A COMPARATIVE STUDY OF THE NON-DIETARY FACTORS OF MALNUTRITION AMONG UNDER-FIVE CHILDREN BETWEEN INDIA, MADHYA PRADESH AND INDORE

(A research undertaken by Building Healthy Cities Project of John Snow India)

Submitted by: Rashika Sharma
Roll no: 970
Stream: HM

PART 1

RESEARCH AREA

Malnutrition among under-five children and Non-dietary factors

RATIONALE

- Out of 10.4 lakh under-five deaths in India in 2017, approximately 7 lakh deaths (close to 68%) have been attributed to malnutrition (Global burden of disease 2013).
- Madhya Pradesh (MP), the 'heart of India' is the second largest state of India and the scourge of malnutrition has swamped this state for a very long time
- Indore, the largest city in MP is also dwindling in its state of handling malnutrition. Every 7th child in Indore is suffering from malnutrition (Times of India 2019)
- Hunger and malnutrition do not necessarily mean lack of food; they are an indicator of a lack of healthy balanced diet. For a long time, only dietary factors were considered for treating malnutrition.
- Dietary factors play a crucial role but are not sufficient to ensure our wellbeing. Non-dietary factors are an essential link between nutrition and our health. Therefore, proper addressal of the underlying factors can provide a more holistic approach to treat malnutrition
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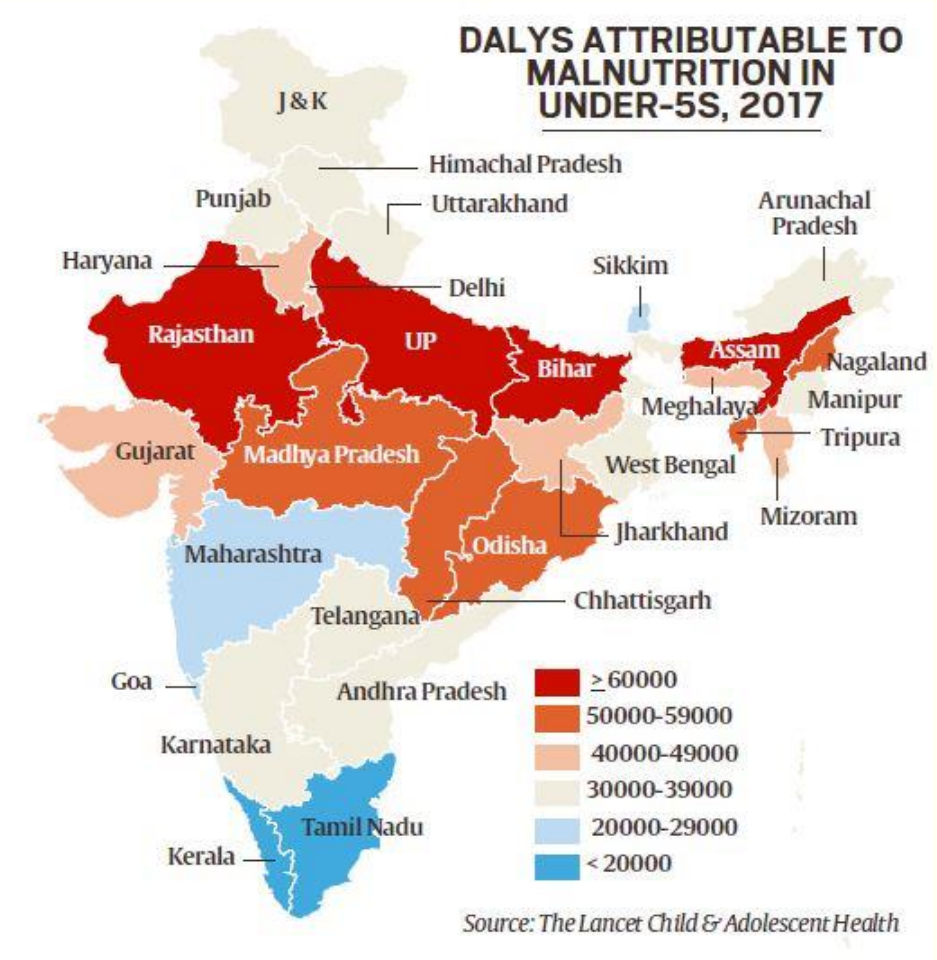

RESEARCH QUESTION

What are the various non-dietary factors that can lead to malnutrition in the under-five age group?

LITERATURE REVIEW

- A total of 12 articles were reviewed, out of which 4 studies were conducted in Madhya Pradesh and the rest were carried out in various other parts of India.

- Out of these, 2 studies focused on the status of malnutrition in urban slums. Both the studies recommended a comprehensive approach towards tackling malnutrition by improving the literacy levels, effective implementation of family planning systems and increasing awareness about the essentiality of feeding and weaning practices along with the importance of maintaining personal hygiene.(Meena, Kaushal, and Saxena 2015; Sethy 2017).

- It was further recommended that regular visits to check the status of severely malnourished children and counselling of parents on personal hygiene and importance of family planning as important steps in improving the nutrition status of under-five children. 3 studies(Yadav et al. 2016; Shukla et al. 2017; Sethy 2017) pointed out about the prevailing gender discrimination and skewed distribution of food in households and lesser availability of food or nutritious diet for females. Nearly, all the studies focused on the importance of maternal factors in tackling malnutrition. Some of the maternal indicators like low literacy rates, high birth order, less awareness on family planning methods, lower socioeconomic status of women was specified as significant factors in gauging malnutrition.

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- 2 studies were carried out in Nutritional Rehabilitation Centres to see if controlling dietary factors had a significant impact in the overall nutrition of malnourished children or not.(Taneja et al. 2012; Sanghvi, Mehta, and Kumar 2014). Both the studies concluded that even after achieving satisfactory weight levels while being admitted in the NRCs, the weight of some children reduced significantly after their discharge since the caretakers/ mothers were uninformed about balanced diet requirements for their children according to their age. Other set of children, who were severely malnourished, did not achieve the desired weight even after being admitted, which pointed out that underlying factors of malnutrition also need to be tackled and just addressing the dietary factors of malnutrition will not fetch us the overall result of healthy, nourished children.

