7 gm/dl) (38).

The prevalence for the same sex and age group became 53% during 2015-16 with 39.6%, 12.4% and 1% cases of mild, moderate and severe anaemia respectively (39). The prevalence across all India is much higher among the population with lowest wealth index (58.6%) compared to the highest wealth index (48.1%). Also, rural women have higher prevalence (54.2%) compared to the urban women (50.8%). Moreover, women with no schooling has higher prevalence of anaemia (56.3%) compared to the women with 12 or more years of schooling (48.7%) (39). Varying prevalence of anaemia is observed in different studies and it was found more than 60% among all vulnerable groups. this problem is much higher because of malnutrition, infections, and lack of sufficient knowledge regarding this problem. A study in tribal area of Andhra Pradesh found 88.9% of adolescent girls are anaemic whereas 17.8% are found to be severely anaemic with mean haemoglobin content as low as 9.7 gm/dL and the highest prevalence of anaemia was seen in the age group of 12-13 and 14-15 years that is 85% and 86.5% respectively (40). Another prospective study was carried out in an urban area of Visakhapatnam in Andhra Pradesh state from January 2017 to June 2017 (41). Among 1208 children of eight different schools 69.8% of girls are found anaemic. The prevalence of mild, moderate and severe anaemia was 48.3%, 19.8% and 1.7% respectively. It was significantly higher in low socio-economic classes, (60.8%), mother's educational attainment below high school studies (57.1%), girls at post-menarche stage (70.2%) and BMI lower or equal to 18.5 (94.4%). The prevalence of anaemia was significantly higher among girls consuming vegetarian food. Also, all forms of anaemia are more in menstruating girls when compared to non-menstruating girls (41). At the state level, the prevalence of anaemia among women aged 15 to 49 years is 60% at Andhra Pradesh which is higher than the nationwide prevalence (26). The variation in the prevalence rate was similar to the national trend in terms of wealth index, geographic location and educational attainment. Poorer women, living in rural areas and no schooling- had higher prevalence of anaemia. In addition, the prevalence is slightly higher (61.1%) among the adolescents aged 15 to 19 years with a distribution of 39.3%, 20.2% and

1.6% cases of mild, moderate and severe anaemia (26). Another large scale study District Level Household and Facility Survey 4 (2012-13) provided the prevalence for girl child within age group 6 to 14 years as 71.4%, 60.9% for adolescent girls within 15 to 19 years age group and the prevalence was 69% for girls aged 10 to 19 years including 10.4% cases of severe anaemia (42).

This high burden of anaemia among the adolescent girls is a major public health challenge for Andhra Pradesh- which can affect the lives of these adolescents, their future reproductive health and professional performances as well as outcomes, and the overall population health and well-being within the state. In Rajasthan, 47% women in age group 15 to 49 years are anaemic as on 2015-16 which includes 35% with mild anaemia, 11% with moderate anaemia and 1% with severe anaemia (43). Anaemia is observed to be higher among the children between 6 to 59 months with a prevalence of 60% which continues to the adolescence where the lower dietary intake compared to the demand and increased blood loss due to menstruation which aggravates anaemia among the adolescent girls. This is evident in the Annual Health Survey 2014 which revealed that the prevalence of anaemia among the adolescent girls is 81.4% which is enormously high (44). The burden of anaemia is predominantly higher among the vulnerable demographic groups living in rural or tribal areas, having lesser wealth and education which is similar as the national scenario (43).

Lastly, adolescent mental health is a growing area of public health concern which defines the course of development, quality of lives and prospects in the productive future the adolescents progress toward. Many neuropsychiatric conditions affect their journey to the adulthood and these disorders are considered as the leading causes of disability among the young people around the globe (45). Many mental health disorders begin during late childhood and early adolescence. It is estimated that 10 to 20% of children and adolescents experience mental health disorders and about half of all mental illnesses emerge by the age of 14 years and three-quarters by mid-20s (45). In India, several psychiatric epidemiological studies have been conducted to estimate the prevalence of different psychiatric disorders. In the context of India, less awareness about mental health and allied disorders often lead to lower access to the mental health services. In most cases, only patients with severe mental disorders are diagnosed and treated leaving those with minor mental disorders who lives without timely diagnosis and adequate management (46). It indicates the huge burden of non-identified cases mental health disorders among more than 243 million adolescents in India who constituted 20% of the

world's 1.2 billion adolescents despite sharing the similar trends in age-specific mental health mortalities and morbidities. There is a substantial gap in research focusing on specific prevalence of different mental health disorders among adolescents in India (47). However, there are few epidemiological evidences available from countries with similar context which shows the burden of mental and developmental disorders and illustrates their impact on health seeking and other dimensions of the lives of adolescents. Earlier epidemiological studies have revealed the prevalence of child and adolescent mental disorders in the context of India which considered the whole spectrum of child and adolescent age group that is 0 to 19 years. A systemic review and meta-analysis provided the overall prevalence from sixteen community based studies on 14594 children and adolescents and seven school based studies on 5687 children and adolescents (47). The prevalence of child and adolescent mental health disorders in the community was found to be 6.46% (95% confidence interval 6.08% to 6.88%) and within the school it was found to be 23.33% (95% confidence interval 22.25% to 24.45%). Apart from such studies, nationwide studies reported the prevalence of mental disorders is 7.3% among children aged 13 to 17 years and it is similar in both genders (48). The prevalence among urban metro children is nearly double (13.5%, 95% confidence interval 10.4% to 16.5%) compared to the rural children (6.9%, 95% confidence interval 4% to 9.7%). Major illnesses include depressive disorders (2.6%), disabilities affecting intellectual status (1.7%), agoraphobia (2.3%), autism (1.6%), psychotic disorders (1.3%) and phobic anxiety disorders (1.3%). Moreover, the survey estimated the prevalence of depression as 6.9%, anxiety as 15.5%, tobacco as 7.6% and alcohol consumption as 7.2% in a study based on Himachal State (48). There is a gap in evidences that can illustrate the true burden of mental health disorders among the adolescents in Andhra Pradesh but the high prevalence in different states warrants careful assessment and management of such disorders in the context of Andhra Pradesh. In our study, we discuss prospective interventions to address each of the above-mentioned adolescent health problems and analyse the benefit-cost ratio for the same in the context of Andhra Pradesh and Rajasthan.

Review of Literature on Past and Ongoing Efforts to Address These Problems

The economic and social impacts of child marriage involve a range of costs starting from the individual to the population. Child marriage severely affects the girls and women to have children earlier which adversely influences her reproductive health outcomes and increases

direct and indirect costs over the lifetime (12). In such scenario, the direct costs will be the hospitalization and other health expenditure during pregnancy, on childbirth and treating complications following parturition (49). In contrast, indirect costs would include the healthcare cost to the children born to teenage mother, missed educational attainment of the girl and loss of productivity throughout lifetime, and low quality of living (50). Further, the social cost of child marriage would include intimate partner violence, lack of autonomy and decision-making, inadequate awareness about healthcare and other rights leading to under-utilization of the available services, poverty to the household level and so on (51). Furthermore, child marriage costs to the nation in terms of higher fertility, undesired population growth, burden of illiteracy, poor health and poverty; which implies ending child marriage can yield greater benefits to the nation (52). Previous studies show benefits from lower population growth through ending child marriage for 106 countries would be \$566 billion in 2030 (12). Moreover, other benefits from saving child lives and childhood malnutrition would provide benefit of \$16 billion and \$82 billion in 2030 for averted cases of under-five mortality and stunting respectively (12).

