Anaemia in Women: A Silent Epidemic

Seminar Paper submitted in partial fulfillment of the requirements for the award of the Degree of Bachelor of Science in Economics

Ananya Senapati

76012100389

Under the guidance of

Dr. Anand Prakash

School of Economics

NARSEE MONJEE INSTITUTE OF MANAGEMENT STUDIES

Bangalore campus

2023

DECLARATION BY THE STUDENT

I hereby declare that "Anaemia in Women: A Silent Epidemic" is the result of the seminar paper carried out by me under the guidance of *Dr. Anand Prakash* partial fulfilment for the award of the degree of Bachelor of Science in Economics by NMIMS University, Bangalore Campus.

I also declare that this seminar paper is the outcome of my own efforts and that it has not been submitted to any other University or Institute for the award of any other degree or Diploma or Certificate.

Place:

Date:

Name of the student: Ananya Senapati

SAP Number: 76012100389

X

Signature of the student

TABLE OF CONTENT

ANEMIA IN WOMEN: A SILENT EPIDEMIC

ABSTRACT

India is home to the largest number of anaemic women in the international community, with over 228 million women affected. The goal of this research is to look at the trend and understand the reasons behind the incidence of anaemia among women belonging to different socio-economic groups in India. It analyses the food consumption pattern of women by looking at the National Family Health Survey (NFHS) data, conducted in four phases, from 1998 to 2021.

INTRODUCTION

Anaemia is when the blood does not have enough healthy blood cells to hold oxygen to the body's tissues, often leading to related concerns like nutritional deficiencies, chronic diseases and even blood disorders. Anaemic women face difficulty in carrying out their day-to-day obligations and participating in social and economic activities. Anaemia also can result in reduced productivity and absenteeism from work, which may harm women's earnings and livelihoods. Initiatives taken by the government of India like various nutrition programmes, iron fortification and public awareness campaigns have reduced the prevalence of anaemia among women in India. However, the government should develop more practical solutions to address these ground root problems of inadequate nutrition and the spread of infectious diseases among women.

RESEARCH QUESTION

1. What is the historical trend in the prevalence of anaemia among various socio-economic groups?
2. What are the major risk factors of anaemia among women in India?

OBJECTIVE

1. Understanding the magnitude and distribution of the prevalence of anaemia across socio-economic groups in India over time.

2. Identifying the major risk factors of anaemia.
3. Assess the scope for making informed policy decisions targeting the root cause of differences in anaemia prevalence.

METHODOLOGY

1. Secondary data collection from NFHS.
2. Trends were analyzed from 1998 to 2021 of the prevalence of anaemia among women and men.
3. Food consumption patterns of women were analyzed, considering factors like caste, residence, age, education, wealth and marital status.
4. Trends were then analyzed with quantitative techniques.

LITERATURE REVIEW

Anaemia has been a worldwide clinical entity since the 1800s affecting men, women, children and old people, among them women are the most noxious to it. In a society marked by gender inequalities, where decision-making power and economic opportunities are disproportionately skewed in favour of men, women face multiple challenges when it comes to anaemia. And more than that, is India's population aware of this silent epidemic, "Anaemia"?

According to the World Health Organisation's 1992 report, global estimates of anaemia averaged 56%. In India, data on the percentage of women affected by anaemia is collected by the National Family Health Survey (NFHS) and existing reports from 1998 to 2021 show a clear increase in the prevalence of anaemia among non-pregnant women (15-49 years old). The data shows that the prevalence of anaemia among all women (pregnant/non-pregnant/education wise/religion wise/work status/standard of living) in India was 52%, the reason being low heme-iron and high phytates in diet, high level of malaria, and frequent reproductive cycling and other infectious disease that lead to decrease in iron storing capacity (Bentley & Griffiths, 2003b). Among women of all categories, women of reproductive age are the most vulnerable because of their recurrent menstrual loss, along with that, the demands of pregnancy and repeated childbearing worsen the situation. Even global estimates on the prevalence of anaemia show that among pregnant women, 41.8% of women are anaemic whereas among non-pregnant women, 30.2% of women are anaemic (Balarajan et al., 2013). The magnitude and distribution of the issue extend beyond pregnant and non-pregnant women, encompassing variables such as residence, age,

wealth, caste, marital status, and education, which are pivotal axes of stratification in Indian society.

Regionally, the NFHS-3 data shows that 69.4% of women in Assam, 68.7% in Bihar and 67.5% in Tripura, 32.7% in Kerala, 38.4% in Punjab and 38.8% in Goa are anaemic and this percentage has been rising till 2021, only four states, that are Punjab, Arunachal Pradesh, Meghalaya and Mizoram have shown a significant decrease over 7-year period. The economic cycle in various regions of India has been impacted by the burden of anaemia, with rural areas experiencing higher prevalence rates of mild, moderate and severe anaemia compared to their urban counterparts. Among castes, scheduled tribes (STs) present the highest prevalence of mild, moderate and severe anaemia followed by scheduled castes (SCs) and other backward classes (OBC) as per the NFHS data. Women belonging to different social statuses and religions, distinguished as members of the scheduled tribe (STs) and scheduled caste (SCs) were more likely to have any anaemia, even after controlling for wealth and education. On the other hand, Muslims and Christians were significantly less likely to have any anaemia in comparison to Hindus (Balarajan et al., 2013a). And there is no such reason as to why Muslims and Christians are less anaemic than Hindus. There is evidence from a study conducted in Mumbai that when poorer households have increased income for food, they tend to choose pricier but not necessarily more nutritious options like sugar, salt, and processed foods; moreover, the issue of undernutrition in girls (16-18) stems from early gender discrimination, exacerbated by menstrual iron losses post-menarche (Sharma et al., 2018) leads to less consumption of healthy and nutritious diets. Despite the theoretical advantage of urban areas with greater access to diverse food options, extreme poverty constrains both urban and rural women, particularly the most impoverished urban women, from affording nutritious food. Consequently, both groups face similar risks of anaemia(Bentley & Griffiths, 2003c).

