
INTRODUCTION

Nutrition is a key factor in determining health and wellbeing of an individual and is therefore crucial to the development of human capital. Nutritional journey of an individual starts prior to birth, continues into adulthood and from individual can span into generations. Measures like Height, Weight, BMI, WC and HC can act as a pointer to map this nutritional journey of an individual especially during adulthood where under nutrition manifests as under-weight and over-nutrition is revealed as obesity. Both these challenges of under- and over-nutrition further pose and prolong risk of deficiency, communicable and NCDs. Investment in adult nutrition can reap healthy dividends for countries saving them of significant medical and health care costs and benefitting them with an overall increase in national productivity.

Statistics suggest, one in every three individuals today suffers from at least one or other malnutrition across the globe. Rapid economic development for many countries brought with itself test of nutritional transition among masses, presenting before these countries dual challenge of under and over-nutrition. This, primarily referred to as, dual nutritional burden is a growing concern to the world especially in such developing countries which have just transitioning from the clutches of under nutrition. Various study indicate that Place of residence, affluence status, discretionary physical activity, education levels, profession etc are the early predictors of under- or over- nutrition among the vulnerable group of population especially among women population.

The known history of civilization is marked with occurrences of food shortages, chronic hunger and malnutrition. The prevalence of overweight and obesity is relatively new epidemic and has risen dramatically in the last few decades. It is only after the technological advances that brought enormous gains to productivity and an increasing supply of food became possible. While on one hand, these advances have led to increased global food supply and reduced food insecurity around the world, on the other, these have contributed to overabundance and easy access to food with least physical efforts leading to

rise in obesity. The prevalence of both under-nutrition and over-nutrition in the society has caught the attention. (<https://www.ncbi.nlm.nih.gov>)

Term ‘dual nutrition burden’ was invented, sometime in 90’s, to represent this emerging phenomenon of coexistence of overweight and obesity alongside under-nutrition (stunting and wasting) in the lower middle and upper middle income countries as they experienced a shift in obesity burden led by income increases with unequal distribution. As things stand now, these countries are concurrently staring at dual disease burden having the prevalence of high morbidity rates because of communicable diseases and simultaneous rise in the NCDs characterized by sedentary lifestyle and emerging over nutrition. (<https://www.who.int/nutrition/double-burden-malnutrition/en/>).

India is a vast country with diverse demographics and varied income levels which result in substantial difference in the health transitions across the country. Indian clinicians and epidemiologists have therefore attuned their analyses to conditions prevalent in different states, regions, and even urban-rural strata, thus measuring the dual burden by states, regions and strata. In spite of this, research indicates that the dual burden can also be found in different individuals within the same household and within the individual at different points of time. National surveys that have been carried out to evaluate and measure India’s health transition, including NNMB and NFHS, show that there has been a slow yet persistent decline in the under-nutrition in the country. Prevalence of under-nutrition is more in the low income group rural population, population with lower literacy rate. Prevalence of overweight and obesity is higher in the urban affluent income group, educated working population and amongst women. The proportions of normally nourished persons are comparable across all sections of the population.

Studies carried out in the 1980s have shown that in women from low income families, lactation during the first six months was associated with weight loss. This weight loss was due to the fact that the additional energy cost of breast milk production was not met by increase in dietary energy intake. With waning lactation and reduction in amount of breast milk secretion, majority of women regained their weight in the next two years. The ICDS programme provides food supplementation to lactating women during the first

six months of lactation to bridge this gap and prevent deterioration in maternal nutrition during lactation. However the coverage and consumption levels under this programme have been suboptimal. Over time there has been substantial reduction in under-nutrition across all groups including lactating women. There have been very few studies exploring the impact of lactation over the nutritional status of women in this era of dual nutrition and dual disease burden. (Goel *et al.*, 2020)

In the latter part of the twentieth century, India had started witnessing a problem of over nutrition and obesity, something that was already prevalent in the west. As the overall development of the nation gained steam, certain trends associated with growth were set rolling:

- **Population growth:** With medical advancement, count of deaths led by previously known chronic diseases came down. Death rates fell, while the birth rates sustained; population grew rapidly. This prepared the ground for under nutrition in a large section of population threatening shortage, starvations and under-nutrition. Fortunately, advancement in agricultural techniques – green revolution – came to rescue and guaranteed food access to all, even the poor and backward. Wealth was no longer a factor for food security.
- **Urban migration:** Cities became the centers of growth and as these developed and offered greater opportunities for employment, there was a mass movement from rural to urban areas. Industries replaced agriculture as the leading employer. People who were accustomed to healthy lifestyles and dietary habits in rural areas became part of the mushrooming urban slums and sharp changes in their life styles and nutritional status were witnessed.
- **Mechanization and labor-saving devices:** The advent of technology and advancement of infrastructure in every field from household to transit to offices has cut down on energy expenditure of almost all sections of the population and lifestyles became more sedentary.

