Predicted Interventions for Improving the Nutritional Status of Vulnerable Groups of Uttarakhand: Evidence from Comparison between NFHS-5 and NFHS-4 Survey

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ABSTRACT

Background: Nutritional status is an indicator of the overall well-being of a people. In view of this effect, a study was undertaken to compare the nutritional status of vulnerable groups (*viz* women of reproductive age group 15 to 49 years, pregnant women's, adolescent girls and children aged 6 to 59 months of Uttarakhand.

Methods: The data of the state under study was compared with national data. NFHS 4 and 5 data were used to analyse the health and nutritional trend of the identified groups over the reporting period of 5 years, to identify interventions and to help formulate policies for improving the nutritional status of the state.

Result: The decreasing trend in the case of underweight women and the increasing trend in the percentage of overweight women were noted in every district. In the case of anemia among children aged 6 to 59 months, most of the districts had managed to reduce the prevalence of anemia in the last 5 years. Most of the districts have seen a decreased trend in anemia among pregnant women and among adolescent girls aged 15 to 19 years. The study reveals that the nutritional status of the vulnerable population of Uttarakhand has improved over the last five years, however, still, some districts (Tehri Garhwal, Dehradun, Chamoli, Pauri Garhwal, Uttarkashi and Rudraprayag) need special attention. A comparison of the improvement between the state and national data depicts that the state of Uttarakhand performed better than the nation in all categories except in reducing the cases of undernutrition in women. It may be postulated from the study that health and nutritional programmes have been effective in meeting their targets to a great extent. However, to further improve the condition of the population, district-specific developmental programmes need to be formulated, with a special focus on eradicating undernutrition among women.

Key words: Children, Intervention, NFHS survey, Nutritional status, Women.

INTRODUCTION

The National Family Health Survey (NFHS) is an extensive, multi-round exercise that is carried out in a representative sample of Indian households. The survey provides information on fertility, infant and child mortality, family planning use, maternal and child health, reproductive health, nutrition, anemia and the quality of health and family planning services for India at the state and national levels. The Ministry of Health and Family Welfare and other organizations have needed critical data on health and family welfare for policy and programme reasons. Additionally, each subsequent round of the NFHS has the aim of providing information on significant new health and family welfare issues (NFHS, 2022). Five round of national family survey that has been conducted till now from year 1998 to 2019.

The fifth survey in the series of the National Family Health Survey 2019–21 (NFHS-5), offers data on India's population, health and nutrition for each state and union territory (UT). Similar to NFHS-4, NFHS-5 offers district-level estimates for a number of significant indicators (IIPS and ICF, 2021). The NFHS-5 survey work has been carried out in approximately 6.37 lakh sample households from 707 districts (as of March 2017) across the country from 28 States and 8 UTs, covering 7,24,115 women and 1,01,839

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men to produce disaggregated estimates up to district level (Ministry of Health and Family Welfare, 2022). The contents of NFHS-5 are similar to NFHS-4 to allow comparisons over time. NFHS-5 does, however, introduced a few new subjects, such as preschool education, disabilities, access to a toilet, death registration, bathing practices during menstruation and procedures and reasons for abortion. Waist and hip circumference measurements have been added to the list of clinical, anthropometric and biochemical

testing (CAB) procedures and the age range for blood pressure and blood glucose measurements has been widened. HIV testing has, however, been discontinued. The NFHS-5 sample has been designed to provide estimates of several survey indicators at the national, state/union territory (UT) and district levels. Estimates on indicators of sexual behaviour, husband's background and wife's employment, knowledge, attitudes and behaviour related to HIV/AIDS, as well as domestic violence, are only available at the state/UT and national levels.

This paper highlights the key findings and comparison of NFHS 5 data with NFHS 4 data of Uttarakhand as well as national data. Data on the nutritional status of vulnerable groups *i.e* children aged 6 to 59 months, women of reproductive age group, pregnant women and adolescent girls has been analyzed. Thereafter predictions and suggestions for policy interventions have been suggested.