Over last few decades, multiple programs and schemes have been implemented aiming a reduction in child marriage in Andhra Pradesh. The State Government launched Old Girl Protection Scheme GCPS 1996-97 which enrolled girls aged less than 3 years who had a family income less than Rs 11000 on that time and special attention was given to the girls who belonged to vulnerable population groups (53). Under that scheme, an initial amount used to be deposited to a nationalized bank. The girl child, enrolled in that program, was entitled to receive Rs 500 on her 1st birthday, Rs 500 on enrolling to the school, Rs 500 on passing 5th class, Rs 1000 per annum from 8th class to next 8 years, and a final payment of Rs 20000 after completion of 20 years. The initial amount deposited in bank based on the girl's age during enrolment; for age 0-1, 1-2 and 2-3 years old girl child the amount was Rs 3550, 3975 and 4550 respectively. This scheme was revised in 2003 with modified eligibility criteria for the enrolment as girl child up to 3 years old was allowed with a priority to single girl child borne to families below poverty line, then to the families with two girl children and then to the families with one girl and one boy. In this revised scheme, a girl child was entitled to receive Rs 500 on primary school enrolment, Rs 500 on enrolment on 7th class, Rs 500 on enrolment on 10th class and remaining amount on marriage at maturity period. To implement the same, Rs 5000 was deposited to the bank for each enrolled girl child irrespective of age for a term of 20 years. Following this initiative, another scheme rolled out named "New Girl Child

Protection Scheme 2005” which considered a girl child for enrolment to the program if the girl child was up to 3 years, borne to the families with single girl child or two girls, the parents had undergone family planning and family's annual income was not more than 24000 in rural and 48000 in urban areas (54). However, the family's income limit was flexible to up to Rs 1 lac for girl up to 80% disability, other priorities were same as other schemes. The entitled benefits were a disbursement of Rs 1200 per annum from 9th to 12th class and Rs 1 lac after 20 years of age. Also, this scheme offered Rs 30000 in case if a family had two girls, Rs 30000 as death insurance, Rs 37500 and Rs 75000 on partial and full disability respectively. For implementing this scheme, the State provided annual premium depending on age; for a single child aged 0-1, 1-2 and 2-3 years the amount was Rs 2800, 3100 and 3450 respectively; for two girls it was given within a range between 1050 to 1850 for 1 to 6 years. Next large-scale initiative was “Bangaru Talli” which emerged in 2013. This scheme was offered to the girl child born after May 1, 2013 till she reaches 21 years of age (55). Also, priority for enrolling to this program, was given to the economically backward families and first two children of the household. Financial benefits were given as- Rs 2500 at birth, Rs 1000 per year on second and third birthday, Rs 1500 per year on 3rd to 5th birthday, Rs 2000 per year from 6-10th birthday, Rs 2500 11-13th birthday, Rs 3000 per year on 14-15th birthday for studying on 9-10th classes, Rs 3500 on 16-17th birthday for 11-12th classes, Rs 4000 per annum from 18-21th birthday for studying at graduation level and Rs 50000-100000 is paid if she passed 12th class or completed her graduation (56).

Both at the state and national level, several legislations are in place that prohibit marriage before legal age of 18 years in women but earlier studies have shown very little impact of such regulatory initiatives to delay child marriage in neighbouring country Bangladesh (57). In addition, other laws that prohibit dowry are also available in both India and Bangladesh but their effectiveness in delaying child marriage is found non-significant. Another approach of delaying child marriage through increasing years of schooling has been found cost-effective in previous study conducted by Copenhagen Consensus in Bangladesh (57). Incentivizing the adolescent girls through Female Secondary School Stipend has shown several prospects to improve the scenario. First, the increased years of schooling increases the qualification of the adolescent girl which facilitates better wages in job market after finishing the school. Also, higher rate and duration of schooling is associated with better self-development and empowerment which increases the autonomy of the girls to decide about their age at marriage. Moreover, these empowered girls can take better decisions about their health resulting better

reproductive health outcomes throughout their reproductive age. The benefits of education never limit to the individuals but also enhances the well-being and development of their family members and offspring. The children of an educated mother are more likely to receive education, immunization and other benefits in the future (58). These lead to reduced healthcare cost, social cost and better economic outcomes in the broader sense. However, another program of providing cooking oil to unmarried women in Bangladesh was also found cost-effective (57). It is also necessary to consider the social context where the girl child is often seen as a cost in comparison to a boy child who is perceived as a earning-member in the future and this phenomenon commonly attributes to higher child marriage among the people living at poverty. A provision of providing household consumables as an incentive allows the girl child to attain her full age at first marriage. In the prospective intervention, we consider the components from both of the cost-effective interventions from Bangladesh- providing stipend for secondary schooling and oil incentive program. Different public institutions and development partners have taken several initiatives to educate and empower girls and women presuming such efforts will facilitate social development in terms of reducing child marriage and improving the lives of the target population. One of such educational programs is “Sarva Shiksha Abhiyan (SSA)”- Government of India's flagship program launched to achieve the Universalization of Elementary Education (UEE) in a phased manner (59). This program is mandated by the 86th amendment to the Constitution of India which aims to ensure compulsory education to the Children aged 6 to 14 years. SSA has a special focus in serving the vulnerable girls and promoting technical and technological education for bridging the digital divide in the society. Another program, “Rashtriya Madhyamik Shiksha Abhiyan”, was launched in 2009 with an objective to increase the access to secondary education with optimal quality (60). It aimed to achieve a higher enrolment rate of 75% from baseline rate of 52.26% in 2005-06. This program also promoted the quality of education through improving the standards, removing the biasness based on gender, disabilities and other socioeconomic barriers. Another scheme was “Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (RGSEAG) SABLA”, a Centrally-sponsored scheme which was introduced during 2010-11 in selected 205 districts from all the States/UTs at a pilot basis for improving the dropout rate of girl students, increasing literacy rate among women, reducing the number of girls married before the age of 18 and facilitating female work participation (61). Other schemes like “Kishori Shakti Yojana”, “Beti Bachao Beti Padhao”, “Aapki Beti Yojana” focused on empowering women through proper education and life skills training (62). Furthermore, schemes like “Mukhyamantri Rajshree Yojana” provides cash incentives for upbringing and educating daughters who are defined as “Lakshmi”

of the households (63). This scheme rolled out in June 1, 2016. Starting from the birth of a girl to her 12th class, incentives of up to Rs 50,000 is provided to the parent of the girl child for ensuring her education, health and overall care. The beneficiaries of the scheme are entitled to receive Rs 2500 at birth of daughter, Rs 2500 for one year of vaccination, Rs 4000 for admission in first class, Rs 5000 for admission of the same child in 6th class, Rs 11000 for admission in 10th class and finally, Rs 25000 on passing 12th grade (63). There are other schemes like “Palanhar Yojana” and “Mukhya Mantri Hunar Vikash Yojana” which aim to improve the educational and socioeconomic status of the vulnerable adolescents who are orphan or living in the institutional homes which also empowers them to prevent child marriage in their lives (64). Apart from these initiatives, the Government has introduced holistic programs like “Rashtriya Kishor Swasthya Karyakram” which was launched on 7th January, 2014 with principles of adolescent participation and leadership, equity and inclusion, and strategic partnerships with other sectors and stakeholders (65). This program emphasized on gender equity envisioning an enabling environment for all adolescents to realize their full potential by making informed and responsible decisions related to their health and well-being. Initiatives like this has been working toward improving the overall condition of adolescent girls and their autonomy to delay the age at first marriage (66).