With the rise in National GDP, increase in general income levels and overall improvement in the quality of life across strata's, India has evidenced progressive reduction in under nutrition rates. Increased farm productivity and resultant food security have also ensured easy access to food even amongst poor, thus leading to decline in under-nutrition. Over time, India has been able to modernize its health infrastructure, enabling improved healthcare access to both urban and remote centers. This has further impeded the nutrition toll due to infections resulting in slow but steady decline in under-nutrition. (Misra *et al.*, 2019)

A fall in physical activity in various domains like is occupational, domestic and transport was observed in the last decade. These reductions in physical activity have added in bridging the energy gap in adults. The drift from under-nutrition is also manifested by the emerging problem of over-nutrition which is the direct outcome of reduced physical activity at home, in offices and during transit. The trend is worrisome as this catapults rise of non-communicable diseases hitherto unheard of among Indians which had adequate or more physical activity embedded in their daily routines. Indians accustomed to moderate physical activity in their daily chores are now more prone to sedentary lifestyle. The dietary requirements as determined by the amount of physical activity have therefore declined even as the dietary habits remained unchanged or enhanced (Goelet *et al.*,2020).

Unlike western countries, Indians are not familiarized to discretionary physical training regime. Having moderate physical activity in their daily chores ensured a vast section of the society enjoyed health benefits associated with moderate physical activity. With better infrastructure, improved governance, technical advancement, human efforts and activity in their daily lives have been significantly reduced. An overweight individual has higher BMI and is more inclined to non-communicable diseases than a normally nourished person. Therefore, the need for discretionary physical activity and role of government in spreading physical education becomes imminent. (Newtonrajat *et al.*,2019)

Some of the factors affect the prevalence of Under and Over Nutrition and double nutrition burden. In Times now news, an article was published that while it is a known fact that urban population is obese compared to rural population, a new study has

quantified this concept. The article put this obesity prevalence at 3x that of rural areas. Increased convenience due to mechanization, reduced physical labor in day to day activity is leading to Indian people getting obese. Work at home, office and efforts in transit have significantly come down.

In spite of this, there remains very little to no awareness among people in India about obesity and its averse health impacts on individual and society. Dr. Misra, Director of the National Diabetes, Obesity and Cholesterol Foundation, has opined that it's time India drafted a policy for obesity control. "It should target women because it will not only improve their metabolic state, but also have a multiplier effect on their families. Such a step will have a trans-generational effect. For this, every effort should be made to educate them at young age."(<https://www.timesnownews.com/technology-science/article/women-3-times-prone-to-obesity-than-men/8252>)

Changes observed in India during the past three decades are expressed in terms of

- Increase in mean height in the adult population (2-4 cm)
- Significant increase in body weights
- Increases body fat deposition especially in urban areas

These changes are the direct result of changes in physical activity pattern which have witnessed massive transformation over this period. Few studies have been carried to document these changes but below variations have been commonly established: (Raj & Ploriya, 2018).

The changes in society has led to reduced prevalence of under-nutrition and increased instances of over-nutrition are i) Number of people engaged in manual labour has drastically reduced, ii). Mechanization of agriculture, industry and services has led to reduced efforts and increased productivity, iii). Householders have easy access to water and fuel – piped directly to their homes, iv). Private and Public transport have reduced physical activity, v). Offices have mechanical work where work is carried by computers and machines with little human aid and vi). TVs and Gadgets consume most of the day time and other social activities have reduced. (Güngör, 2014)

In India, under-nutrition and its health consequences and poor maternal and child health indices are still public health problems. Majority health problems produce symptoms and sustain for a shorter period of time. Developments of non-communicable diseases are greatly associated with the problem of over nutrition or it can be said that it is directly proportionate with over nutrition. In the early stage NCDs are asymptomatic and people only know when the complication arises. It could not be completely treated and it requires the life long medications and modification in life style. India's health system needs to reinvent itself and radically prepare for the timely detection and controlling of dual nutrition and consequent dual diseases burden (Goel et al.,2020)

As India stares at the double whammy of under and over nutrition, need for government interventions become compelling. India is home to billion of people and spread of both communicable and non-communicable diseases poses a challenge. National and state level programs to address the health transition for all and for specific groups therefore become desirable. Commendable work in this field has been carried out by NFHS, NNMB, ICDS and NRHM and its urban counterpart. These have attempted to monitor health status of people for early detection, have suggested timely interventions for prevention, provided worldwide access to vital nutrition and wellbeing services, have advised government on the policy matters, and have run programs for effective control of under-nutrition and infections as well as obesity and non-communicable diseases (Undavalli *et al.*,2018)

National surveys have shown that India has entered the dual nutrition burden era. The government needs to strive to implement programs that boost health education efforts, ensure universal access to vital nutritional and health services and enable timely detection, prevention and controlling of under and over nutrition. As poverty, which was previously the determining factor for under nutrition, loses its relevance in the access to food, government needs to ensure that the problem of under nutrition does not get substituted by problem of over nutrition.(Singh & Singh, 2017).