MATERIALS AND METHODS

Data from the 5th round of the National Family Health Survey (NFHS-5) (2021) and 4th round of the National Family Health Survey (NFHS-4) has been utilized for the study. The study is based on secondary data analysis. NFHS-5 and NFHS-4 were conducted by the Ministry of Health and Family Welfare, coordinated by the International Institute for Population Sciences, Mumbai and implemented by a group of survey organizations and Population Research Centers, selected following a rigorous selection procedure. Research and Development Initiative (RDI) Pvt. Ltd. carried out the fieldwork for the NFHS-5 in Uttarakhand from 7 January 2020 to 21 March 2020 before the lockdown and from 5 December 2020 to 31 March 2021 after the lockdown. Data was collected from 12,169 households, 13,280 women and 1,586 men. Whereas, the Institute of Health Management Research (IIHMR University) conducted the fieldwork for the NFHS-4 in Uttarakhand from 30 January 2015 to 19 July 2015, collecting data from 15,171 households, 17,300 women and 1,994 men. NFHS-5 survey for India was conducted in 2 phases, where in first phase took place from 17 June 2019 to 30 January 2020 and the second phase from 2 January 2020 to 30 April 2021 by 17 field agencies and gathered information from 636,699 households, 724,115 women and 101,839 men. NFHS-4 carried on from 20 January 2015 to 4 December 2016 by 14 field agencies and gathered information from 601,509 households, 699,686 women and 112,122 men.

The NFHS used a two-stage stratified random sampling approach, choosing the same number of households from each of the primary sampling units (PSUs)-villages in rural regions and census enumeration blocks in urban areas-in the first stage with a probability proportional to population size. The field agency hired both male and female interviewers to communicate with respondents. Four Survey Schedules-Household, Woman's, Man's and Biomarker-were canvassed in the local language using Computer Assisted Personal Interviewing (CAPI).

The present study was based on information that is in the public domain and is accessible to everyone. No identifiable information about the survey respondents is present in the data set. The secondary data was tabulated in MS Excel and then statistically analyzed to identify the changing trend in the health and nutritional status of the vulnerable population of Uttarakhand and the nation.

RESULTS AND DISCUSSION

Nutritional status of women in the reproductive age group (15-49 years): Underweight Women

Underweight/undernourished adult is a person with a body mass index below 18.5 (WHO, 2000). Improvement in nutritional status among women of all districts of Uttarakhand has been reported. There has been a drop in the percentage of underweight women. Among all districts, Almora has shown maximum improvement with a drop of 9.5 % in the underweight population. Currently, women of district Rudraprayag appear to be relatively healthy as only 8.8% of the women are underweight followed by district Chamoli with only 9.6 % of women being underweight (Fig 1). According to the NFHS-5 data for India, there are now 18.7% fewer undernourished women than there were in the NFHS-4 data, which was 22.9%. When the percentage reduction of undernourished women in Uttarakhand and India was compared, it was found that Uttarakhand had a slightly higher percentage reduction than taken as a whole. At the national level, the percentage decline is 4.2% and in Uttarakhand, it is 4.5%. As per the trend depicted in data of NFHS IV and V, the percentage of underweight women is likely to become minimal in the coming years due to the ongoing developmental programmes for women of reproductive age groups such as Poshan Abhiyan.

Policy interventions

Surveillance studies for identification of women at risk of becoming undernourished and developing an action plan of capacity building and nutritional intervention, identifying the region-specific insults that hamper the health status of women and developing as well as popularizing the region-specific health foods can help improve the situation of the state.

Overweight/ obese women

Women who are overweight or obese have a BMI over 25 (WHO, 2000). The scenario is disturbing and is a warning that even Uttarakhand is headed towards an obesity epidemic. Obesity predisposes a person to non-communicable diseases such as diabetes, hypertension, stroke and cardiovascular diseases (CVD) that are becoming a burden at the national level (Akhter *et al.*, 2021). There is an increase in the percentage of overweight women in every district with Dehradun (39.8%) contributing

the maximum percentage of obese women. A sudden spike in the percentage (from 5.3 to 20.9) of overweight women has been reported in the Tehri Garhwal district of Uttarakhand (Fig 2). The percentage of obese women estimated at the national level in NFHS-5 is 24, which has increased from 20.6 in NFHS-4. The NHFS-4 and NHFS-5 data show that the percentage of overweight women has increased in India over the past five years by 3.4%, whereas Uttarakhand has seen a rise of 9.3%. According to the data, the percentage of obese women in Uttarakhand increased from 20.4% in NFHS-4 to 29.7% in NFHS-5. As per the trend depicted in data of NFHS IV and V, the percentage of overweight or obese women is likely to increase due to changing lifestyle and food habits.