From the NFHS-4 data, alarming statistics have come to light, there has been a 10% increase in the prevalence of anaemia, staggering at 65%. The WHO sets a critical threshold; if the prevalence of anaemia within a community exceeds 40%, it signifies a problem of high magnitude. In response to these findings, the WHO and UNICEF echo the urgent need for action (Osborn et al., 2021b). This specifies emphasizing changing dietary patterns and ways to cure anaemia diseases.

Iron deficiency anaemia (IDA) is widespread in tropical regions, particularly among women of childbearing age, especially within underprivileged communities. A significant factor contributing to this issue is the low dietary intake of iron- and folic acid-rich foods. In the context of Indian diets, the high levels of phosphate and phytic acid pose a problem, as they lead to the formation of insoluble compounds like iron phosphate and phytates in the gastrointestinal tract, consequently reducing iron absorption. Additionally, the high prevalence of intestinal infestations results in increased intestinal motility, further hindering iron absorption (Prakash

Upadhyay et al., 2012). State-wise, iron deficiency has increased in Delhi, Haryana, Himachal Pradesh, Kerala, Meghalaya, Tamil Nadu, Punjab, and Uttar Pradesh. This raises an alarming question – how did some states in India such as Delhi, Himachal Pradesh, Kerala and Punjab, which rank among the highest on the state Human Development Index (HDI), fail to contain IDA and instead join Uttar Pradesh, one of the lower-ranked HDI states? However, this is still a matter of investigation (R. Rai et al., 2018). These nutritional deficiencies, including insufficient intake of proteins, vitamin C, and iron, contribute significantly to anaemia. Furthermore, within the societal framework, a woman's status, particularly after marriage, is often assessed based on her reproductive roles, specifically the number of male children she bears, emphasizing the need for addressing these nutritional challenges to ensure the well-being of women and girls (Kaur, 2014). These factors underline the importance of addressing nutritional deficiencies and promoting awareness about balanced diets to combat iron deficiency anaemia effectively. Along with nutrition, parasitic diseases like malaria, hookworm, etc build-up due to iron depletion in a human's body (Ghosh, 2009). Even after controlling for the economic status, people with low literacy rates, meagre purchasing power, poor access to basic amenities, and who are often employed as casual labourers are the ones who are more prone to infectious diseases, and lag in the epidemiologic transition (Kassebaum et al., 2014).

Persistent issues such as corruption, delayed payments, inadequate coverage, and administrative challenges have impeded anaemia control programs; addressing these challenges requires a robust monitoring and evaluation framework for public interventions to minimize corruption and enhance accountability, alongside raising awareness about adequate nutrition beyond staple grains, as improved financial status does not always translate to better food consumption patterns due to varying household priorities (Rai et al., 2022b).

Several public programmes in India already exist to improve nutrition either through food supplementation or by providing financial support. To push the existing initiatives, in 2018 our current prime minister started a movement called, “Anaemia Mukt Bharat", The primary strategy is the distribution of prophylactic iron and Folic acid supplementation and improving the dietary pattern of all villages, blocks and districts of all states/UTs of India. Government food and nutrition interventions have traditionally focused on protein-energy malnutrition, leaving behind micronutrient deficiencies such as Iron deficiency anaemia (IDA) (Rai et al., 2022). Other major social security programs, including social security pensions, the Mid-day Meal program, the Integrated Child Development Scheme, the Public Distribution System, and the National Rural Employment Guarantee Act, mandated by the 2013 National Food Security Act, provide essential support; among these, social security pensions and the National Rural Employment Guarantee Act exclusively offer financial assistance, enhancing food access and diversifying household food choice. But the question that arises is, whether financial support through these programmes can help tackle micronutrient deficiencies such as anaemia.

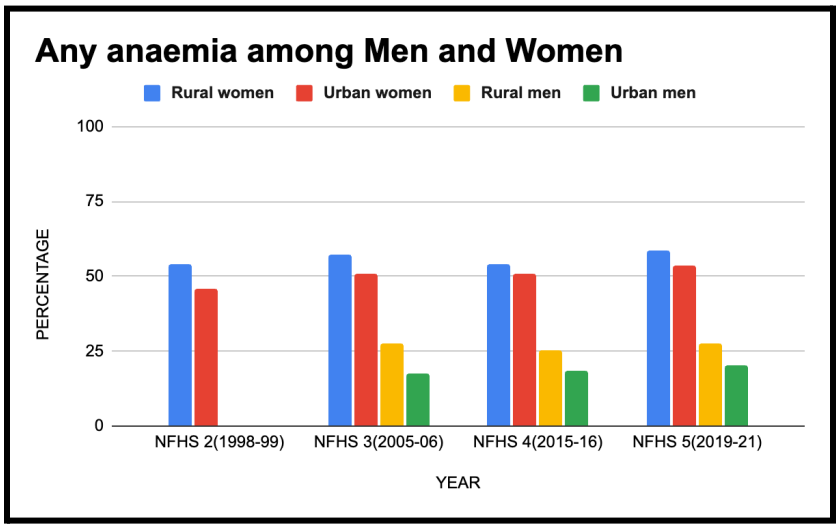
When it comes to bridging gender wage gaps and improving economic prospects for women in India, more active participation of women in the workforce is required. However, joining India's workforce is an uphill task for women due to the double work burden. Women lack the time to visit hospitals or buy supplements, they are always asked to prioritize their family first which limits their access and in the end, they have to adjust to whatever food is left and this gets worse when the breadwinner of the family is alcoholic, reducing household resources that could be spent on iron-rich food (Sedlander et al., 2021b). To prevent this scenario, overcoming anaemia requires addressing broader social issues that perpetuate gender inequalities. By challenging male-dominated decision-making structures, promoting equal access to education and economic opportunities, and combating societal norms that prioritise women's roles as caregivers at the expense of their health, India can work towards breaking the cycle of anaemia and empowering women in both rural and urban areas (Sedlander et al., 2021).