The consequences of anaemia are documented in various studies conducted in different contexts. On maternal health, anaemia can alter the health status in critical situations of maternity. Excessive loss of blood at before, during and after childbirth can diminish the reserve of blood within the circulatory system. A reduced level of haemoglobin lesser than 4 g/dL increases the risk of heart failure during any stage of maternity (67). Also, anaemia increases the susceptibility to various infections resulting poor perinatal health outcomes (68). With wide range of adverse effects to the health of a pregnant woman, anaemia contributes to 20% of all maternal deaths (69). In addition, anaemia of the mother often affects the health of children including adverse birth outcomes, preterm birth and low birthweight (28). More importantly, iron deficiency anaemia is associated with poor cognitive and motor development of children (70). A meta-analysis estimated an increased association (odds ratio 1.73, 95% CI 1.04 to 2.41) of IQ points per 10 g/dL increase in haemoglobin level (28). Among the adults, anaemia affects the transportation of oxygen to the tissue level resulting impaired productivity of the affected individuals. Such phenomenon is observed in developing countries where physical labour is very much prevalent. A decreased productivity further decreases the quality

of life to an individual whereas the lost income affects the household dependent on the income of that person and the entire economy suffers from lost production. The economic burden of that lost productivity for human capital of South Asia is estimated as \$4.2 billion annually (28). Moreover, the healthcare expenditure to treat anaemia and the consequences of the same adds further burden on the national economy which would be much more considering the opportunity cost of the same investment to other development sectors.

Many strategies are suggested in scientific literature to control anaemia and prevent it in the first place. These strategies include- improving dietary intake both in terms of quality and quantity, increasing diversity within the consumed food materials with higher bioavailability of iron, fortification of staples with iron, fortification of targeted foods for high-risk, controlling diseases that are associated with anaemia like malaria and helminth infestations, improving knowledge and practices among the communities and providing iron and folic acid supplementation to the vulnerable population who are at higher risk of anaemia which includes adolescent girls as well (28). In all the states of India, a notable measure to address the challenge of anaemia among the adolescents aged 10 to 19 years is Weekly Iron and Folic Acid Supplementation (WIFS) program which includes supervised consumption of Iron (100mg) and Folic Acid (500 microgram) supplement with biannual deworming medications (71). It targets in-school adolescents in class 6 to 12 and out of school adolescent girls. It utilizes the existing human resources framework and works through the convergence of multiple agencies for the implementation of the program. Results from earlier studies has shown good compliance with IFA supplements and more than 90% of the girls consumed most of the tablets (85 out of 90 tablets) which resulted an increment of 17.3 gm/L haemoglobin among the beneficiaries (72). This consumption was associated with significant weight gain of 0.83 kg in the intervention group compared to the girls in the control group which informs the potential of this supplement for anaemia correction and growth promotion among adolescent girls. As adolescent girls are more prone to be anaemic and iron deficiency anaemia is most prevalent among all the types of anaemia, providing iron folic acid supplement with adequate support can serve as an effective strategy to overcome the challenge of anaemia in Andhra Pradesh and Rajasthan.

Socioeconomic impact of untreated mental health conditions can be enormously high. Such illnesses severely affect the development of the children, their educational attainments and their potential to lead productive lives (45). The affected children with mental illnesses often face

major challenges with social stigma, discrimination within the peer groups and isolation. They generally lack access to quality health services, education facilities and other entitlements which is not compliant with their fundamental human rights. The consequences of poor mental health continue include several health and social outcomes such as higher rate of crimes, increased alcohol consumption, tobacco and other substances abuse, unsafe sexual activities leading to STDs and adolescent pregnancy etc. It is evident from the national mental health survey 2016, there is wide gap of treatment of mental disorders in the total population, which is an indicator of disease burden, lack of availability and accessibility of services and utilization of the same (48).

Despite of the presence of evidence-based interventions to improve mental health services, this treatment gap persists in India resulting in the burden of disease which is largely affecting the national health. The treatment gap in overall population is about 50-60% for schizophrenia, 88% for depression, 97.2% for substance abuse and 22 to 95% for seizure disorders. The treatment gap for common mental disorders is 95% which is higher than the gap in severe disorders which is 76% (48). Another critical issue for mental health is the patterns of how the health services are being utilized by the population. Several factors like median duration of mental illness, delay in seeking care from time of onset, choice of providers, distance from health centre and number of visits to the service provider further contribute to this issue. Previous studies have reported a median duration of depressive disorders as 36 months which is about 72 months for diseases like bipolar disorder. A delay of 2.5 months was reported for depressive disorders which was about 12 months for conditions like epileptic disorders. Further, the median number of visits to the service providers was 2, ranging from 1 to 30. In 4 to 50% cases, the preferred provider was based on government institutions (48). In earlier studies conducted among European countries, the cost of mental disorders varied between 3 to 4% of the GNP during 1990 among which nearly 2% was attributable in treating the mentally ill individuals (73). In addition, the aggregated cost for all mental disorders was USD 148 billion and the indirect cost for mental disorders was equal or more than the direct cost (73). Similar studies conducted in Canada at 1998 revealed the cost of treatment was 6.3 billion Canadian dollars and cost of lost productivity was 8.1 billion Canadian dollars (74). Another study conducted in UK demonstrated the cost of mental illness was 32 billion GBP in 1996-97 of which 45% was due to the lost productivity (75).

The cost of mental illness during young age is huge both in short and long term. An estimation by WHO shows that, treating mental disorders among those who suffered from conduct disorders at early age can incur 70000 USD whereas similar patient with no previous history of early mental illness required treatment cost of less than 10000 USD (76). Cost of education and criminal justice for an adult with early mental disorders were significantly higher than a normal adult (77). Another study demonstrated that the cost of behavioural abnormalities were 10 times higher in adulthood for those who suffered from mental illness at earlier age (75). On the other hand, the families incur cost of treatment, miss the opportunities to earn livelihood as they have to spend more time with the affected adolescent (78). These findings inform the policy-makers to invest more on child and adolescent mental health to yield better population health outcomes among the adult population in the future. But the provision for budget specific to CAMH is rarely found in national and state budgets in India and other countries with similar economies. Therefore, the financial expenses for CAMH are met by out of pocket (OOP) expenditures. This burden of OOP ranges from 12.5% to 71.4% in developed and developing countries respectively (78).

In addition to the cost burden, the efficiency and effectiveness of existing psychiatric and psychological interventions for adolescent mental illnesses are studied in different context. Evidence of therapeutic interventions resulted improvement of more than 50% compared to the non-treated group which indicate that timely psychiatric, psychological and behavioural interventions can reduce mental health disabilities among the adolescents (76). Also, community-based outreach programs ensuring lower cost of drugs and basic psychological support can reduce the disease burden to a greater extent. A study in rural India demonstrated the gradual reduction of cost of treatment as well as dramatic improvement of schizophrenia over a follow-up period of 18 months (73). A review of 83 trials of different psychological interventions aiming prevention of depression among the child and adolescent population, revealed that most of the trials (n=67) were conducted in school settings with handful of studies at the community level (79). Among these trails, 29 were conducted in unselected populations and 53 in targeted populations. 32 trials with 5965 participants reported a reduced rate of diagnosing depression among the participants compared to the control groups. The overall results show small benefits for preventing depressive symptoms and depression diagnosis up to 12 months but not beyond that. Studies have found integrated mental health prevention programs in educational institutions targeting children and adolescent population resulting long-term benefits like enhanced emotional and social behaviour and academic attainments

which are also cost-effective (80). Particularly in India, programs like peer counselling and teachers training are provided as part of a multicomponent youth health intervention which had limited feasibility and effect due to various logistical and financial barriers (81). Evidences from Mauritius showed short-term benefits to depression, hopelessness, coping skills, and self-esteem after the evaluation of a school-based preventive program targeting the adolescent population (82). These findings provide insights about the acceptability and feasibility in the long term (80). However, most of these analyses provide evidences from high income countries and there is a lack of adequate evidence on cost-effectiveness of the interventions for adolescent mental health in Andhra Pradesh and Rajasthan.