Policy interventions

Immediate action plan needs to be developed to address the problem of rising obesity. (It may be taken into consideration that males too are suffering from this problem). IEC modules (Information, Education Communication) should be developed for each district, a sensitization programme for the general population on a mission mode, health camps for affected people and development of region-specific weight control diets and collaboration with agriculture scientists to increase the cultivation of high fibre produce can be done. Millets can also be used that offer immense potential in our battle against climate change, malnutrition along with providing food and nutritional security (Sinha and Sharma, 2022). The government has not woken up to the disaster of obesity. Therefore, the database of the prevailing situation needs to be presented to policymakers. Programmes addressing these problems must be formulated.

Anemia among children and women

Anemia among children aged 6 to 59 months

Children with a haemoglobin level of 11 and below gm/dl (deciliter of blood) are categorized as anemic (Longanbach *et al.*, 2016). It may be noted that a healthy child (who is not stunted, wasted or underweight) or adult may be anemic. Due to the imbalance between rapid growth and inadequate
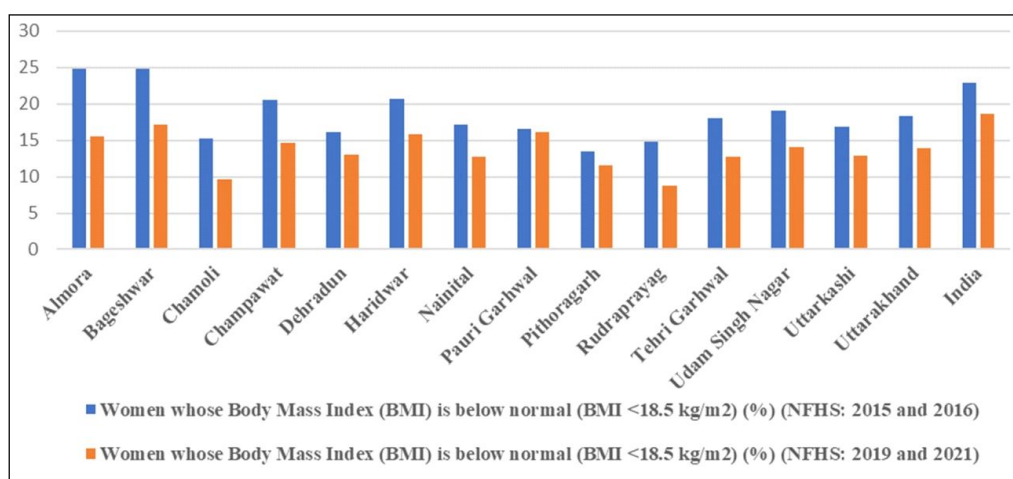

Fig 1: Women whose Body Mass Index (BMI) is below normal.
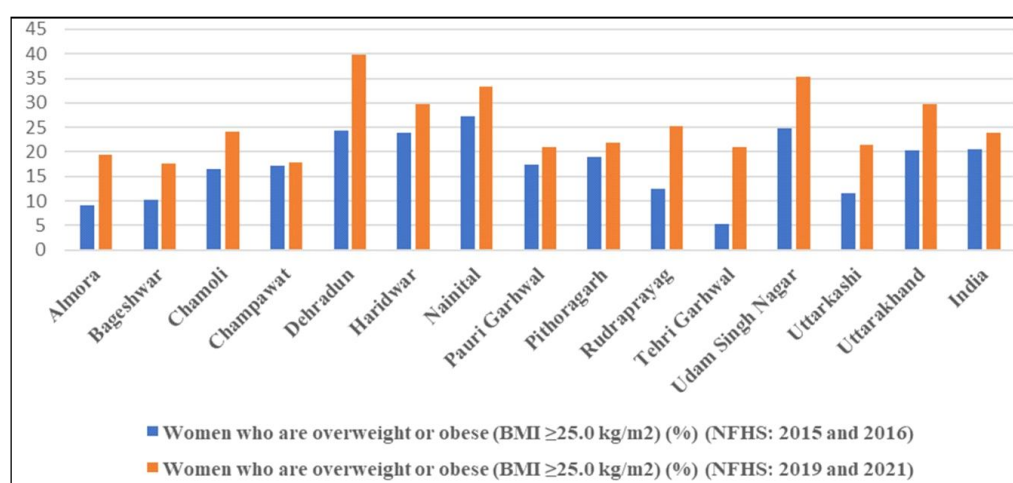