- 4 studies indicated that socio-economic factors like lack of food security, low income and unemployment or limited livelihood opportunities can also have an indirect impact on the status of nutrition. (Sanghvi, Mehta, and Kumar 2014; Ghosh 2013; Yadav et al. 2016; Ansuya et al. 2018)

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- Overnutrition is another aspect of malnutrition that has not been studied widely in India. A secondary data analysis was done with a focus on the determinants of both undernutrition and overnutrition. Determinants related to under-nutrition included higher birth order, families with lower per capita income, rate of breast feeding and complementary feeding practices. The determinants of over-nutrition included lack of physical activity, watching television or video games or families having a positive history of obesity. Additionally, the study also emphasised on the importance of calculating BMI for ruling out the current energy deficit as it can help in planning effective intervention strategies

- The study also recommended on strengthening the healthcare system for more effective intervention.(Sahu et al. 2015). One study conducted anthropometric measurements using CIAF (Anwar et al. 2013). CIAF is a more recent indicator of malnutrition which calculates the aggregate of all the three indices of malnutrition i.e. stunting, wasting and underweight.

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- Strong traditional and Cultural belief models can have a major impact on the child's nutritional status. This might prevent the mothers/caretakers to take treatment from the accessible healthcare facilities and may blame the evil eye for illness. Lack of safety nets, limited livelihood opportunities, inadequate childcare, improper feeding practices, seasonal male migration, limited knowledge about child nutrition among mothers/caregiver were some of the major factors that the study cited, relating to malnutrition in the community. Apart from them some factors like inadequate collaboration between government FHWs and MSF field staff, lack of robust understanding of screening methods, referral pathways and counselling were a deficit from the side of healthcare providers. The study emphasized on the increased demand of community education and their engagement would play a crucial part. Also, the healthcare providers need to focus on capacity building in the area of healthcare provision.(Chaand et.al 2019) .

- A community-based study in the Udupi district of Karnataka emphasised upon the Information, Education and Communication (IEC) campaigns alleviating food habits and taboos and promoting birth spacing. All these factors can further help in preventing the gruesome conditions caused by malnutrition among the preschool children (Ansuya et al. 2018).

OBJECTIVE

The primary objective of this study was to study the status of malnutrition among under-five children and non-dietary risk factors in India, Madhya Pradesh, and Indore City/District, with a focus on informal settlements

METHODOLOGY

A mixed methodology was used. First a literature review was conducted from the internet using Google, Medline, and PubMed databases. The search criteria were limited to those literature from 2011 – 2020, from All India focusing on studies looking at nutrition among children under five. Key search terms included malnutrition, under-five children, stunting, underweight, wasting, overweight. Both peer-reviewed journals and official government reports were included in this search. These descriptive analyses pulled from the most recent rounds of Census India 2011, National Family Health Survey (NFHS) 2015-16, Annual Health Survey (AHS) and Comprehensive National Nutrition Survey (CNNS) 2016-18. Descriptive analysis was completed in Excel.

LIMITATIONS

It was originally planned to collect primary data on children under five nutritional status from Anganwadi centers in 8 informal settlements where the USAID-funded Building Healthy Cities project works, but due to COVID restrictions during the time of this study, the quantitative strategy was revised to evaluate existing secondary data sources to explore descriptive statistics on both nutritional status and some related non-dietary health factors, such as immunization, poverty, gender, and maternal indicators

SECONDARY DATA ANALYSIS

DEMOGRAPHIC INDICATORS

- Madhya Pradesh is the second largest state of India with an area of 3,08,245 sq. km. and a population of 7.27 crores.(Wikipedia 2002)
- Indore is the most populous and the largest city in Madhya Pradesh and comes under Tier 2 cities of India
- 12.72% of the total population of Indore is under six years. Out of the total population of Indore district, 2,427,709 people live in the urban region and 8,48,988 people reside in the urban region. Therefore, 74.09% of the population in Indore district is urban in nature whereas 25.9% is rural. The sex ratio in urban areas of Indore district is 922 and the child sex ratio is 897 as per 2011 census data (Indore District Population Census 2011)

DEMOGRAPHIC INDICATOR COMPARISION

INDICATORS	INDIA	MADHYA PRADESH	INDORE DISTRICT
Total population	1,210,854,977	72,626,809	3,276,697
Male population	623,724,248	37,612,306	1,699,627
Female population	586,479,174	35,014,503	1,577,070
Urban population	377,105,760	20,069,405	2,427,709
Rural population	833,087,662	27,149,388	8,48,988
Sex ratio (per 1000)	940	931	928
Average Literacy rate	74.04%	69.32%	80.87%
Male literacy	82.1%	78.73%	87.25%
Female literacy	65.5%	59.24%	74.02%
Child Population (0-6)	158789287	10,809,395	4,21,380
Male population (0-6)	82,952,135	5,636,172	2,21,612
Female population (0-6)	75,837,152	5,173,223	1,99,768
Child sex ratio (per 1000)	914	918	901

Source: Census 2011

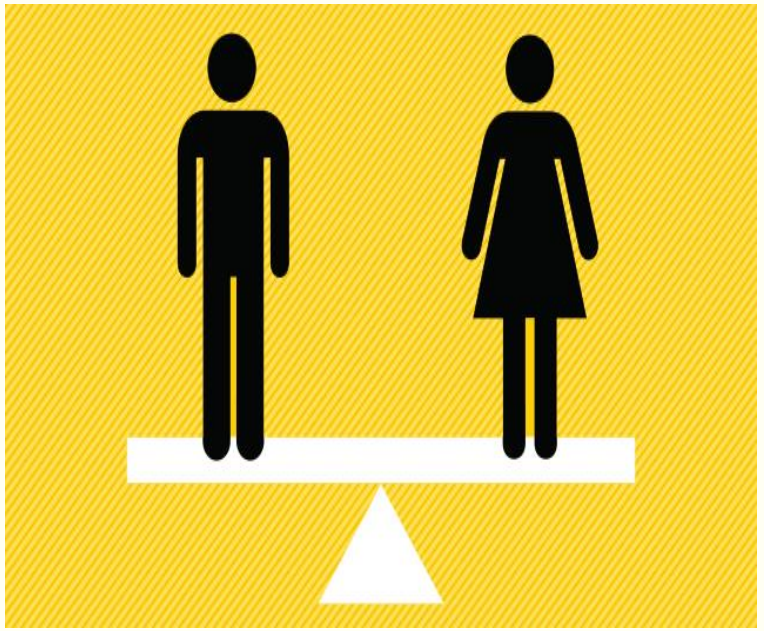
DEMOGRAPHIC INDICATORS FOR SLUM AREAS

Slum Population	Total	Male	Female	Sex ratio	Child population (0-6)
India	65,494,604	33,968,203	31,526,401	928	8,082,743
Madhya Pradesh	56,88,993	29,57,524	27,31,469	923	7,71,999
Indore	5,90,257	3,06,785	2,83,472	924	1,24,904