Prospective Interventions Addressing the Problems Adopting the Perspectives of Key-stakeholders

Based on the findings of key-stakeholders consultations and opinions from sector experts, three adolescent health interventions for delaying child marriage, preventing anaemia and diagnosing and treating mental health problems are identified for assessing cost-effectiveness of the same. A brief discussion on those interventions is given below:

Intervention 1: Delaying Child Marriage in Andhra Pradesh and Rajasthan through Providing Incentives

To prevent child marriage in Andhra Pradesh and Rajasthan, earlier initiatives in the state and national level were examined. Further, similar schemes in other low and middle-income countries are also reviewed which suggest numerous gaps and prospects in designing as well as implementing such programs in the context of Andhra Pradesh and Rajasthan. Several programs providing cash transfers, transportation to the schools, educational materials, consumables and so on are offered amongst which conditional cash transfer and oil transfer schemes are found as cost-effective in another study by Copenhagen Consensus in the context of Bangladesh (57). However, conditional cash transfer is also offered in Haryana which was found to have minimal degree of success in addressing social behaviors to child marriage (83). Moreover, the implementation of such transfers did not show adequate efficiency in reaching marginal population, ensuring accountability and assuring distributive as well as procedural justice to the beneficiaries (57,83,84). In this proposed intervention, we intent to apply

learnings of earlier schemes and enhance the socioeconomic protection of the girl child by providing two incentives. First part of the incentives will be provided for pursuing education and bearing allied expenses which will improve the employability and productivity of the girl child. Secondly, we aim to provide oil as household consumables which will allow the girl to contribute to the household wellbeing without jeopardizing her educational attainments. We intent to implement the intervention to rural girls and urban girls born to the families living below the poverty line where the child marriage is extremely prevalent. In addition, the intervention will be conditional to unmarried status of the adolescent girl up to 18 years. To prevent marriage immediately after reaching 18 years as the benefits will be stopped after the same, adequate institutional support to delay marriage preserving the autonomy and socioeconomic protection of the girl will be ensured. Although the scheme provides incentives for education which implies the primary beneficiaries will be school going children, we propose to offer similar transfers to the out of the school girls as expenses for their vocational training or any other means to increase productivity- which will enable all the girls to move forward to a better, secured and fulfilling life. Moreover, special attention should be given to orphan girls, girls with mental disorders or girls who are differently abled so that the benefits of the proposed intervention will leave no girl child in Andhra Pradesh and Rajasthan behind. Initially, this intervention will provide incentives to the adolescent girls aged 14 years who are enrolled in the secondary schools throughout Andhra Pradesh and Rajasthan with gradual expansion as described earlier.

The incentive per annum will be divided to two equal shares. One will be given as cash incentive covering the educational cost like uniform, additional vocational training as per the interest of the individual which is not covered by any of the usual provisions of institutional training, transportation to the school, prices for the books, pen and papers etc. Another share will be provided as consumable goods for the household promoting the ideology of considering the education of the girl is beneficial for the entire family. The cost of the intervention will be the direct cost of providing both incentives as a package. It will use the existing framework of school-based education to identify and enrol the beneficiaries without deploying any materialistic or human resources dedicated for the implementation. The enrolment, disbursement and monitoring data of the intervention will be included to the Management Information Systems to minimize the false enrolments or any other discrepancy in the demand and/or supply side of the intervention. Since the system is already in place, adoption of these data will not require any additional cost for uploading and managing the same.

The intervention will target 455530 school going adolescent girls in Andhra Pradesh and Rajasthan who are aged 14 years. The intervention will provide the incentives for next four years to the same cohort of girls provided they continue their enrolment to the schools.

Intervention 2: Preventing Anaemia Among the Adolescent Girls through Iron and Folic Acid Supplementation

Although anaemia is prevalent among both adolescent boys and girls but the prevalence is much higher among the girls which is evident in multiple large population based surveys (42,85). There are several reasons of higher prevalence of anaemia among the adolescent girls. First, adolescent girls experience chronic blood loss due to monthly menstrual cycles (86). Second, adolescent girls particularly those who get married before 18 years and living in the rural areas start childbearing during late adolescence. Those adolescent girls often experience repeated pregnancies. It is evident that mothers with greater number of pregnancies and deliveries will have more chances of developing chronic anaemia (87). Third, adolescent girls and women have hormonal changes in the body during the pregnancy and lactation which increases the demand for iron and calcium which may lead to chronic iron deficiency anaemia (88). Fourth, adolescent girls are usually negligent about their nutrition which is critical for the growth and development during their adolescence which contributes further in developing anaemic status among themselves (89). Moreover, recurrent infections like urinary tract infections are more common in adolescent girls which increases the susceptibility to develop anaemia (90). Furthermore, adolescent girls contribute more to the household activities than the boys and higher physical exercise with inadequate dietary intake makes them vulnerable to develop iron deficiency anaemia (91). Considering the higher prevalence and magnitude of anaemia among the girls, the proposed intervention to address anaemia among the adolescents will focus on adolescent girls. However, the intervention can be eventually scaled up for all the adolescents irrespective of their genders. This intervention will be implemented through providing weekly iron and folic acid supplementation and biannual deworming with an aim of covering all the adolescent girls of Andhra Pradesh and Rajasthan aged 10 to 19 years. To improve the compliance with timely consumption, the beneficiaries will undergo an awareness building exercise, one hour per month, conducted by trained teachers within the schools and healthcare providers at the community level focusing out of the school adolescent girls. The providers within the school as well as out of the school will prepare a demand chart at least

two months prior to the date of distribution to ensure adequate supply of the supplements and other materials in a timely manner.

The providers at the school and community level as well as the beneficiaries will be informed about the benefits of the intervention, short and long-term consequences of anaemia and the importance of their participation. Data on coverage of the program, gaps and challenges during implementing the same will be conveyed to the supervising officials of Andhra Pradesh and Rajasthan for better decision making.

Intervention 3: School-based Behavioral Screening and Further Mental Health Services for the Adolescents

This intervention will consider the adolescents within secondary and higher secondary schools. It comprised screening the mental health status of the adolescents, referring them to the appropriate providers and treating them for the respective disorders. Also, the intervention promoted positive mental health through increasing awareness among the students, parents or guardians and the teachers- who advocate mental well-being among the school-going adolescents.

Though it will be offered to all the students, but the participation will be voluntary and require the assent of the adolescent and the consent of the parent or guardian. To conduct the intervention, authorization from the school authority, relevant school health institutions and local health authorities will be taken. The parents and the teachers will be informed about the purpose of the intervention and their role throughout the process. These key stakeholders have critical roles to play for facilitating the adolescent to participate in this intervention.

Prior to the intervention, the students will be informed thoroughly. Considering the learning difficulties or communication disorders among any adolescent within the class, the message of the communication should be prepared in a way so that it is understandable by a student of primary level or fifth grade which is lower than the intervention group. The intervention should not be conducted during the class timings affecting the regular educational activities. Instead, a convenient time will be fixed upon a participatory discussion with the students, teachers, parents or guardians and the mental healthcare providers.