Fig 2: Women who are overweight or obese.

iron intake at this age, preschool-age children (ages 0–5) are more susceptible to iron deficiency than older children (Lopez *et al.*, 2016). The most common deficiency disease is anemia, which is one of the major nutrition-related deficiencies globally (Vibhute *et al.*, 2019). According to the WHO's global estimate for 2021, anaemia affected 39.8% of children aged 6 to 59 months in 2019, which is less than half of India's estimate of 67.1% for the same age group (NFHS Fact sheet, 2021). Across the globe, children and women of reproductive age are the most at risk for anemia (Belwal *et al.*, 2021). Developing nations like India have also made continuous efforts to reduce the anaemia among children and women. However, as suggested by the WHO Global Nutrition Report (2021), there has been little progress in reducing prevalence of anaemia and malnutrition since 2016 (WHO, 2021). Uttarakhand is among the states with the highest prevalence of this deficiency disease. An increase in the percentage of children who suffer from anemia has been observed among most of the districts in the last five years. Where, Almora (57.7 %), Chamoli (65.5%), Dehradun (59. 5%), Nainital (59.8 %) and Tehri Garhwal (61.7%) with Chamoli (65.5%) contributing to the highest anemic children among all districts as per NFHS-5 data. Haridwar has reported a decline of only 8 per cent as compared to NFHS 4 data but still it contributes to a total of 63.1 per cent of the anemic population (Fig 3). According to NFHS-4 data, there were 59.8% and 58.6% of children with anaemia in Uttarakhand and India, respectively. However, at the national level, the percentage of anaemic children has reached 67.1%, which is an urgent call for action to reduce the incidence of anaemia in the early stages of life. According to NFHS-5 data, the number has declined to 58.8% in Uttarakhand.

Policy interventions

The concept of nutrition garden has been launched at the national level to address this problem. It may be understood that multiple interconnected problems contribute to an individual developing anemia. As per the trend depicted in data of NFHS IV and V, the percentage of children with anemia is likely to increase if proper measures are not taken on time. Future interventions include the identification of region-specific foods that are rich in iron, folic acid, vitamin B12, ascorbic acid etc. and the promotion of their intensive cultivation and uses. As children as young as six months are found to be anemic, intensive sensitization programmes of mothers for the adoption of accurate complementary feeding should be taken up. Capacity building (Training) of mothers and increasing awareness among the policy planners and implementors to enhance their understanding of this serious health problem to deal with the condition should be promoted. The government is already working on this issue in mission mode. Monitoring should be improved to achieve better results.