The World Health Organization (WHO) has declared anaemia a significant public health concern when its prevalence exceeds 40% within a community. This pervasive issue extends beyond traditionally considered vulnerable groups, such as pregnant and lactating women, to encompass the broader adolescent population. The onset of menstruation, accompanied by regular blood loss, exacerbates the prevalence and severity of anaemia among adolescent girls. To combat this escalating public health challenge, a comprehensive approach is imperative, encompassing nutrition education, community awareness campaigns, and targeted supplementation programs. Regular blood tests to monitor haemoglobin levels are crucial for early detection and intervention. Integrating nutritional education into the school curriculum is paramount to instil healthy habits and foster informed dietary choices among adolescents.
Emphasizing preventive measures, particularly iron supplementation, during the pre-adolescent stage is essential to mitigate the risk of anaemia in adolescent girls. Some key interventions required by the Government of India should be improving antenatal services and creating awareness among mothers, ensuring food security, food-based approach along with food fortification, using a positive deviance approach as a tool, and strengthening the surveillance system (Prakash Upadhyay et al., 2012b). By proactively addressing this issue, we can empower young women to lead healthy, productive lives.

FINDINGS AND DISCUSSIONS

TRENDS IN ANAEMIA PREVALENCE

Figure 1



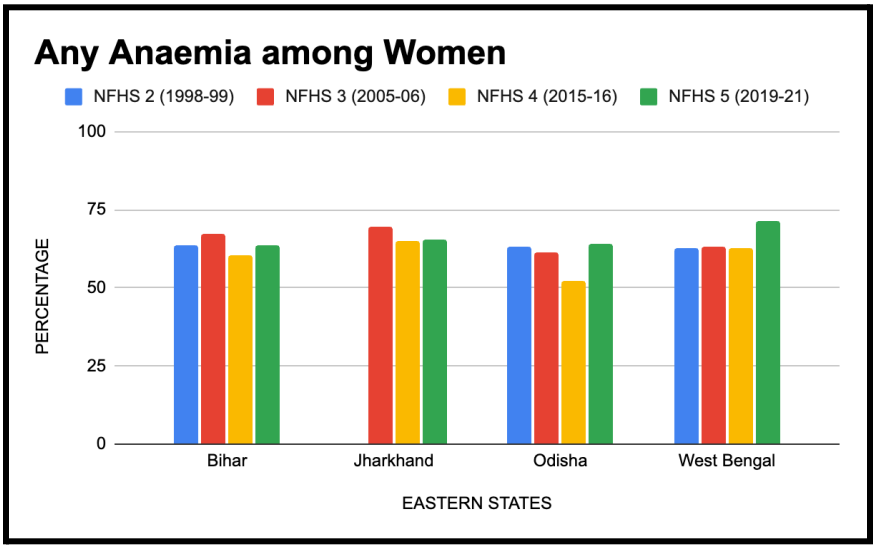
When comparing anaemia prevalence between genders, women consistently exhibit higher rates compared to men. This discrepancy is particularly pronounced among rural women, who face a higher vulnerability, with current rates at 58.5%, and urban women, whose rates are slightly lower but still substantial at 53.8%. Although men also experience differences in anaemia prevalence based on their residence, with a noticeable drop noted in NFHS 5 data, their overall rates remain considerably lower.

The existing literature underscores the inherent challenges women face regarding iron deficiency, attributed to factors such as menstruation, pregnancy, and childbirth. Additionally, women residing in rural areas encounter additional obstacles due to economic constraints, limiting their access to iron-rich foods. A balanced diet is crucial for mitigating anaemia risk, yet it remains challenging for rural women with limited resources.

Among urban populations, the urban-poor women emerge as the most vulnerable group. A paper published by the European Journal of Clinical Nutrition mentioned that one major reason why urban poor women have a high risk of anaemia is, due to lower participation in extra household employment and diminished economic autonomy within the household, limiting access to personal income and resources.