In an appropriate schedule the students will be enrolled to the intervention and the screening procedure will be conducted. The will be asked to complete a self-administered questionnaire which is written in a simplified language for easier communication. As this step doesn't require mental health expert to administer the questionnaire, teaching staffs as well as social workers can conduct the same which can be an effective strategy in the context of severe paucity in mental health professionals. However, additional staffs will be deployed to explain the questions if required. Also, special attention will be given to differently abled students to read/understand the questions. The questionnaire will be prepared based on three scales- Mood and Feeling Questionnaire, Youth Self-report aggression scale and 3-point Likert scale. The questionnaire will be reviewed, assessed and modified upon consultation with educationists, psychiatrists and psychologists. The cultural appropriateness will be examined and necessary modifications will be done prior to administering the questionnaire to the intervention group. The findings will be assessed by the mental healthcare providers and positive cases will be sorted out of the total students who will be undergone through the screening process.

The screened-positive students will be scheduled for the next step of the intervention. At this step, trained clinical mental health evaluator will conduct sessions ranging from half an hour to one hour per student to assess the current and past mental health status including the behavioural disorders, bodily discomforts of psychosomatic origin, learning difficulties etc. The status of mental health and level of mental illness will be determined which requires referral to specialized care. A global study shows that 19.1% adolescents receive mental health services in developing countries which implies an unmet need for similar services for 80.9% adolescents (92). Therefore, the students who would reveal confirmed diagnosis of mental illness and will be receiving mental health services prior to enrolling the program will be excluded at this level to mitigate overlapping of treatment and misuse of resources.

Remaining students following the exclusion will be short-listed and their parents or guardians will be communicated with the findings. Through motivational interviews and discussions, the necessity of referral and benefits of timely care for better educational and professional outcomes in the future will be explained. The possible barriers like stigma which requires multiple sessions of discussion, distance between the residence and mental health care centres or providers will be assessed and addressed at that stage ensuring better compliance with the referral. Follow-up visits, telephone calls and interviews will be conducted for timely visit to

the specialized provider. The diagnosis and prognosis throughout the clinical management will be followed up at a timely manner. The opinions of all the students who enrolled in the intervention, the parents or guardians, teachers, school and other authorities, the healthcare providers and other stakeholders will be collected, evaluated and adopted for better implementation of the intervention within the sociocultural context of the school as well as the population.

Methodologies of Cost-effectiveness Analysis, Sensitivity Analysis and the Preliminary Findings

For the intervention addressing child marriage, we collected the data required for this analysis from various sources. First, we used the census data, data from published Government reports and large-scale population based surveys like National Family Health Survey third and fourth round. Further, we searched, retrieved and reviewed published literature from PubMed and Google Scholar using relevant keywords without applying any specific time frame for the publication. We reviewed published reports and other documents by different development agencies working in the context of Andhra Pradesh and Rajasthan. We also collected administrative data from the Department of Women and Child Development, Government of Andhra Pradesh and Rajasthan. For anaemia prevention intervention, we collected the data from the census data, data from published Government reports and large-scale population based surveys conducted in Andhra Pradesh and Rajasthan like National Family Health Survey third and fourth round, Annual Health Survey and District Level Household and Facility Survey report for Andhra Pradesh and Rajasthan, published literature from PubMed and Google Scholar using relevant keywords. In this process, we primarily focused on papers that provide data specific to the context of Andhra Pradesh and Rajasthan, or other Indian States/UTs, or similar economies. We also collected administrative data from the National Health Mission Office, Government of Andhra Pradesh and Rajasthan. Furthermore, for mental health intervention, we retrieved relevant disabilities data from the Census of India, published Government reports and large-scale population based surveys conducted in Andhra Pradesh and Rajasthan like National Family Health Survey third and fourth round, educational data from District Information System for Education, published literature from PubMed and Google Scholar using relevant keywords of interest. In this process, we primarily focused on papers that provide data specific to the context of Andhra Pradesh and Rajasthan or similar population.

Further, we reviewed grey literature, other published reports and documents published by different development agencies.

Intervention 1

In this proposed intervention for delaying child marriage, we estimate the costs as well as benefits for a cohort of 455530 adolescent girls aged 14 years in Andhra Pradesh up to 18 years of age. Considering the present rate of child marriage in Andhra Pradesh, we estimate the rate 33% is equally distributed throughout four years as 8.85%. Therefore, the estimated number of total child marriage is 150325 and the yearly number of girls getting married before 18 years is 37581. We consider the outcome of the interventions as similar as the BCR analysis in Bangladesh which was 25% reduction on child marriage after the intervention. This leads to the calculated number of averted cases of child marriage per year as 28186 in Andhra Pradesh. Remaining number of girls who will be getting married per year even after the intervention will be deducted from the cohort and thus we calculate the number of beneficiaries every year. We transfer the amount of incentives per beneficiary in terms of percentage of GDP per capita from the previous studies which is 2.35 and applying this rate, we calculate cost of intervention per child per year.

In addition, studies from Bangladesh suggest that conditional cash transfers reduce the school dropouts and increase the enrolment per year by 20.5%. As on 2013-14, the average annual dropout rate at secondary level and post-secondary level in Andhra Pradesh is 15.6% and 11.8% respectively. We calculate the yearly increase upon the existing enrolment rate and estimate the number of additional girls receiving school education due to the intervention. For these girls, we estimate the additional cost of schooling and the opportunity cost for other works they could have done if they stayed out of the school. Also, we estimate the indirect cost per child to implement this intervention which includes the costs for training, transportation, human resources expenditure, awareness campaigns and other behavioral change communication programs and costs for monitoring and evaluation. Adding the direct cost of the incentives, additional cost of schooling including the opportunity cost and the indirect costs- we calculate the total cost of this proposed intervention.

For calculating the benefits of preventing child marriage, we estimate three types of potential benefits. First, we calculate the incremental benefits in wages with increased years of schooling

and multiply the same with the number of beneficiaries who do not get married remain in the schools due to the interventions. Second, we calculate the amount of incentives provided to each beneficiary within the program by multiplying with the number of total beneficiaries. Further, we estimate the social cost of child marriage which include cost due to fertility rate, domestic violence, stunting among the children and maternal mortality.

We calculate the cost and assume that the proposed intervention can prevent this cost and therefore, this cost can serve as potential benefit assuming full implementation of the intervention. In that situation, the averted cases of child marriage multiplied by the social costs per child marriage resembles the total benefits from averting the social costs of child marriage in Andhra Pradesh. Both for the costs and benefits, we estimate discounted values at 3%, 5% and 8%. For each final value of these costs and benefits, we use the benefits as numerator and costs as denominators and finally we calculate the benefit cost ration (BCR) of preventing child marriage at Andhra Pradesh as following:

Table 1: Benefit Cost Ratio of delaying child marriage through providing incentives, Andhra Pradesh

Discount	Benefit (INR)	Cost (INR)	BCR
3%	72,396,840,753	15,158,954,697	4.8
5%	44,012,235,051	14,486,015,827	3.0
8%	24,097,221,974	13,564,972,868	1.8

Further, we applied similar methodology to estimate the cost-effectiveness of same intervention in Rajasthan by changing the value of the variables used in this analysis which revealed following benefit-cost ratio for Rajasthan:

Table 2: Benefit Cost Ratio of delaying child marriage through providing incentives, Rajasthan

Discount	Benefit (INR)	Cost (INR)	BCR
3%	105,940,913,590	15,158,954,697	7.0
5%	67,282,011,980	14,486,015,827	4.6
8%	37,320,687,538	13,564,972,868	2.8

The structure of the intervention is based on evidences from another South Asian country Bangladesh which shares similar cultural and socioeconomic dimensions as India. Though there are differences in population dynamics if the context of Andhra Pradesh is considered, however, the societal challenges have shown similar trend in the past. Problems like illiteracy and poverty aggravate the issue of child marriage in the patriarchal social structure of both of the countries as well as the respective states. In the light of such ideations, we consider the quality of evidence as “medium”. However, the population-based projections are derived from large-scale surveys which adopted generalizable sample providing better acceptability of the estimates derived through economic analysis.