Source: Census 2011

NUTRTIONAL STATUS BY GENDER

- One of the main reasons behind this bias is the society's preference for a male child which is also a major reason behind female feticide in the country.
- Other reasons of this inequality can be attributed to the authoritative nature of our patriarchal society and the system of dowry in marriages.
- Further there is discrimination against women when it comes to accessing healthcare facilities during illness.
- Young girls and women are often forced to stay home and look after the household chores instead of working which leads to lower social status of women as compared to men leading to a disproportionately larger workload for women
- Undernourished mothers will produce malnourished progenies and the cycle continues leading to increased prevalence of intergenerational malnutrition. Low birthweight babies have a higher susceptibility of dying within first year of their lives (UNICEF 2006)

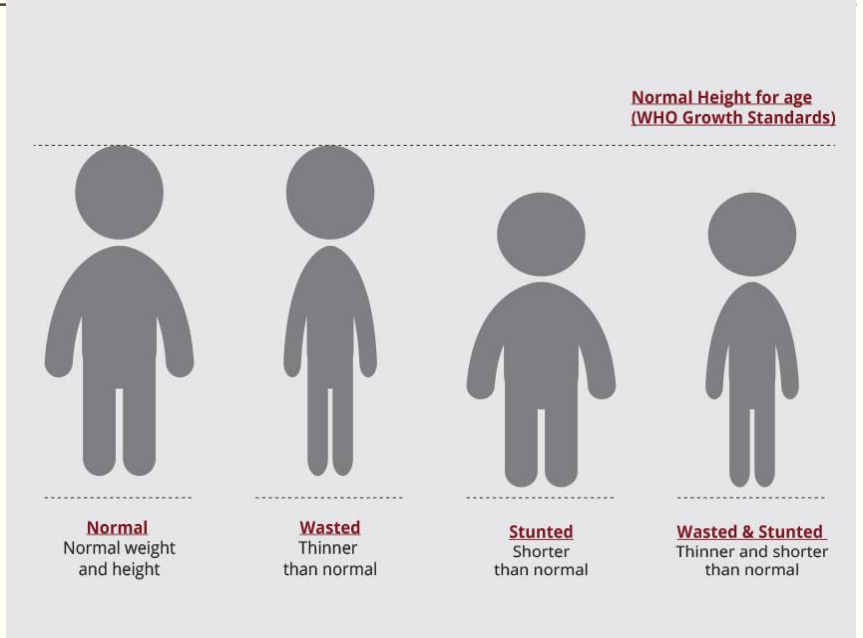


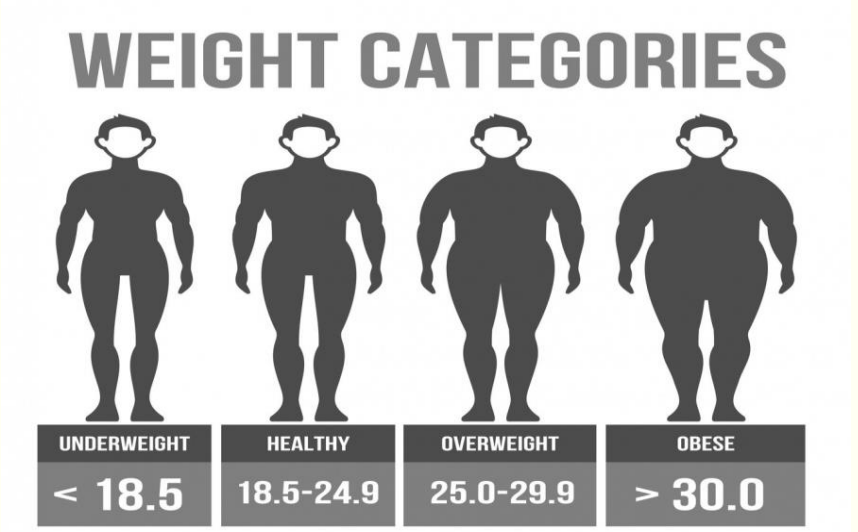
POVERTY AND FOOD INSECURITY

- Income, poverty, and food security go hand in hand and have a major impact on malnutrition.
- Approximately 32% of the population of Madhya Pradesh lies below poverty line and has been classified as a low-income state by the World Bank Group. The same data has stated that approximately 4-15% of the population in Indore lies below poverty line (World Bank 2016).
- The poor socioeconomic condition of people often drives them to migrate in urban areas in search of better job opportunities which often forces them to live in slums.
- Most of the slums lack proper sanitation facilities, reliable source of safe drinking water and lack of proper hygiene