The focal points of these programs should be three folded and are i). Monitoring the nutrition and health status of the people, ii).Ensuring essential nutrition and health services to everyone, iii). Educating the community and the individuals on the importance of

moderate physical activity. Assessment of health and nutritional status of population is a mandatory tool for designing and implementing policies and programmes for the welfare of population. There are various national health surveys and varied nutritional surveys that collect data and provide information on public health and nutrition on large scale (Rautela *et al.*, 2018).

Health and Nutrition professionals have to play important role in spearheading physical education. The current phase of dual nutrition, where under nutrition is on decline and over nutrition is still limited to urban affluent, is the most opportune time to combat dual nutrition. Poverty is no longer the pivotal to under nutrition. Over-nutrition can be brought to control by promoting programs around nutrition and life style counseling (Reddy *et al.*, 2002).

Firstly, an assessment needs be made on the health status of an individual and community. Once the assessment has been made, appropriate instructions should be imparted based on the nutritional status. For example, for **Normally Nourished**, sustain their present lifestyle with moderate physical activity and continue health monitoring, for **Under Nourished**, Nutrition supplementation and active counseling and for **Over Nourished**, increased physical activity, nutrition therapy and active counselling are imparted to lead a healthy life (Solanki *et al.*, 2020)

For people who are under or over nourished, improvement should be monitored on a consistent basis and timely interventions should be suggested. Practical demonstrations on imbining physical activity in day to day life can be advised. Discretionary physical activity can be encouraged. People should be guided on health hazards associated with overweight and obesity. Effective nutrition and health education on physical activity and dietary requirements can act as a major force in combating the challenge of dual nutrition (Goel *et al.*, 2020).

Universal health coverage (UHC) is vital to ending malnutrition in its any form. UHC can only be achieved by keeping nutrition and health education at the center. Primary health care should be integrated with essential nutrition and health care counseling for preventing the development of diseases and it should be accessible to all. Basic education on leading a healthy life styles should be made available to all, even the most

deprived and marginalized. Mohalla Clinics, Anganwadi is, Asha Workers, PHC centers etc. need to play a pivotal role in ensuring these essential preventive, promote and curative actions. In order to achieve the goal of normal nutrition and healthy life, a multi-sectoral and a multi-stakeholder action is required. It is crucial for all stakeholders involved in nationwide systems for health, nutrition and Universal Health Coverage, including government officials and representatives, community leaders, civil activists to support essential nutrition and health services to everyone to address the problem of dual nutrition, leaving no one behind (Kesh *et al.*, 2018)

Identification of the research gap

Even though malnutrition is a known evil and a catalyst to rapidly emerging dual nutritional challenge, there are still not many research studies or policy papers around adult malnutrition especially in the low and middle income countries. In the Indian context, this information is limited to key cities like New Delhi. This study assessed the nutritional status and its associated factors among women population in New Delhi, which is capable of providing incidence to policy makers and program implementers alike for their decision making needs.

Scope of the study

Women are more prone to malnutrition than men because of their higher requirement for dietary intakes during pregnancy and lactation and as well for gender inequalities they face at homes. In countries, which undergo nutrition transition as they transition from low to middle or high income, women are disposed to this double burden of malnutrition. This dual nutrition burden concludes into dual disease burden with both communicable and non-communicable diseases plaguing the country. The purpose of the present study is to assess the nutritional status among Women and the impact of lactation on the nutritional status of mothers. Women nutrition and women nutritional education are two critical factors in safeguarding the health of society, children and future generations. This dual nutrition burden and dual disease burden are therefore key challenges faced by developing countries. Focus on women nutrition in each stage Lactation, Pregnancy and womanhood in terms of non pregnant non lactating is essential to achieving the nutritional goals and to breaking the intergenerational cycle of poverty, malnutrition and ill-health.

With these backdrops, the present study entitled “Dual nutrition burden in Urban Women from Low middle income families” as undertaken with the following objectives.

- To study prevalence of under and over nutrition among Non Pregnant and Non Lactating women (NPNL) in urban low middle income families
- To study prevalence of dual nutrition burden in relation to age of NPNL women
- To assess occurrence of abdominal and truncal adiposity in NPNL women in different age and BMI groups
- To study the effect of lactation on nutritional status of women
- To assess prevalence of abdominal and truncal adiposity in lactating women in different age groups

Hypothesis of the study:

Ho1: There is no significant difference in nutritional status of non pregnant and non lactating women from urban low middle income families.

Ho2: There is no significant difference in Nutritional Status in relation to age

Ho3: There is no significant difference in abdominal and truncal adiposity in NPNL women.

Ho4: Lactation does not have any effect on nutritional status of women

Strength of the study

- A large scale mixed longitudinal community study
- Covered NPNL women and Lactating Women
- Nutritional status (BMI) as well adiposity (MUAC,WC,HC and WHR) were investigated in relation to age and duration of lactation
- Compared the NPNL women with lactating women in the same age group

Limitation for the Study

- Covered only women from food secure urban low middle income group
- Body composition was not assessed due to sample size and unable to shift the Body Composition Analyzer.
- Health status was not assessed