We conducted the sensitivity analysis of the earlier calculations by changing the assumed rate of reduction in child marriage. Instead of 25% rate of reduction, we consider a much lower reduction in the child marriage which is the outcome of interest and a potential benefit of the intervention. Assuming the cost as well as other benefits as constant, a reduced rate of 15% averted cases of child marriage due to the intervention, we get the following benefit-cost ratio (BCR):

Table 3: Sensitivity Analysis of delaying child marriage through providing incentives, Andhra Pradesh

Discount	Benefit (INR)	Cost (INR)	BCR
3%	46770771147	14801357644	3.16
5%	28855363586	14148208750	2.04
8%	16279794025	13253981078	1.23

The findings for sensitivity analysis on Rajasthan are given below:

Table 4: Sensitivity Analysis of delaying child marriage through providing incentives, Rajasthan

Discount	Benefit (INR)	Cost (INR)	BCR
3%	105,940,913,590	14,801,357,644	7.2
5%	67,282,011,980	14,148,208,750	4.8
8%	37,320,687,538	13,253,981,078	2.8

Intervention 2

In the intervention of preventing anaemia, we assume the prevalence of anaemia as revealed in District Level Household and Facility Survey 2012-13 in Andhra Pradesh remains constant till the time of this BCR analysis and applies to the entire spectrum of adolescent age group 10 to 19 years. Further, we estimate an average reduction of 42% over a period of four years due to that intervention from estimates of a study conducted in Uttar Pradesh (93). This provides the estimated number of averted cases of anaemia for the entire duration of the intervention as 3153311 and then we calculate the average number of 572724 cases averted per year assuming the reduction in anaemia takes place equally each year. Further, we bring the distribution of anaemia among the women aged 15 to 19 years from the State report of National Family Health Survey-4 for Andhra Pradesh and assume the same distribution applies to the adolescent girls aged 10 to 19 years. Using the proportion of that distribution to three groups- mild anaemia (10-11.9 g/dL), moderate anaemia (7-9.9 g/dL) and severe anaemia (less than 7.0 g/dL), we estimate the prevalence of different levels of anaemia among the adolescents. For each group, we estimate the rate of averted cases in each group assuming the weightage of correction of anaemia is same to each group. Applying this rate to the total number of anaemia averted cases, we calculate the number of adolescents who had mild, moderate and severe anaemia earlier. For each of the adolescents belonging to any of these category, we estimate the years lived with disabilities due to anaemia using the following equation (94):

$$YLD = D * [kce^{ra/(r+b)} / (r+b)^2 (e^{-(r+b)(L+a)} [-(r+b)(L+a)-1] - e^{-(r+b)a} [-(r+b)a-1]) + [(1-k)/r](1-e^{-rL})]$$

Here,

“K” is age weighting factor,

“C” is constant,

“r” is the discount rate.

“A” is age at onset of disability,

“b” is the parameter from age weighting function,

“L” is the duration of disability and

“D” is the weight for disability.

In this equation we apply $r=0.03$, $K=1$ and $\beta=0.04$ for the base cases. Further, we use the values for K , C , r , a , b , L and D as 0, 0.1658, 0.03, 16, 0, 0.67 and 0.004. In addition, we apply the disability weights to mild, moderate and severe anaemia as 0.004, 0.052 and 0.149 respectively (95). Thus, we estimate the years lived with disability for each case and calculate the total years lived with disability by multiplying the same with the number of cases to each group of anaemia. We multiply this number with value per Disability Adjusted Life Year (DALY) for Andhra Pradesh as on 2017. This gives the total value of the averted DALYs as the monetary value of the health benefits due to the intervention. Considering the 18.7% of the beneficiaries who reported to have mild side effects due to the intervention (93), we assume 60% of those beneficiaries (11%) will not continue the intervention and the averted DALYs attributable to these beneficiaries is deducted from the total value of DALYs as calculated earlier. Similarly, we estimate the discounted benefits at 3%, 5% and 8% for all the averted cases of mild, moderate and severe anaemia. Totalling the values for discounted benefits at each of the above-mentioned rates, we get the total benefits for the respective rates. Then we estimate the cost per adolescent per year based on earlier studies which estimated a cost of Rs 14.6 per year per adolescent (93). This study also found a compliance rate of more than 90% for school-going adolescents and 86% for non-school adolescents. We estimate the present value of that cost using annual inflation rates from 2006 to 2016 which is Rs 48.97. Then we multiply this cost value to the total number of beneficiaries within that intervention and calculate the total direct cost per annum. As mentioned earlier, the intervention includes components of counselling for increasing the awareness about and compliance with the intervention. Assuming monthly sessions of counselling, one hour per month totalling 12 hours

per annum which is equivalent to 1.5 working days, we calculate the daily wages for those adolescent girls. We consider two age groups- 10 to 14 years and 15 to 19 years and calculate wages for both in-school and out of the school girls based on their educational attainment and the respective wages at the context of the State. We consider these total wages as the opportunity cost to the beneficiaries due to attending the intervention. Adding this indirect cost to the previously calculated direct cost of intervention, we calculate the total cost of the intervention. We assume this cost remains unchanged for the implementation and then we use this cost value as denominator and use the discounted rates of benefits as numerator to calculate the benefit cost ratio (BCR) as following:

Table 5: Benefit Cost Ratio of preventing anaemia among the adolescent girls, Andhra Pradesh

Discount	Benefit (INR)	Cost (INR)	BCR
3% discount	2945028453	1330228812	2.21
5% discount	2925546911	1330228812	2.20
8% discount	2896646420	1330228812	2.18

We applied similar methodologies for Rajasthan and found following benefit-cost ratio:

Table 6: Benefit Cost Ratio of preventing anaemia among the adolescent girls, Rajasthan

Discount	Benefit (INR)	Cost (INR)	BCR
3% discount	1927500418	1304952616	1.48
5% discount	1914749886	1304952616	1.47
8% discount	1895834718	1304952616	1.45

For the sensitivity analysis, we assume that the final number of cases averted for mild, moderate and severe anaemia will be 10% lesser than the estimated amount. Applying that reduced rate of reduction in the cases and assuming all the other variables including the cost of the intervention, disability weight and value of YLDs as same, we calculate the benefit-cost ratio as following:

Table 7: Sensitivity Analysis for preventing anaemia among adolescent girls, Andhra Pradesh

Discount	Benefit (INR)	Cost (INR)	BCR
3% discount	2651122708	1304952616	2.03
5% discount	2633585370	1304952616	2.02
8% discount	2607569069	1304952616	2.00

For Rajasthan the sensitivity analysis revealed following findings:

Table 8: Sensitivity Analysis for preventing anaemia among adolescent girls, Rajasthan

Discount	Benefits (INR)	Cost (INR)	BCR
3% discount	1735141174	1304952616	1.33
5% discount	1723663109	1304952616	1.32
8% discount	1706635623	1304952616	1.31

Intervention 3

To calculate the cost for each stage of the mental health intervention, we bring the proportionate cost inputs from different studies with similar objectives. For the screening programs, we adopt the cost-effectiveness analysis of a school-based emotional health screening program conducted by Kuo et al. which used a framework borrowed from existing literature of cost-effectiveness analyses of breast cancer (96).

In this calculation we consider the cost of human resources dedicated to different stages of screening, material development and dissemination for the screening, and other cost related to the intervention. We do not consider the cost of the school staffs and teachers, value of the time of the parents provided for the intervention or any other indirect cost.