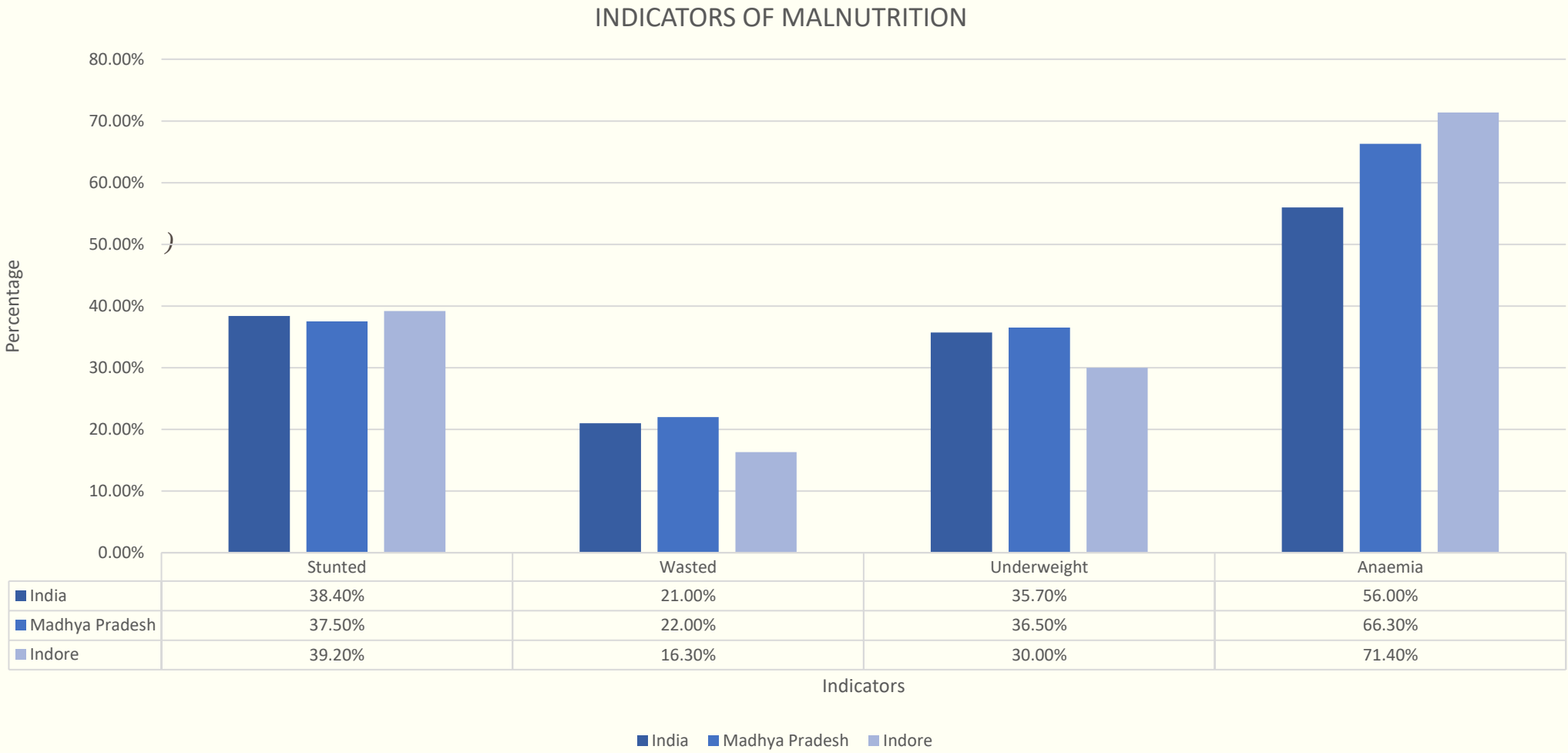
INDICATORS OF MALNUTRITION

- Underweight: (low weight for age) is a reflector for acute and chronic malnutrition
- Stunting: (low height for age) is a reflector of chronic malnutrition or prolonged food deprivation
- Wasting: (low weight for height) is a reflector of acute malnutrition or short-term food deficit.
- Micronutrient deficiencies: Malnutrition can occur in the form of deficiency of various essential vitamins or minerals like vitamin A or zinc or iodine which manifests itself in the form of night blindness or stunting or lack of mental or cognitive development.
- Overweight: Based on higher Body Mass Index (weight in kg. /height in meters^2) as compared to defined standards. It is a reflector of obesity which can lead to chronic complications related to increased weight in the form of cardiovascular diseases, diabetes etc. (WHO 2010)





Indicators of Malnutrition (Contd.)



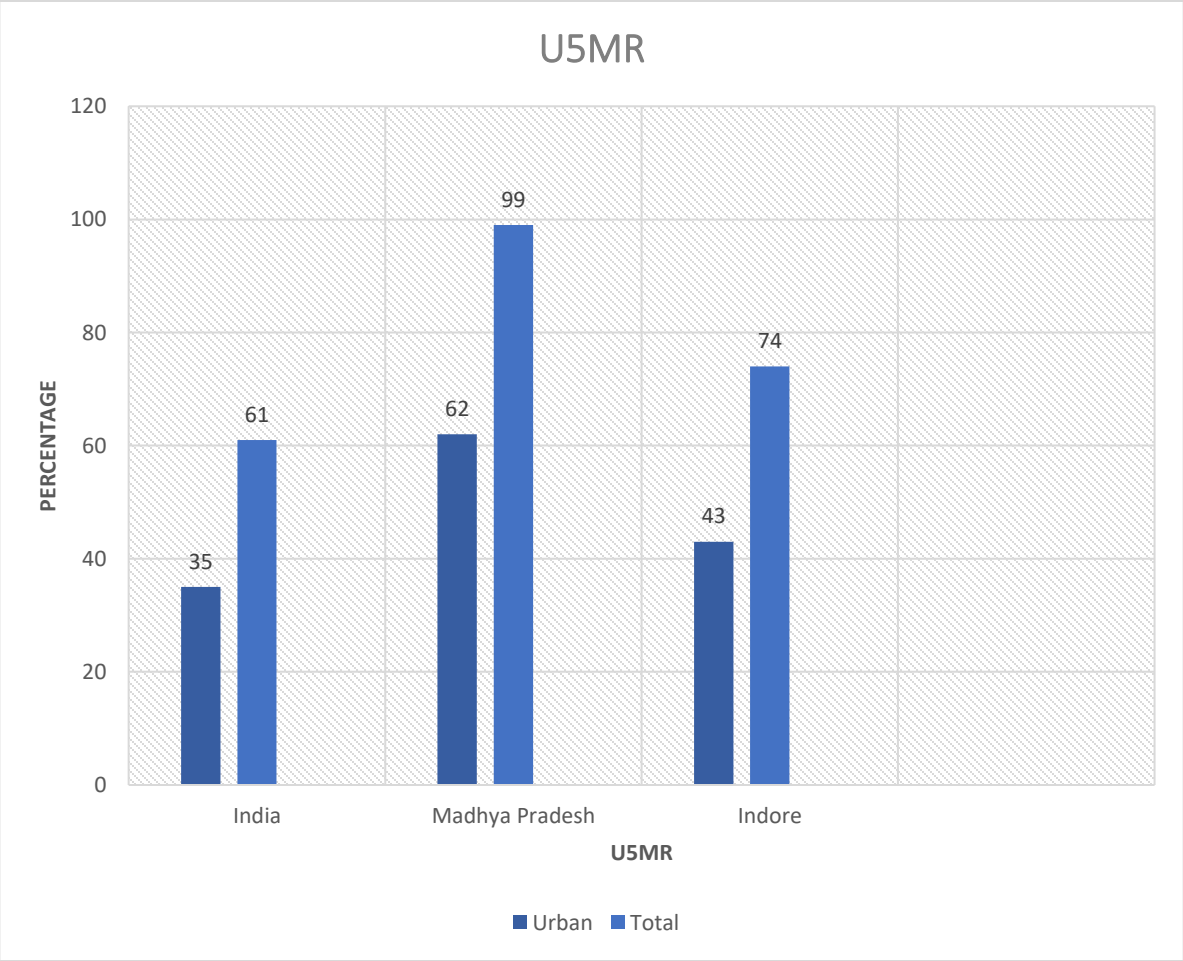
	Stunted	Wasted	Underweight	Anaemia
India	38.40%	21.00%	35.70%	56.00%
Madhya Pradesh	37.50%	22.00%	36.50%	66.30%
Indore	39.20%	16.30%	30.00%	71.40%