Anemia among non-pregnant women aged 15 to 49 years

Women with a haemoglobin level of less than 12 gm/dl (deciliter of blood) are categorized as anemic (Cappellini and Motta, 2015). By implementing the Anemia Mukta Bharat Program under POSHAN Abhiyaan (2018-20), India hopes to reduce the prevalence of anaemia in children and adolescents as well as in women who are of reproductive age by 3 percentage points annually (MOHFW, 2018). According to the WHO dashboard, 53% of Indian women of reproductive age had anaemia in 2019. This has made India the country with the fifth-highest prevalence of anaemia in the world, behind Yemen, Mali, Benin and Nigeria (Pavithra, 2021). There has been a decline in the prevalence of anemia in all the districts of Uttarakhand except for Almora (slight increase with a percentage of 34) and Dehradun (47.9%). Rudraprayag (40.7%), Uttarkashi (high increment with percentage of 60.8) and Chamoli (41.8 %). Bageshwar (27.8%) shows the greatest decline among other districts in the percentage of anemic women (Fig 4). According to NFHS-4 data, the percentage of anemic non-pregnant women between the ages of 15 and 49 is 45.1% at the state level and 53.2% at the national level. The NFHS-5 data indicates that the intervention was successful, with
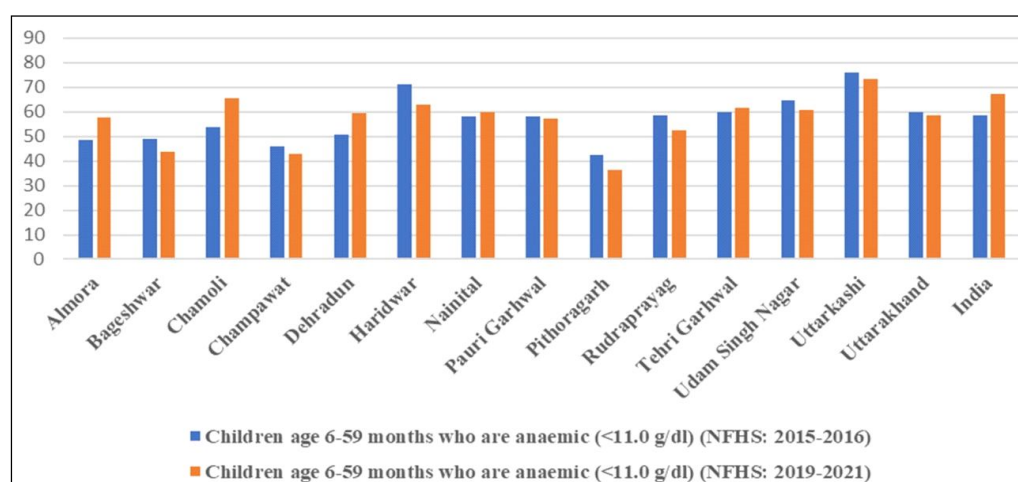
Fig 3: Children aged 6-59 months who are anemic (11.0 g/dl).

a 2.7% decrease in anemia in Uttarakhand, although there is an increase in the condition nationally. Anemia prevalence among non-pregnant women has increased in India from 53.2% to 57.2% over time.

Policy interventions

A decline in the percentage of women with anemia can be expected in future due to various ongoing intervention programmes. District machinery should be sensitized about this serious health issue and increase focus on the previously enumerated interventions. An increase in the percentage of anemic women in the five districts of Uttarakhand indicates that the government programme has not been effective in addressing the issue of anemia effectively. A relook into the strategies for reducing anemia is required. Identification of the causes for failure to meet the target needs to be done (*viz:* impact analysis). Future strategies for tackling anemia may be planned based on gap analysis. Chamoli and Rudraprayag districts are remote which may be a cause for the increase in the prevalence of anemia. Gap analysis through assessment of the nutritional status of women in the affected districts to help map region-specific strategies to tackle the problem of anemia among women should be taken up.

Anemia among pregnant women

Women with a hemoglobin level of less than 11 gm/dl (deciliter of blood) are categorized as anemic (Kejela *et al.*, 2020). India had the highest prevalence of anaemia in pregnancy and is the home of largest number of anemic pregnant women in the world. Pregnancy-related anaemia was identified as a significant public health issue in India, contributing to high rates of maternal morbidity and mortality, low birth weight and high infant mortality (WHO, 2015 and Stevens *et al.*, 2013). More than half of the children and women (including pregnant women) are anemic in all states and UTs, in spite of substantial increase in the consumption of iron folic acid (IFA) tablets by pregnant

women for 180 days or more (Press trust of India, 2021). Relative to the national prevalence of anemia among women the status of the pregnant women of Uttarakhand is better, except for Haridwar (slight increase with percentage of 63.6), Tehri Garhwal (most increment with the percentage of 54) and Uttarkashi district (64%) where the percentage has increased in the last five years (Fig 5). In Uttarakhand, anaemia among pregnant women shows a minor drop of 0.1%, from 46.5 to 46.4% according to data from the NFHS-4 and NFHS-5, while at the national level, the rate of anaemic pregnant women has risen from 53.2% to 57.2%.