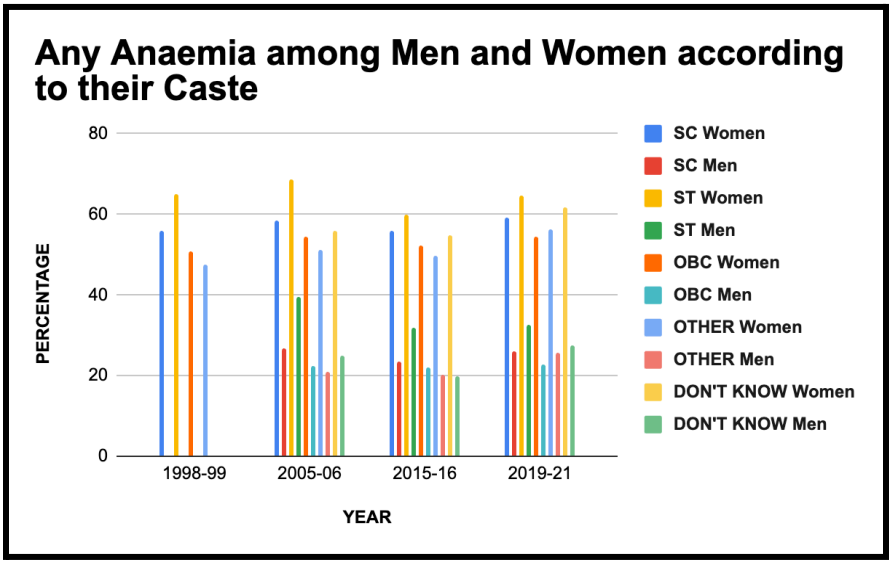
In summary, the disparity in anaemia prevalence between genders persists, with women bearing a disproportionate burden, exacerbated by socioeconomic factors and access to nutritious diets. Addressing these disparities requires comprehensive interventions targeting vulnerable populations, particularly women in rural and urban impoverished communities.

Figure 2



While existing literature extensively discusses the prevalence of anaemia in major northern and southern states, there is a noticeable gap in addressing the conditions in eastern India. States like Bihar, Jharkhand, Odisha, and West Bengal, characterized by their lesser development and presence of more aspirational districts, receive less attention in scholarly works. Notably, West Bengal has experienced a significant increase in anaemia prevalence, rising from 62.7% in 1998-99 to 71.4% in 2019-21, with the other three states showing similar trends, albeit in no particular order. This highlights the need for further research and intervention strategies to address anaemia in the eastern states of India.

Figure 3

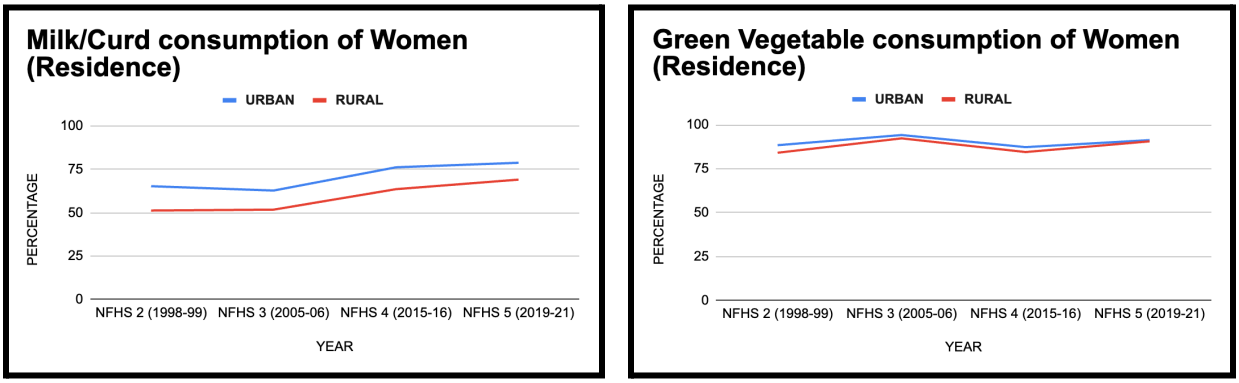


When comparing the prevalence of anaemia between men and women, it is evident that women exhibit a significantly higher prevalence compared to men. Within the female demographic, those belonging to the ‘ST’ category demonstrate the highest prevalence of anaemia, reaching

64.6%, followed by the ‘Don’t Know’ category at 61.7%, ‘SC’ at 59.2%, ‘Other’ at 56.4% and ‘OBC’ at 54.6%, according to NFHS 5 (2019-21). Notably, NFHS data does not specify the caste category within the ‘Others’ and ‘Don’t Know’ categories.
Additionally, existing literature corroborates these findings, revealing that anaemia prevalence among economically disadvantaged groups, particularly within the SC, ST and OBC categories, is notably higher compared to women from wealthier backgrounds.

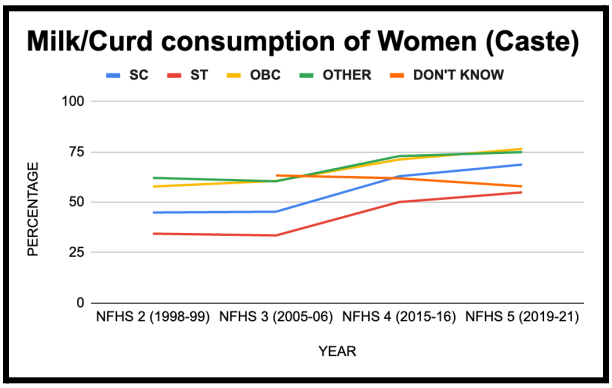
TRENDS IN FOOD CONSUMPTION PATTERN OF WOMEN