Source: NFHS 4(2015-16)

UNDER-5 MORTALITY RATES (U5MR)

- Under five mortality (U5MR) refers to the probability of a child (per 1000 live births) born in a specified year dying before reaching the age of 5 if subject to current age specific mortality rates(UNICEF 2015)

- U5MR is also an indicator of the underlying poverty, high-risk fertility behavior, gender inequality and poor health infrastructure. Indore has higher U5MR as compared to National rate but lower that State level estimates

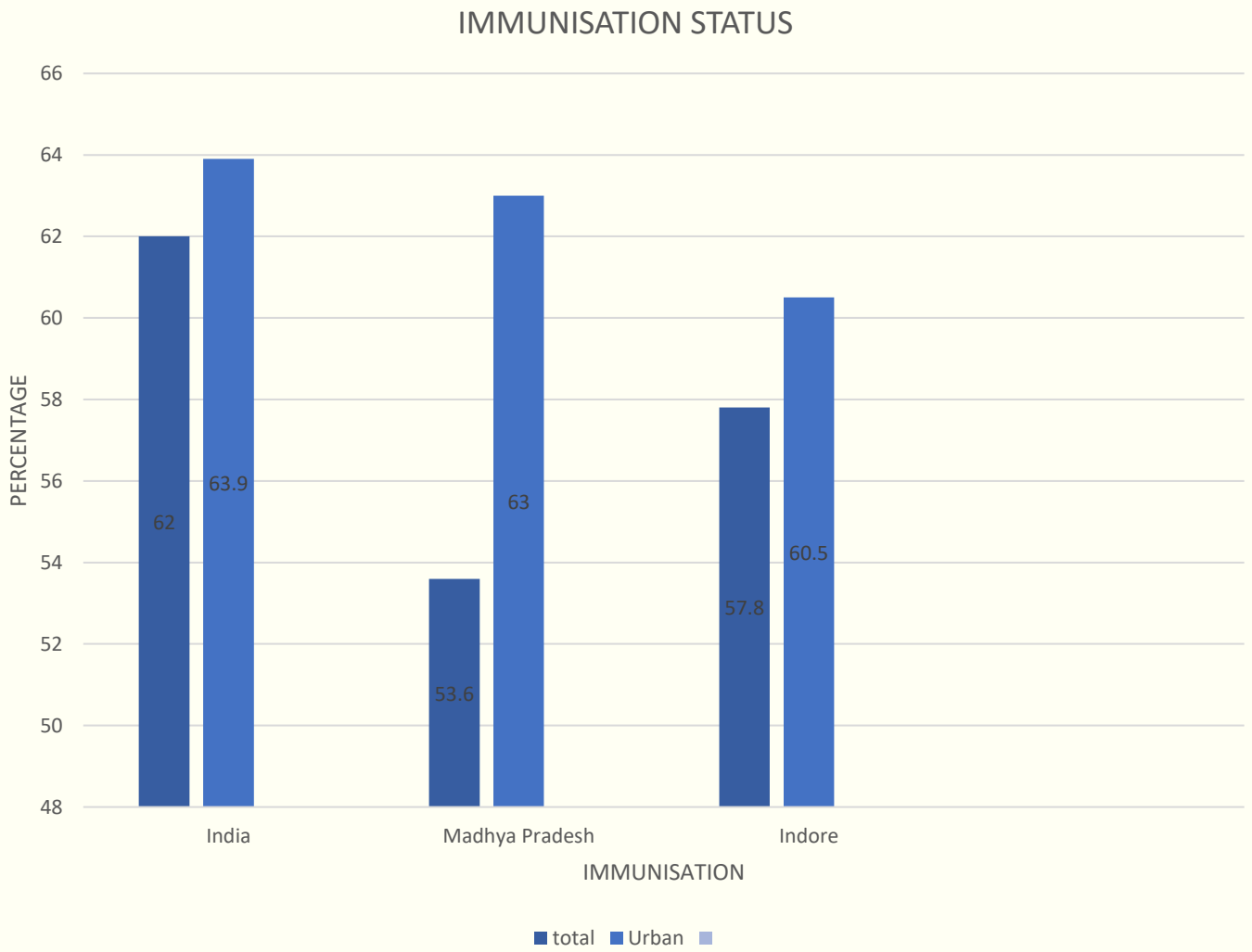


Source: AHS 2011

IMMUNISATION

- Vaccination in children can prevent the development of different kinds of fatal and infectious vaccine-preventable diseases. Vaccinating the children can protect them from tuberculosis, measles, polio, etc. and other major ailments. Many infectious diseases like measles and TB can lead to malnutrition due to catabolism and reduced appetite