Moreover, we assume 80% enrolment at voluntary basis which is similar rate as of the study mentioned above. As this intervention will be implemented through educational institutions, we presume the internal coverage within the same institution for further calculation, therefore, 80% enrolment within same institution does not reflect the coverage in the entire adolescent population in the state. Based on the resources and adequate planning, the program can be replicated to all the institutions which can be termed as coverage among all the school-going

adolescents in the state. However, we assume a fully implemented status of the intervention and apply 80% enrolment rate to the target population of all the school-going adolescents totalling total 4072024 students at Andhra Pradesh to retrieve the number of estimate students enrolling on the screening program. Kuo et al. estimated 18% students will be screened positive who will require further clinical assessment and 60% of them will require referral services. We assume same rate for this analysis and estimate the number of students who will be opting clinical assessment within the school and the number of the students who will be shortlisted for referral. We estimate the proportional cost for the clinical assessment and preparing the students for referral using the same framework. Then we estimate the proportional cost for successful linkage of these referred adolescents to the specialized care providers. These proportional costs are derived from the percentage of the cost in each category provided by Kuo et al. expressed as percent of GDP of the United States. That rate is applied to the state GDP for Andhra Pradesh to calculate the state-specific cost for each category. Calculating the unit cost multiplied by the number of adolescents at each level, we estimate the cost of screening mental health among those adolescents in Andhra Pradesh.

Further, we estimate the average cost of mental health services for each adolescent as per the estimation by Access Economics which adopted a costing framework from earlier studies (97,98). We apply the similar cost after standardizing to the state through calculating the share of GDP. We calculate the total cost of treatment by multiplying the average cost to the total number of adolescents who will be linked successfully to the specialized care assuming the treatment cost will be same for all the participants. We add this cost to the cost of screening as calculated earlier. Thus, we get the cost for the intervention for Andhra Pradesh.

To calculate the benefit, we estimate the years of life lost (YLL) and years lived with disabilities (YLD) for mental illness among the adolescents from Global Burden of Disease data. Further, we adopt the rate of averted cases provided by the same frameworks from which the cost of treatment is calculated (97,98). These studies inform a reduction of 39.9% after the evidence-based treatment. We assume same aversion of mental illness will be found after implementing this intervention. Also, we calculate the unmet need of mental health services for serious mental illness in the less developed countries which is the average of 76.3% and 85.4% which is 80.9% and apply the reduction rate 39.9% to the number of the adolescents who will be receiving mental health services and calculate the averted YLL and YLD due to the intervention (92,98). Applying value of statistical life year and disability adjusted life year

for 2017 in Andhra Pradesh, we calculate the value of averted YLL and YLD. Using this value as numerator and the total cost of the intervention as denominator, we calculate the benefit cost ratio (BCR) for this intervention as given below:

Table 9: Benefit cost ratio of school based mental health services for the adolescents, Andhra Pradesh

Discount	Benefit (INR)	Cost (INR)	BCR
3%	3015386570	1200534172.93	2.51
5%	2957950636	1177666855.35	2.51
8%	2875785340	1144953887.15	2.51

Adopting similar calculations and changing the data for Rajasthan, we found following results:

Table 10: Benefit cost ratio of school based mental health services for the adolescents, Rajasthan

Discount	Benefit (INR)	Cost (INR)	BCR
3%	2687221457.48	1779696034	1.51
5%	2636036286.86	1743001270	1.51
8%	2562813056.67	1687959125	1.52

Earlier we assumed the rate of successful linkage between the referral and the specialized mental health services as 72% as the study framework we adopted (96). For the sensitivity analysis, we assume a much lower rate of successful linkage i.e. 60% and apply this rate to estimate the number of students receiving the services and lower rate of aversion of mental illness as 35% instead of 39.9% as used in the earlier analysis. Also, we consider the same unit cost for each case and we calculate the benefit-cost ratio (BCR) for this lower linkage rate as following:

Table 11: Sensitivity Analysis for school based mental health services for the adolescents, Andhra Pradesh

Discount	Benefit (INR)	Cost (INR)	BCR
3% discount	2643464209	1049683193	2.52
5% discount	2588959793	1028040240	2.52
8% discount	2507203168	995575811.8	2.52

Sensitivity analysis for same intervention in Rajasthan revealed BCR as given below:

Table 12: Sensitivity analysis for school based mental health services for the adolescents, Rajasthan

Discount	Benefits (INR)	Cost (INR)	BCR
3%	2355090314	1557546268	1.51
5%	2306531751	1525431912	1.51
8%	2233693906	1477260378	1.51

There are several limitations in this cost-effectiveness analysis of all three interventions addressing adolescent health issues. First, we calculated benefits in terms of improved productivity following educational attainment which did not include adolescent girls who are out of the school. These girls are at higher risk of child marriage and the potential cost as well as benefits for implementing similar intervention targeting them are not calculated in this analysis, which is a limitation of this study. Moreover, a common public health problem like anaemia affects adolescents of all genders. Although we propose to implement the iron folic acid supplementation to the adolescent girls at the initial phase and upscale the program for adolescents irrespective of their genders, we did not estimate the potential benefits for different genders which is another limitation of this study. Also, we estimated benefits as averted DALYs whereas an alternative methodology to estimate the benefits in terms of increased productivity following correction of anaemia would provide a different benefit-cost ratio for the same intervention. Furthermore, we calculated stage-specific cost structure and benefit after successful linkage to the treatment of adolescent mental illness which was adopted from studies in developed countries. Moreover, there is no baseline prevalence of mental illness among the school going adolescents. In addition, the crisis is also prevalent among out of the school adolescents who would experience higher social cost of mental illness. Also, mental illness among the adolescents will cost the time of the caregivers and treating the same will have opportunity cost for the adolescent and the accompanying person. We could not consider these issues and allied calculations during our analysis. Lack of context-specific evidences illustrating cost and benefits of diagnosing and treating mental health problems among the

adolescents led to the result discussed earlier which reflects those limitation behind the numbers.

Adolescence offers an opportunity to the children to develop themselves as responsible and productive citizens in the future leading fulfilling lives. This period requires support from the families, communities, societies and the nation to combat the challenges affecting health of millions of adolescents in Andhra Pradesh and Rajasthan. High burden of child marriage and anaemia is predominantly suppressing the development of adolescent girls to unlock their fullest potentials whereas all the adolescents- both boys and girls are exposed to the mental health epidemic, emerging from a wide range of risk factors including their vulnerable age and the socio-behavioral aspects.