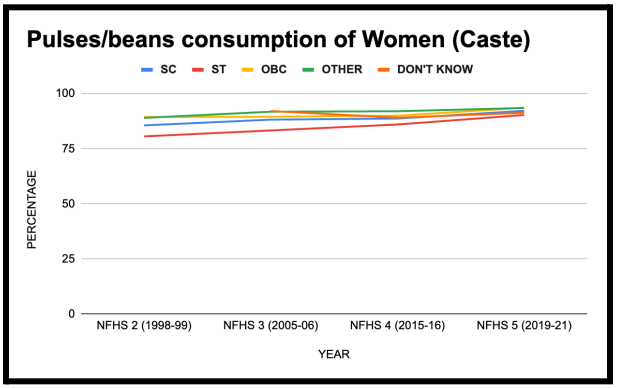
Figure 4



In accordance with residence, the NFHS records the percentage of women consuming various food items like milk/curd, pulses/beans, green vegetables, fruits, eggs, and non-vegetarian items (fish, chicken/meat) weekly. Notably, the consumption of milk among women has shown a significant increase over time in both urban and rural areas, reaching 78.8% and 69.1% respectively. Despite a minor decline observed in urban areas during NFHS 3(2005-06), the relatively similar consumption rates between rural and urban populations signify a positive trend. Similarly, the consumption of green vegetables displays a convergence across the years, with urban areas recording a consumption rate of 91.35% and rural areas at 90.6%. This suggests an encouraging trend wherein plant-based sources of iron, are being equally consumed by the residents of both rural and urban locales.
However, these findings seem to contradict the existing literature because of the data collection method adopted by the NFHS. For example, a paper published by Elsevier Inc. uncovered that in rural districts of Odisha, men typically assume the role of breadwinners and allocate their income towards alcohol consumption rather than prioritizing the purchase of iron-rich foods for their households. Consequently, this leaves women in these households underserved in terms of nutritional needs.

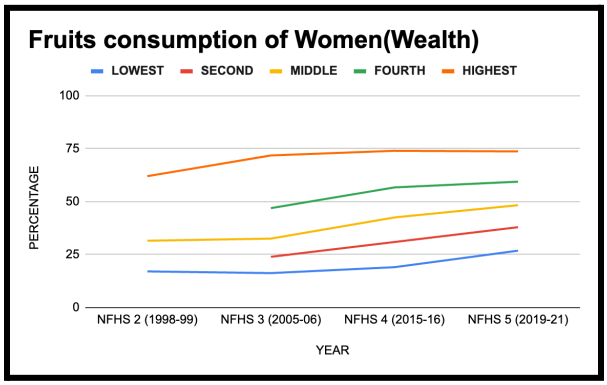
Figure 5

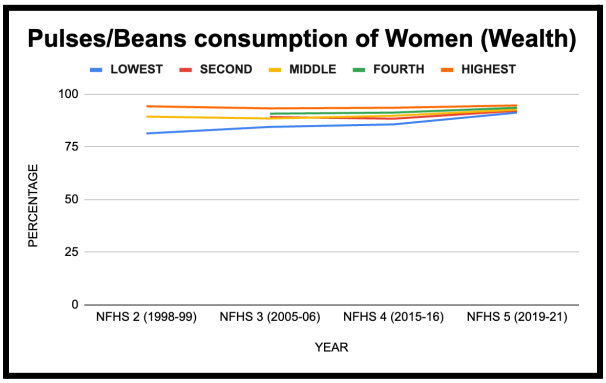




Regarding caste demographics, data regarding the percentage of women consuming similar food items once a week was collected. Notably, the consumption of milk among women has seen an increase for SC, ST, OBC and other categories, except the 'Don't Know' category. However, due to the lack of specification provided by NFHS regarding this category, the reason behind the decline in milk consumption remains undisclosed. Despite this limitation in data collection methodology, drawing insights from existing literature, which underscores the higher prevalence of anaemia among SC and ST women compared to OBC or other categories, one might infer that milk consumption should be higher among SC and ST populations. However, contrary to expectations, milk consumption rates are highest among OBC and OTHER categories, standing at 76.5% and 74.9% respectively, while it stands at 68.7% and 54.9% for SC and ST. Nevertheless, there appears to be convergence in the percentage of women consuming pulses/beans once a week across all caste categories over time, indicating a positive trend. It would be beneficial for women to consume more mixed beans, baked beans, lentils and chickpeas for better nutrition.

Figure 6





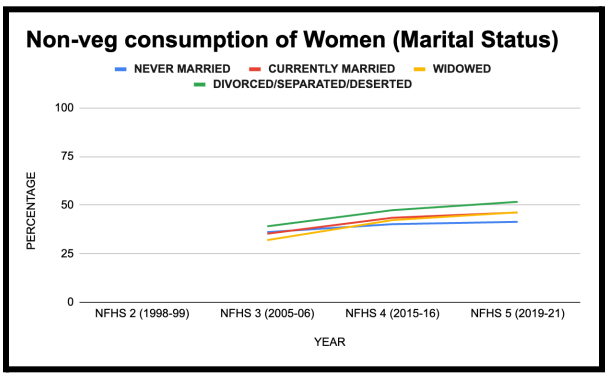
A comprehensive analysis of women's wealth stratification, based on indices derived from ownership of consumer goods such as televisions, household items, and necessities, alongside household characteristics including access to clean drinking water, reveals distinct patterns in dietary habits. Initial assessments conducted during the NFHS 2 omitted data about the second

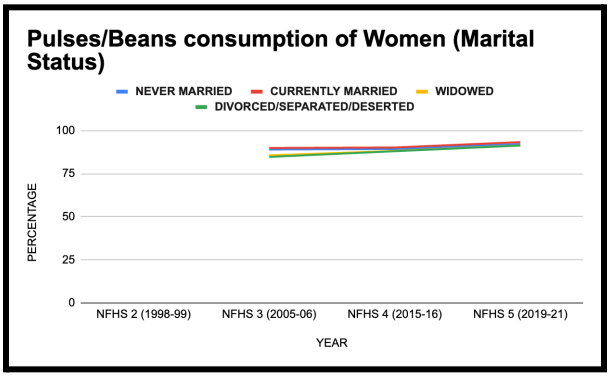
and fourth wealth categories. However, subsequent observations demonstrate a notable correlation between wealth status and dietary preferences.