- Immunization coverage for Indore is lower than the national and state averages. Nearly 40% of urban children were not fully immunized (NFHS 4 2015-16) which indicates low access for immunization in the healthcare system and may be due to limited awareness amongst the masses about the benefits of vaccination in children



Source: NFHS 4

MATERNAL AND CHILD INDICATORS

- Maternal health can directly affect the health of the foetus. Mothers with low BMI and anaemia can have an impact on perinatal outcomes like preterm birth and low birth weight of the neonate in singleton pregnancies (Kaur et al. 2015).
- LBW can lead to high infant/child mortality, increased susceptibility towards infections, and poor physical growth and cognitive development during childhood.
- Underlying factors contributing to poor maternal health could be early pregnancy, short interpregnancy interval, educational status, violence during pregnancy, low food security/ low socio-economic status and poor antenatal care.
- Anemic mothers have a higher chance of delivering anemic kids. Inability to absorb nutrients can lead to long term complications leading wasting away of muscles and lack of energy to perform day to day task. Maternal health therefore plays a crucial role in the overall development of children. Proportion of women with BMI <18.5 was lower in Indore compared to State and National estimates

Anemia (Hb<11.0 g/dl)	India	Madhya Pradesh	Indore
Pregnant women aged 15-49 years who are anemic	50.4%	46.5%	49.2%
Children aged 6-59 months who are anemic	69.0%	68.9%	71.4%
Women between 15-49 years having BMI < 18.5kg/square meter	23.0%	28.4%	17.7%

Source: NFHS 4 (2015-16)

BREAST FEEDING AND WEANING

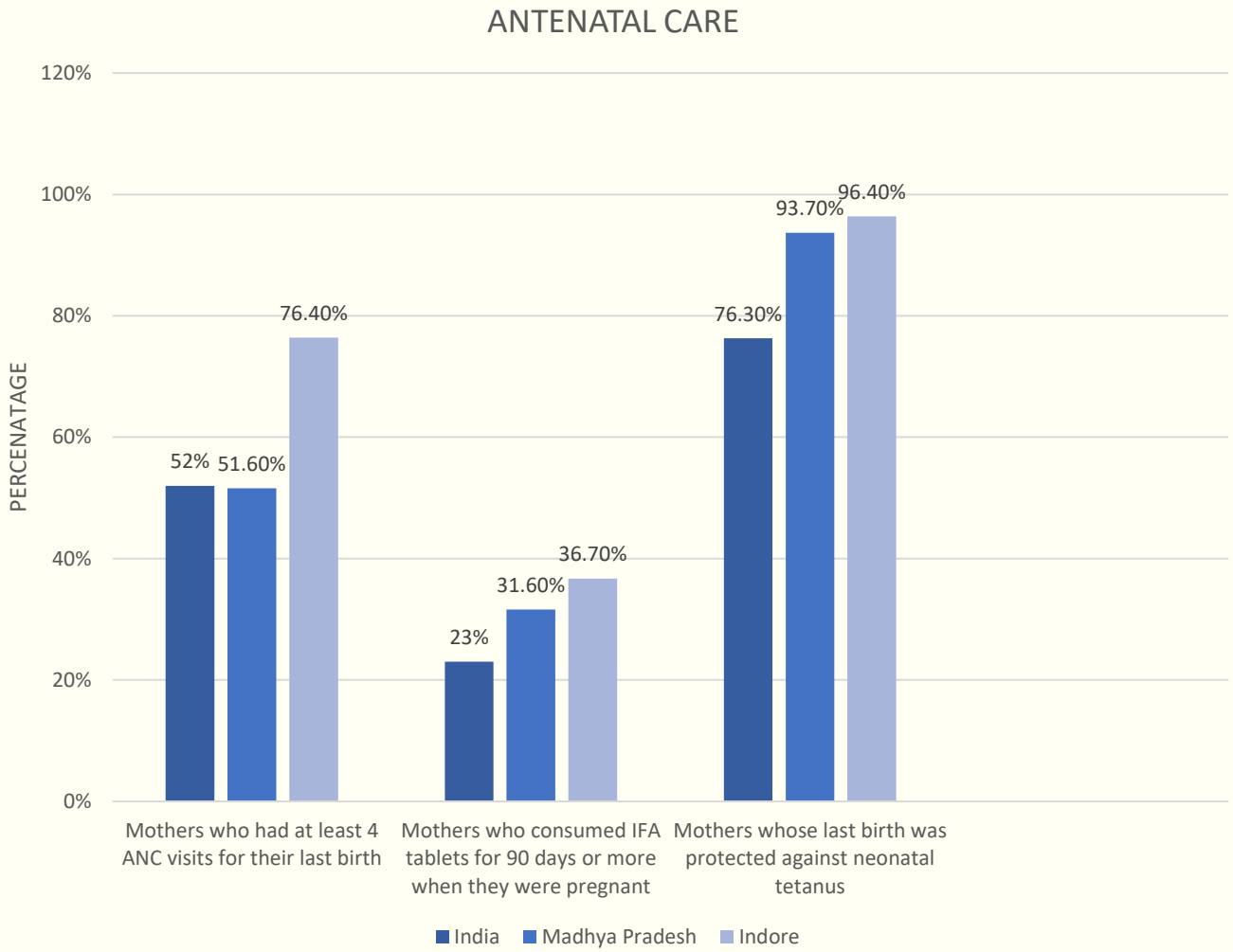
- Only 23.4% of the babies were breastfed within first hour after birth in Indore which is a matter of concern (NFHS 4 2015-16).
- This is lower than State and National estimates. However, percentage of infants who received exclusive breastfeeding and timely weaning was higher in Indore. The reasons for not feeding them could vary from religious belief that considers breastmilk a taboo, to lack of awareness among people about its importance.
- Also increase in the availability of breastmilk substitutes have posed a serious threat for the infants and young children as they hamper their overall physical development and may increase the risk of infections due to lack of hygiene
- Breastmilk during early years of life not only serves as food but also helps in boosting the immune system of the child. Early initiation of breastfeeding is important as colostrum consists of protective factors that help fight against common infections like diarrhoea and pneumonia.