Policy interventions

Due to various ongoing nutritional programme it can be predicted that percentage of pregnant women with anemia will further decline in coming years if these programmes are properly monitored and implemented. Intervention for improving the nutritional status of the districts can include increasing the production of micronutrient (mineral and vitamin) rich produce in all the districts, intensification and propagation of nutri-garden concept and emphasizing the production of citrus plants by horticulturists. SREP's (State Research and Extension Plans) should include the above interventions in their action plans. Along with this, ecosystem based Zero Budget Natural Farming (ZBNF) can be done that provides contamination free food with rich nutrition to cope up with immediate and future challenges (Saxena *et al.*, 2022).

Anemia among adolescent girls aged 15 to 19 years

Adolescents girl is categorized as anemic when hemoglobin level is below 12 gm/dl (deciliter of blood). Adolescent girls form a crucial segment of the population and constitute, as it were, the vital "bridge" between the present generation and the forthcoming generation (Choudhury and Chaudhary, 2024). Adolescent girls have a higher risk of anemia due to an increased requirement,
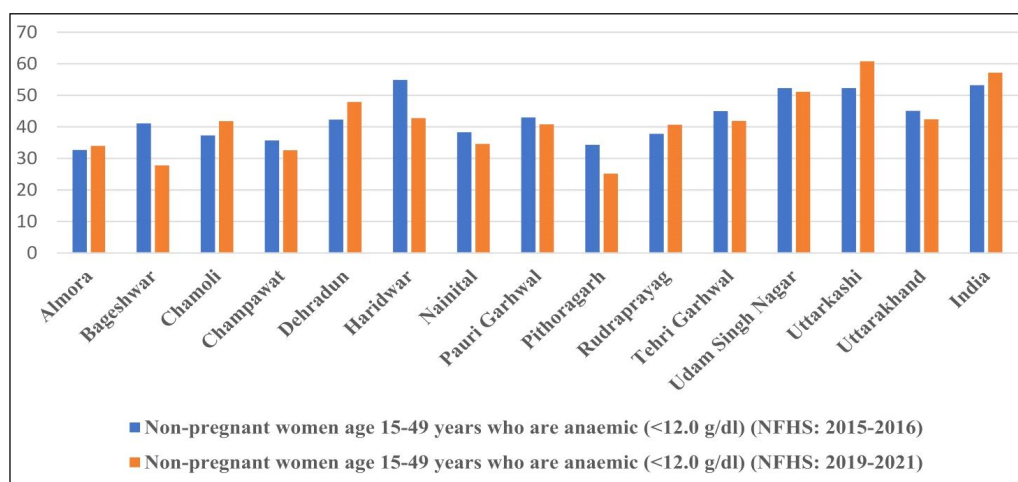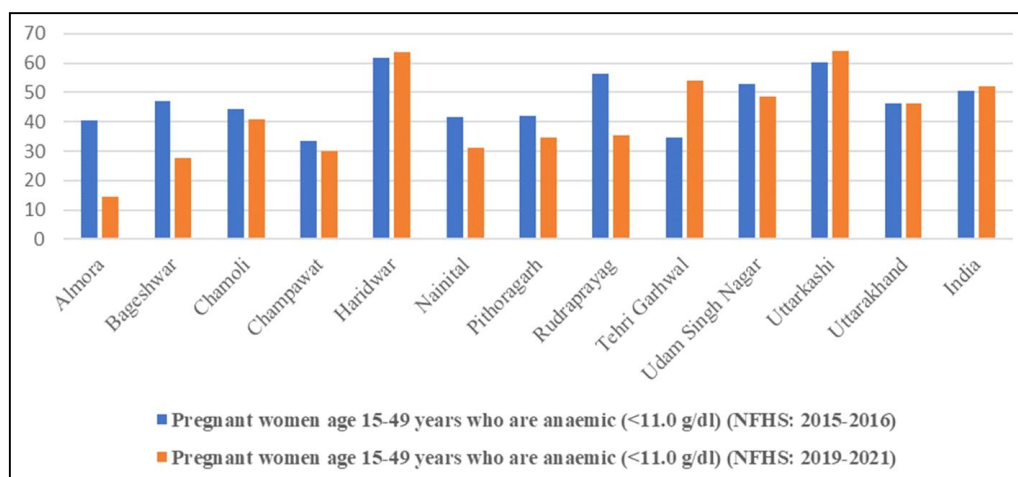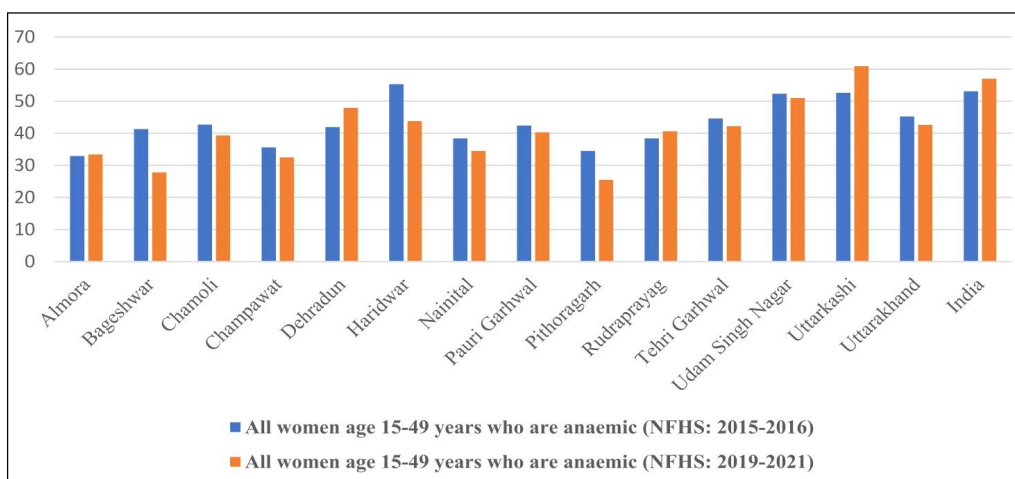
Fig 4: Non-pregnant women aged 15-49 years who are anaemic (12.0g/dl).