Within the highest wealth index category, comprising individuals with the most affluent socioeconomic standing, a substantial increase in the percentage of women consuming fruits at least once a week has been observed, currently standing at 73.7%. Conversely, as the wealth index diminishes, a corresponding decline in fruit consumption among women is evident. This trend underscores the influence of economic status on dietary choices, particularly regarding the consumption of fresh produce. Remarkably, a convergence in the percentage of women consuming pulses and beans has been observed across all wealth categories over time. This convergence suggests a positive trend, indicating that socioeconomic disparities have less impact on the consumption of staple food items such as pulses and beans. Indeed, among the various food items surveyed, pulses exhibit the highest consumption rates across all wealth categories, emphasizing their significance as dietary staples.

Despite these findings, it is noteworthy that existing research literature appears to lack exploration into the prevalence of anaemia and its relationship with women's food consumption relative to their wealth index. This gap in scholarly discourse underscores the need for further investigation into the interplay between socioeconomic factors, dietary habits, and health outcomes among women.

Figure 7





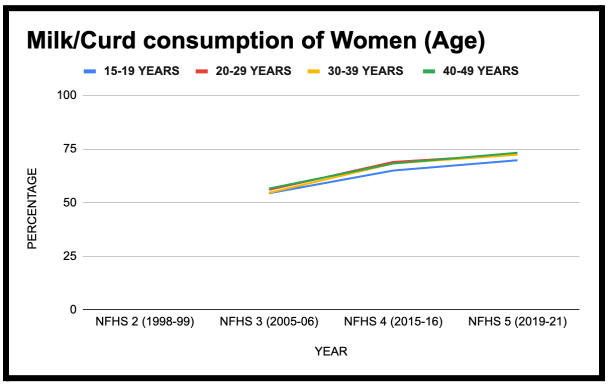
Data concerning the percentage of women consuming similar food items once a week, categorized by marital status, reveals notable trends in dietary habits. A substantial increase in non-vegetarian consumption (comprising fish, meat, and chicken) is evident from NFHS 3 to NFHS 4, with no data collected in this category during 1998-99. This upward trajectory persists across all marital status categories, with the highest prevalence observed among women who are divorced, separated, or deserted, standing at 51.7%. Notably, there exists minimal disparity in non-vegetarian consumption between currently married and widowed women, with rates at 46.2% and 46.3% respectively. Conversely, pulse consumption exhibits marginal differences within all marital status categories.

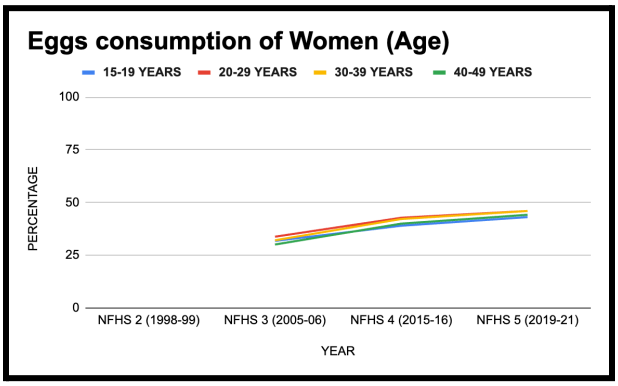
A consistent observation is the lower prevalence of women consuming specific food items once a week among currently married women compared to their never-married counterparts. This trend

resonates with scholarly discourse, which underscores the influence of marital status on women's societal roles, often contingent upon reproductive functions and the number of male children borne.

A paper written by S. Ghosh, highlighted the persistent vulnerability of rich and never-married women to anaemia, accentuating the enduring health challenges despite positive shifts in dietary habits reflected in NFHS data. Anaemia remains a significant contributor to maternal mortality and low birth weight in India, underscoring the imperative for continued attention and intervention in addressing maternal health disparities.

Figure 8





During NFHS 2 data collection, the categorization of women was based on different age brackets compared to subsequent surveys. Consequently, there was minimal variation in the percentage of women consuming the same food items mentioned earlier during this period.

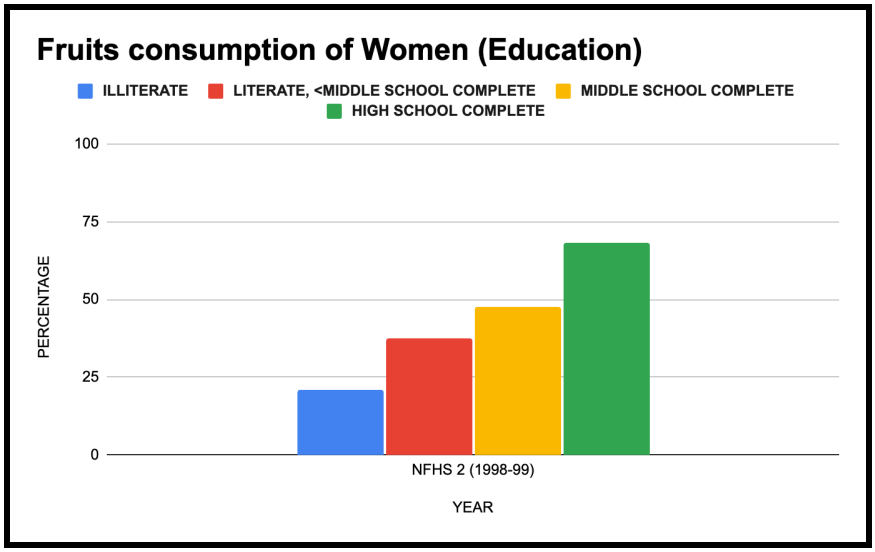
Starting from NFHS 3 onwards, a notable trend emerged in the percentage of women consuming milk/curd once a week, exhibiting a significant increase across all age categories. According to NFHS 5 data, the highest percentage is observed among women aged 40-49 years, at 73.3%, although differences among age groups are marginal.