History of Breastfeeding	India	Madhya Pradesh	Indore
Breastfed within the first hour after birth (0-3 months)	56.6%	34.4%	23.4%
Exclusively breastfed for the first 5 months	58.0%	58.2%	63.8%
Timely initiation of complementary feeding of solid and semi-solid food within 6-8 months	53.1%	38.1%	59.4%
Breastfeeding children aged 6-23 months receiving adequate diet	8.7%	6.9%	14.4%

Source: NFHS4 (2015-16)

ANTENATAL CARE AND DELIVERY

- Data on antenatal care reveal access and utilization of healthcare services by the pregnant women. Antenatal checkups in a way can help a pregnant woman better deal with their dietary requirements and Iron-Folic Acid supplementation and help them in preventing pregnancy related complications. Therefore, antenatal care is a prerequisite for a healthy delivery.



Source: NFHS 4(2015-16)

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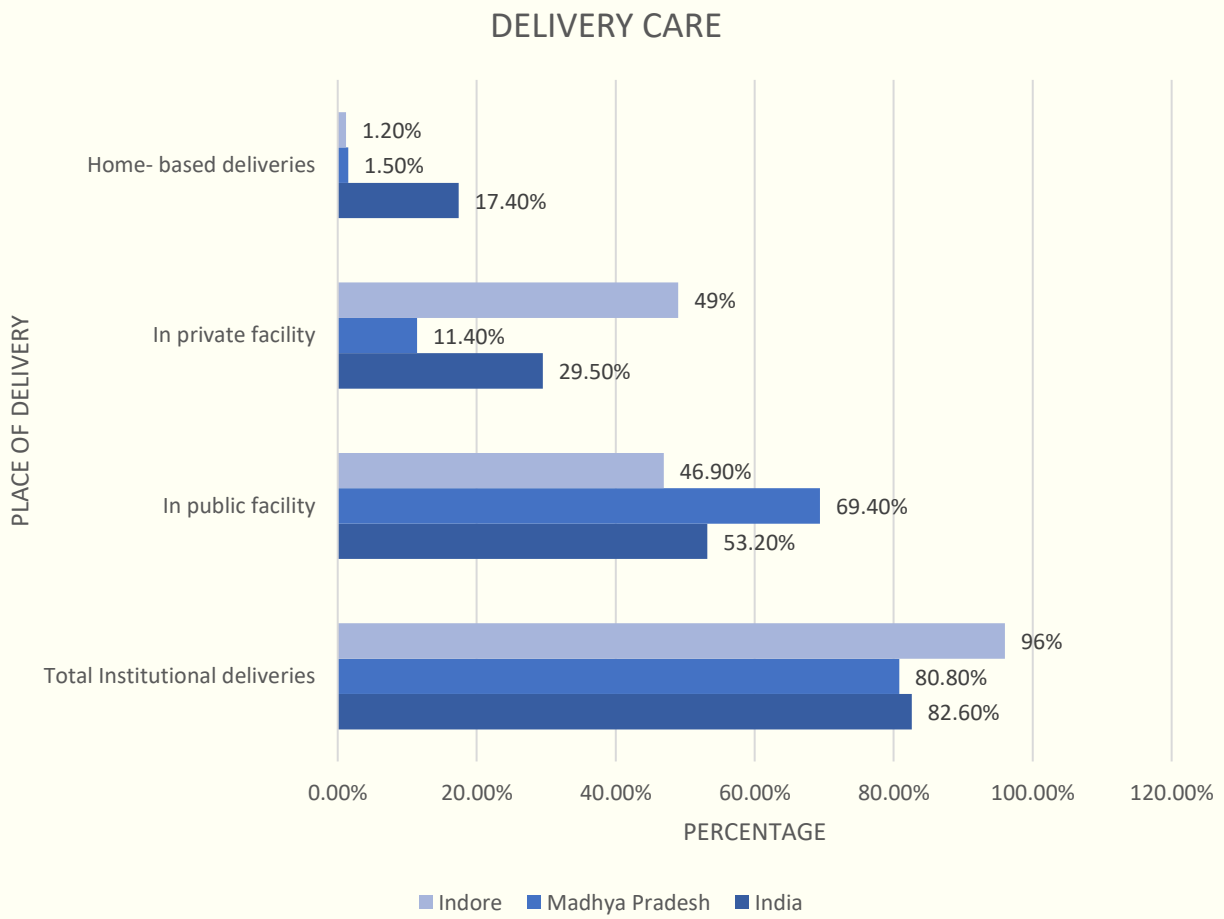
- Proportion of women giving birth in a healthcare facility was higher in Indore than State and National estimates. Almost equal preference was given public and private facilities in Indore, where higher preference was given to public facilities both in the State. Institutional delivery reduces the risk of morbidity and mortality for both the mother and increases their chances of survival of the newborn. Obstetric complications can be better handled, and counselling related to importance of breastfeeding and nutrition for the mother can be given during the post-natal period, which will potentially reduce the risk of malnutrition both in the child and mother



Source: CNNS (2016-18), NFHS 4

DISCUSSION

- Malnutrition amongst the preschool children cannot be curbed by improving the feeding practices alone (Taneja et al. 2012). Various non-dietary factors like socio-economic factors, literacy levels among mothers and caretakers, feeding practices, birth order, convenience food eating and to an extent immunization and sanitation do play a crucial role in suppressing the condition.

- Good nutrition starts before birth. From womb, until adulthood, a child's nutritional need changes constantly. The first 1000 days from the time when the child is born till 2 years of age is crucial for the development of the child (UNICEF 2020). Poor maternal nutrition before conception and during gestation are one of the main reasons for the birth of preterm and low weight babies.

- Lack of knowledge on spacing methods and unmet need of family planning leads to unwanted pregnancies..