Fig 5: Pregnant women agedd 15-49 years who are anaemic (11.0g/dl).

Fig 6: Adolescent girls aged 15-19 years who are anaemic.

low intake of hematopoietic nutrients and low intake of a nutrient that enhance absorption of these hematopoietic nutrients (Engidaw *et al.*, 2018). Anemia in a young girl predisposes her to be anemic during pregnancy and the later years. The prevalence of anemia has gone down in most of the districts except Rudraprayag (most increment with percentage of 43.1) followed by Pauri Garhwal (44.3%), Tehri Garhwal (46.9%), Uttarkashi (66.1%) and Dehradun (least increment with percentage of 45.6%) (Fig 6). According to the NFHS-5 data, the percentage of adolescent females who were anaemic increased from 54.1% to 59.1% nationally. However, in Uttarakhand, the prevalence of anaemia among adolescent girls has decreased by 5.5% and is now 40.9 compared to 46.4% in NFHS-4.

Policy interventions

According to the NFHS survey, anaemia is increasing more quickly in urban areas than in rural population due to rising urbanization and shifts in dietary patterns towards junk food (Shukla, 2021). As per the trend depicted in data of NFHS IV and V, the percentage of girls with anemia will

further decline. However, districts in which rise in percentage is observed, further increment can be expected if ongoing programmes are not properly implemented and strict actions are not taken about this issue. Capacity building programmes of school girls using IEC modules that are already available may be taken up.

CONCLUSION

The nutritional status of the most vulnerable population in all 13 districts of Uttarakhand has been assessed and compared to the national data over 5 years. The data demonstrates that certain districts have had positive results due to the initiatives employed to improve the nutritional status of the aforementioned categories, but some districts still require additional efforts to minimize malnutrition. Comparing Uttarakhand's nutritional status to that of India reveals a more favourable trend in Uttarakhand's favour. India outperforms Uttarakhand in terms of the percentage decrease of underweight, but in all other cases including female obesity, anaemia in children, pregnant women and adolescent girls, the state progress exceeds national

improvement. Thus, policies have been suggested based on this analysis.

Conflict of interest

All the authors declare no conflict of interest.

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