Likewise, the consumption of eggs shows a consistent pattern across age categories, with a convergence observed over the years. This trend is noteworthy as eggs are rich in Heme iron, an essential nutrient for women, particularly those of reproductive age.

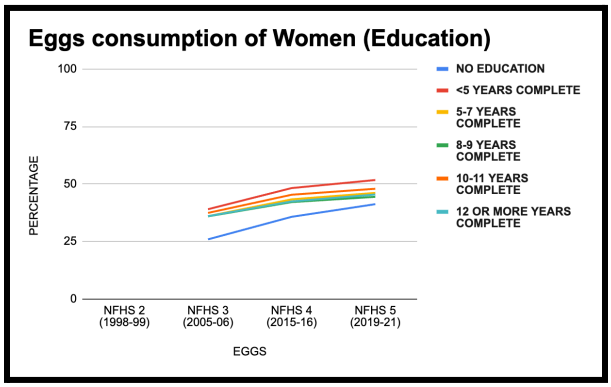
Overall, the observed trends in milk/curd and egg consumption signify positive shifts in dietary habits among women, with consistent improvements noted across various age groups.

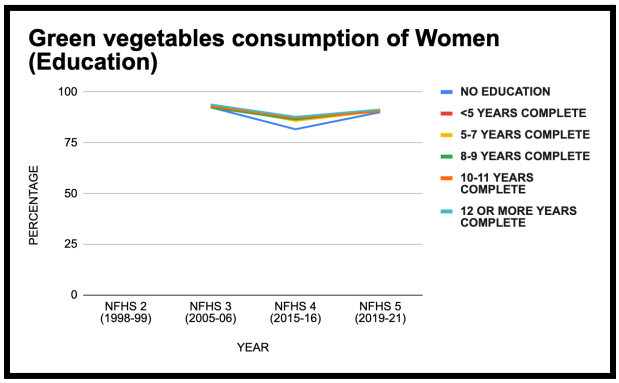
Figure 9

The graphs below depict the percentage of women consuming fruits once a week categorized by age. Initially, the analysis focuses on NFHS 2 data, followed by a comparison across NFHS 3, NFHS 4, and NFHS 5, considering the changes in educational categories formed since NFHS 2 data collection.



According to the educational categories outlined in NFHS 2, there is a notable trend of increase in the percentage of women consuming fruits once a week as their level of education advances. The data reveals that only 20.8% of illiterate women consume fruits once a week, whereas 68.4% of women who have completed high school report consuming fruits with the same frequency. This observation aligns with findings in existing literature, which suggest a correlation between awareness of anaemia and dietary habits. It can be inferred that as women become more educated, they are likely to possess greater awareness regarding anaemia and its prevention through the consumption of nutritious food items.
For other food items, the percentage has been more or less the same as per NFHS 2 data.





The two graphs provided depict trends in dietary habits among women from NFHS 3(2005-06) to NFHS 5(2019-21), focusing on education level as a categorical variable. Specifically, data was collected on the percentage of women consuming food items at least once a week. In terms of egg consumption, there has been a significant improvement across all education levels since NFHS 3(2005-06). NFHS 5 data (2019-21) highlights that the highest percentage of women consuming eggs once a week is observed among those with less than 5 years of complete

education, at 51.7%. While there isn't a clear ordinal pattern among other education levels, there has been a consistent upward trend over the years.
On the other hand, the consumption of green vegetables has shown a more consistent pattern across education levels, with minor fluctuations. Although there was a decline noted during NFHS 4 (2015-16), recent NFHS 5 data suggests a convergence across education levels. This convergence is viewed positively, indicating stable green vegetable consumption habits. Notably, NITI Aayog's report attributes the dip observed from NFHS 3 to NFHS 4 to issues related to malnourishment.
Overall, if we only see the percentage increase, the trends observed in both egg and green vegetable consumption signify positive developments in dietary habits among women over the years, with improvements noted across various education levels.

LIMITATIONS

Several limitations are apparent in the findings and discussions. Firstly, when examining the prevalence of anaemia among women aged 15-49 years over time, the analysis solely considers prevalence in relation to residence and caste, neglecting other pertinent categories such as wealth, education, and marital status. Similarly while collecting data on food consumption percentages among women, the focus is spaced on specific categories like age, residence, wealth, marital status, caste and education, without considering the prevalence of anaemia within these categories. Additionally, the selection of the food items for analysis is restricted to those commonly found across all four phases of NFHS data. Consequently, as each new set of NFHS data introduces additional food items, this approach may fail to capture a comprehensive picture of dietary patterns and their association with anaemia prevalence.