- Gender discrimination that favors men has existed in the realms of Indian mindsets from the past and is still pervasive in many societies. Females are more undernourished as compared to men (Sethy 2017)

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- Another major factor that can lead to repressing the effects of malnutrition is by effective community participation while making policies and programs for the betterment of masses (Ghosh 2013). Poor food security is a major reason for malnutrition in some communities and requires proper addressal before we move on to the next step of improving feeding practices of that community An attempt can be made to identify key individuals or a group that have an effective say in the decision-making process for the community and involving them in making policies can yield better results.

- Involvement of these stakeholders can be considered as an essential aspect in decision making and policy implementation process.(Sahu et al. 2015) Inter-linking the work of various organizations/ field workers can equally distribute the responsibilities and speed up the process of deterring the condition (Chand, Horo, and Nair 2019) Use of IEC campaigns we as a comprehensive approach to address the issue and create awareness amongst people about its effect on our children (Ansuya et al. 2018).

- Robust training of healthcare professionals when it comes to screening and counselling of patients and capacity building in the areas of healthcare provision can also prove to be a major step in improvising the nutritional status. (Chand, Horo, and Nair 2019)

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- The health care belief model that leads to prevalence of various forms of taboos which prevents individuals from perceiving the necessary behavior. (Anwar et al. 2013).The belief that weakness is caused by an evil eye (nazar) and can only be healed by traditional healers is still widespread among the people which prevents them from seeking help from a healthcare professional to find a cure for their children. Indore has fared well when it comes to accessing a healthcare facility at the time of pregnancy, but the statistics can still be improved by subsequent behavior change campaigns that address health issues without hurting their religious sentiments. Strengthening family planning programs that focuses on young girls and adolescents in order to improve their healthcare seeking behavior and encourage breastfeeding, healthy eating habits and other factors that can prevent development of malnutrition in children

CONCLUSION

- The state of MP has been plagued with malnutrition for a long time: 6 million children under five are malnourished including 1nmillion moderately malnourished and 1.3 million severely malnourished (NFHS 4).
- Indore, the largest city of Madhya Pradesh lingers with a similar problem of malnutrition with an even higher rate of stunting than the state and country's average.
- Efforts should be made to identify the reason behind the increased stunting rate. A contingency plan to address the issue of malnutrition should be strategically designed that targets the population residing in the slums of the city.
- Effective interventions in the form of behavior change models to overcome the barriers of social and normative changes to address the issue of gender discrimination and use of public health facilities during times of sickness should be brought into action

PART 2

ONLINE COURSE

ONLINE COURSE NAME: **Protecting Public Health in Changing Climate: A Primer for City, Local and Regional Action by John Hopkins University**

COURSE DESCRIPTION: This course introduces us about the various changing climate conditions that has a direct impact on our health globally. The main message of the course is that public health must “lean in” and become a more central player in climate change mitigation and adaptation. Because climate-related health risks happen mainly at the local level, the course focuses on cities – increasingly key players in climate change policy. Starting with an overview of the science consensus suggesting we have 10-20 years to prevent risks associated with exceeding 1.5°C of global warming and put in place adaptive policies.

OBJECTIVES

- To understand the role of public health in climate change.
- To study how public health can transcend its boundaries and adopt an intersectoral approach by integrating with other departments associated with climate change.
- To understand various mitigation and adaptation policies that can help in achieving a carbon neutral environment in the near future.

COURSE METHODOLOGY

The course provides interactive lectures, expert interviews and case studies that build practical knowledge. Therefore, to create a carbon neutral environment, the Public health can play a crucial role in the coming decade. This is a 16-hour course, available on an online platform, Coursera. The course is distributed in 5 weeks and involves reading material and videos. The syllabus for each week can be completed in a period of 3-4 hours per week. In the final assignment, participants apply course tools and strategies to a city of their choice, preparing them to contribute to climate mitigation and building health resiliency in our own local context. The course instructors for this course are Mary Sheehan, Tom Burke and Mary Fox (MPH, PhD)

COURSE CONTENT

WEEK 1: Introduction and Climate Change

WEEK 2: Public Health Perspective

WEEK 3: Assessment Frameworks and Case Study

WEEK 4: Policies and Practices

WEEK 5: Final Assignment

KEY LEARNINGS FROM THE COURSE

- Climate change refers to the measurable change in the mean/variability of major climate properties like temperature or perception (J.B.R 2018). Earth's surface temperature has increased nearly by 1˚C since the pre-industrial period although the impacts have been distributed unevenly.

- The IPCC projections claim the probability that we are likely to see an increment of global average temperature of 1.5˚C from 2030 to 2052 and almost 3˚C by the end of 21st century.

- This rise in temperature can be majorly attributed to human activities in the form of burning fossil fuels and greenhouse gas (GHG) emissions. (Anderko et al. 2012) All these events have a negative impact on health and the vulnerable groups that comprise of elderly, infants and outdoor workers are at more risk than the general population.

- Healthcare professionals can in turn prove to be ideal advocates in such issues as they can help and spread awareness and education regarding the health hazards due to the climate change and also integrate with other sectors dealing with climate change to develop policies and plans to reduce the outcomes of the gruesome situation.

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- WHO has projected nearly 2,50,000 deaths between 2030 and 2050 due to climate change and an economic loss of 2-4 billion dollars by 2030 (“WHO | Climate Change and Human Health”- 2018). The result of these climate changes can be felt directly in the form of storms, floods, droughts and heatwaves and indirectly in the form of diminished water quality, air pollution and ecological changes.
- Policy planning by healthcare professionals can be done by establishing necessary mitigation and adaptation policy changes
- Role of Public health:

1. surveillance and monitoring
2. Diagnosis and investigation
3. Partnerships
4. Communication
5. Evaluation

CONCLUSION

Many climate changes are unprecedented over the millennia.(“IPCC” n.d.) The cataclysmic effects of climate change can range from a dilapidated food production to increase in the sea levels because of the melting glaciers. All these effects can be seen globally and can spawn deleterious effects on the health of inhabitants of earth overall. United Nation’s Intergovernmental Panel on Climate Change in its third assessment report concluded that climate change has direct and indirect implications on our health and is a defining issue of our time at the moment(J.B.R 2018). Public health can therefore play a crucial role in developing mitigation and adaptation polices to reduce the detrimental effects of climate change