In our analysis, we have found all three problems resulting very high cost to the overall population as well the economy. In most cases, the indirect costs occurring to the families of the adolescents and the economy of the state and the nation outweighs the direct costs to the affected adolescent which provide meaningful insights about the responsibility of the policy makers to prevent these adolescent health challenges and protect the adolescents from exposure to these problems. We reviewed the preventive as well protective measures for each of the interventions and analysed the cost-effectiveness. With varying methodologies adopted in this as well as other analyses, all three adolescent health interventions are found to be cost-effective, even in altered scenario with variations in key variables. However, the estimates should be used cautiously because of their diversities across local and global literatures. Child marriage prevention through incentives, both conditional and unconditional- have shown promises to reduce the rates in child marriage and improve the educational attainment leading to better productivity provided adequate employment (57). While the adolescent girls should get such opportunities after finishing their schooling, it is also necessary to activate and navigate the driving forces within the society to reduce child marriage through collective approaches. Moreover, the cultural perceptions at the household level in Andhra Pradesh and Rajasthan should be explored to identify the barriers to the compliance of all the initiatives adopted to reduce child marriage and take further steps to address them both at the community and policy levels. Another health intervention focusing on reducing anaemia shows higher cost-effectiveness if the cognitive development and labor force participation is considered as the potential benefits of the intervention (99). It informs the opportunity to address a single problem to yield multiple benefits at the individual and population level through cost-effective

evidence based intervention. In addition to providing supplementation, other efforts to ensure minimizing the risk factors of anaemia should be considered as a part of the holistic approach to improve the overall health of the adolescents. The last intervention discussed in this paper, improving mental health among the adolescents through screening and providing specialized mental health services to the affected individuals, the benefits appear as nearly twice of the cost of the intervention. Though the value of averted years lived with disabilities was considered as potential benefits, it is likely to be higher if the passive benefits of time savings of the caregiver, improved quality of life and social benefits like lower crime and other benefits are estimated in the context of Andhra Pradesh and Rajasthan. The assessment and management of mental illnesses in Andhra Pradesh and Rajasthan should be investigated properly to explore the mental health threats and potential opportunities to address the same through cost-effective manner ensuring optimal treatment and stronger preventive measures. All of three interventions provide scientific as well as economic basis to work upon them and adopt them as prioritized adolescent policies and translate these to health strategies and programs for ensuring safe adolescence for all the adolescents in Andhra Pradesh and Rajasthan, who have the potentials to play pivotal role in the future of the state and the nation.

Competencies Acquired in the Frame of the Predefined Objectives of the Practicum

As mentioned in the beginning of this report, there have been several objectives of this practicum training, which can serve as the basis of assessing the accomplishments and evaluate the acquired public health competencies. However, it is absolutely subjective assessment which is done by myself and my supervisor has no role in this process. It would be better to illustrate these as how a Master of Public Health candidate can reflect on his own activities, which has to be unique to each candidate based on their works and experience achieved throughout the practicum. In following table, I would provide a brief summary of my achievements during my practicum in the light of the learning objectives inferring the core public health competencies I perceive to have been developed in the due course of the practicum training.

Table 13: Competencies acquired during the practicum as per the objectives

Learning Objective at the Beginning	Achievement Through the Practicum	Acquired Public Health Competencies
Assessment of the status of the adolescent health and health systems of two large Indian states- Andhra Pradesh and Rajasthan	- Performed documentary analysis of adolescent health and health systems in Andhra Pradesh and Rajasthan. - Visited Andhra Pradesh, met with the Govt. officials and interviewed them to derive policy data. - Worked with state nodal officials in Rajasthan to assess the current status of the respective domains.	- Analytical Skills - Cultural Competencies
Critical analysis and identification of key health challenges as well as health interventions for the target population	- Participated in key-stakeholders consultation and learned the art and science of conducting policy dialogue and preparing ground for generating new ideas to address old problems. - Reviewed local, national, regional and global data and reports in the light of identified health interventions to explore the gaps and prospects in diverse socioeconomic contexts	- Analytical Skills - Communication Skills
Collaborative academic and research activities with colleagues within IIHMR and co-researchers from Copenhagen	- Worked with chief economist of Copenhagen Consensus, Dr Brad Wong and another Economist Dr Amar Chanchal to accomplish the cost-effectiveness analysis. - Joined on-campus academic and research activities with limited capacities.	- Communication Skills - Public Health Advocacy and Leadership Skills

Consensus TATA Trust	- Communicated with stakeholders from public and private institutions to collect data, understand the relevance of policy components within the context of Andhra Pradesh and Rajasthan and inform the policy implications of ongoing research. - Worked in strengthening the ties within different research teams to achieve desired goals of mutual benefits and creating lasting impacts for population health.	
Writing reports for implemented programs for adolescents as well as the health systems a part of the documentary research	- Prepared bi-weekly and monthly reports informing the status of the project to the principal investigator and senior researchers. - Communicated preliminary findings with leading economists and health researchers locally and globally.	- Communication Skills - Public Health Advocacy and Leadership Skills
Performing economic assessment of public health interventions identified by the key stakeholders	- Collected data, contributed in designing the methodologies and performed cost-effectiveness analysis of six public health interventions each for Andhra Pradesh and Rajasthan. - Performed sensitivity analysis of the same and shared the models with external experts.	- Analytical Skills - Communication Skills - Public Health Advocacy and Leadership Skills
Preparing four scientific publications on health outcome	Drafted two papers on cost-effectiveness analysis of adolescent health interventions for both states as second author, and two papers on	- Analytical Skills - Communication Skills

evaluation on above-mentioned states of India	health systems interventions for the same states as third author. These papers are currently under review by Copenhagen Consensus and external reviewers. • If published, the papers will be made available to public domains, which is expected to serve as critical policy analysis documents guiding future development of economically smarter interventions for the above-mentioned states of India.	• Cultural Competencies • Public Health Advocacy and Leadership Skills
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Although four areas of public health competencies are listed in the above-mentioned table, I perceive there are many more things that could be listed as well as categorized as acquired competencies. However, public health is an interdisciplinary subject and when it comes to practice, the theoretical divisions of a competency can be interpreted in many ways. Therefore, these competencies inform the areas where I have experiences positive differences in myself, however, an objective assessment might provide more accurate findings in terms of which competency has been acquired and how much of the same can be attributed to the practicum training.

Limitations of this report

This report is not intended for publishing in to any scientific journal, therefore, I wrote everything without considering the standards of scientific writing, which can be a limitation of this report. In addition, practicum is a diversified platform of learning public health in practice, therefore, this practicum report can be insufficient if any specific evaluation criteria is adopted to assess the same. Being unaware of any framework like that, I couldn't write it better within the time allowed for the submission. Moreover, a brief description of my contributions to other research activities in IIHMR could provide a better insight of how much did I learn on the way, which is another limitation of this report. More importantly, I could have added how did I feel about my work and the world of public health after few months of completing the coursework,

which might not be considered as a formal part of an academic report, therefore, much of untold stories are absent in this report, which could make this report lengthier without yielding any academic outcomes related to the core purposes of a MPH practicum.

Conclusion

A conclusion to this practicum report brings an end to the academic requirements of my Master of Public Health program which I joined with endless hopes and happiness. This course, from the beginning of the classes in Lecture Hall 9 in IIHMR to the evening of April 22, 2018, has provided great opportunities to the learners like me. As described earlier, a subjective assessment cannot be and should not be generalized, but it is noteworthy that education transforms our minds and for a public health servant the significance of practical thinking and application of the same is as important as the theoretical understanding of the field s/he works on. If public health is considered as a coin then its two sides can be named as assessment and management of public health problems. At the end of the practicum as well as this MPH I am more confident with this coin which reminds me the classes of my Biostatistics Professor who beautifully taught us the odds of appearing either side of the coin is almost same if the coin is flipped a large number of times which implies the more we encounter crises in our journey the more we can solve the same. In my practicum, I have seen the individual and collective approaches to assess the problems and manage the same, just like flipping the coin without knowing what comes next. Although illiteracy, poverty, corruption and many other socioeconomic issues continue to affect the art and science of improving lives around the world, a public health professional must know the roots of these problems and keep faith on humanity which can empower her/him to take informed decisions and lead during critical moments of the history of her/himself as well as the mankind. My MPH program and subsequent practicum in IIHMR in collaboration with Copenhagen Consensus and TATA Trust has provided me much learnings in identifying my weaknesses and assessing possible strategies to be a better learner and servant in coming days, therefore, at the end of this practicum report which is the last academic submission of my beloved Master of Public Health program it would not be inappropriate to recall the words of Winston Churchill who said with hope and courage, “Now this is not the end. It is not even beginning of the end. But it is, perhaps, the end of the beginning” (100).

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