CONCLUSION

An essential aspect to consider when analyzing the dietary patterns of women across different socio-economic strata in India is the data from the National Family Health Survey (NFHS), which indicates an increase in the percentage of women consuming specific food items weekly, rather than reflecting an increase in the actual quantity consumed. Additionally, there exists a notable variation in the diversity of food consumed by women across all socio-economic groups. For instance, while pulses and green vegetables are consumed by a higher percentage of women, the consumption of fruits remains considerably low, indicating a lack of diversity in dietary intake among women.
This observation highlights a significant contrast with existing literature, which predominantly underscores the importance of enhancing the nutritional status of women across all

socio-economic segments. Many researchers advocate for a concerted effort towards food-based initiatives, urging the Government of India to implement proactive measures aimed at improving women's nutritional well-being. Despite the increased consumption of various non-cereal food items, the prevalence of anaemia among women has continued to rise across demographics, indicating a gap in nutritional quality rather than quantity.

Furthermore, women in India often cite dietary restrictions and the practice of "eating last" or consuming whatever is leftover as reasons for inadequate dietary intake. This nuanced point underscores the need for a holistic approach towards addressing nutritional deficiencies among women. It suggests that simply increasing the availability of food may not be sufficient to address underlying nutritional challenges, such as inadequate absorption of key nutrients like iron, which is crucial in combating anaemia.

REFERENCES

Balarajan, Y. S., Fawzi, W. W., & Subramanian, S. V. (2013a). Changing patterns of social inequalities in anemia among women in India: Cross-sectional study using nationally representative data. *BMJ Open*, *3*(3), e002233. https://doi.org/10.1136/bmjopen-2012-002233

Bentley, M. E., & Griffiths, P. L. (2003a). The burden of anemia among women in India. *European Journal of Clinical Nutrition*, *57*(1), 52–60. https://doi.org/10.1038/sj.ejcn.1601504

Ghosh, S. (2009). EXPLORING SOCIOECONOMIC VULNERABILITY OF ANEMIA AMONG WOMEN IN EASTERN INDIAN STATES. *Journal of Biosocial Science*, *41*(6), 763–787. https://doi.org/10.1017/s0021932009990149

Kassebaum, N. J., Jasrasaria, R., Naghavi, M., Wulf, S. K., Johns, N., Lozano, R., Regan, M., Weatherall, D., Chou, D. P., Eisele, T. P., Flaxman, S. R., Pullan, R. L., Brooker, S. J., & Murray, C. J. L. (2014). A systematic analysis of global anemia burden from 1990 to 2010. *Blood*, *123*(5), 615–624. https://doi.org/10.1182/blood-2013-06-508325

Kaur, K. (2014). *Anaemia 'a silent killer' among women in India: Present scenario*. Www.Scholarsresearchlibrary.Com Scholars. https://d1wqtxts1xzle7.cloudfront.net/41725279/Anaemia_study_report_India-libre.pdf?1454071756=&response-content-disposition=inline%3B+filename%3DAnaemia_a_silent_killer_among_women_in_I.pdf&Expires=1699031788&Signature=IxpTA~l1EuBin3DQyduTAqEn0J4m39Oun0CYke3y8~jHLzTnxMPC3xhQvBycpxXL3y3cAkZh5pd-EtCDrgvcWCttE68A6MAst5ItzaegvNP41EyGbKOORmHZrvI5acmmF-C5Xh5~KZKwedtXPQ6qg5BW5Ma8IATCfgSCJXcPETZZzkrNHozY~T02AAVn~qot73K4QgNzGtdVh7Lm-vGvVDdwpG8FhuqenIsOFmJKrjKSd~41EOL7hz7qzAoa~GQZK-dpWYht-uIaJV5rC0T

WAv4BG1ZRLV8VcRO~XAUneqM6el2gYVKmj81QlyxPxSDEkgd52ROw3zKD43sWjADnVA__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA

Osborn, Aj., Muhammad, G., Ravishankar, S., & Mathew, A. (2021a). Prevalence and correlates of anemia among women in the reproductive age (15–49 years) in a rural area of Tamil Nadu: An exploratory study. *Journal of Education and Health Promotion*, *10*(1), 355. https://doi.org/10.4103/jehp.jehp_1526_20

Prakash Upadhyay, R., C, P., & Kulkarni, V. (2012a). Unrelenting burden of anemia in India: Highlighting possible prevention strategies. *International Journal of Medicine and Public Health*, *2*(4), 01–04. https://doi.org/10.5530/ijmedph.2.4.1

Rai, R., Fawzi, W., Barik, A., & Chowdhury, A. (2018). The burden of iron-deficiency anemia among women in India: How have iron and folic acid interventions fared? *WHO South-East Asia Journal of Public Health*, *7*(1), 18. https://doi.org/10.4103/2224-3151.228423

Rai, R. K., Kumar, S. S., Sen Gupta, S., Parasannanavar, D. J., Anish, T. S. N., Barik, A., Varshney, R. K., & Rajkumar, H. (2022a). Shooting shadows: India's struggle to reduce the burden of anemia. *British Journal of Nutrition*, *129*(3), 416–427. https://doi.org/10.1017/s0007114522000927

Sedlander, E., Talegawkar, S., Ganjoo, R., Ladwa, C., DiPietro, L., Aluc, A., & Rimal, R. N. (2021a). How gender norms affect anemia in select villages in rural Odisha, India: A qualitative study. *Nutrition*, *86*, 111159. https://doi.org/10.1016/j.nut.2021.111159

Sharma, H., Singh, S. K., & Srivastava, S. (2018a). Major correlates of anemia among women (age 15-49) in India and spatial variation, evidence from National Family Health Survey-4. *Journal of Women's Health Care*, *07*(04).

https://doi.org/10.4172/2167-0420.1000440