

खण्ड 47

संख्या 1

जनवरी - मार्च 2024

आई.एस.एस.एन.-0253-6803

Volume 47

Number 1

January - March 2024

ISSN- 0253-6803

स्वास्थ्य एवं जनसंख्या:
परिप्रेक्ष्य एवं मुद्दे

Health and Population:
Perspectives and Issues



आरोग्यम् सुखसम्पदा

राष्ट्रीय स्वास्थ्य एवं परिवार कल्याण संस्थान

The National Institute of Health and Family Welfare

बाबा गंगनाथ मार्ग, मुनीरका, नई दिल्ली—110067

Baba Gangnath Marg, Munirka, New Delhi –110067

HEALTH AND POPULATION: PERSPECTIVES AND ISSUES
(Quarterly Journal of the National Institute of Health and Family Welfare, New Delhi)

Editorial Board

<p>Chief Editor Dr. Dheeraj Shah Director</p>	<p>Editor Prof. V.K. Tiwari</p>	<p>Associate Editors Dr. Bishnu Charan Patro Dr. Bhaswati Dash</p>
--	--	---

Joint Editors
Dr. Sherin Raj TP
Dr. Vaishali Bhole

Advisors

<p>Dr. Jayanti Semwal, HIMS, SRHU, Dehradun Dr. Kuldeep Kumar, Bond Business School, Australia Dr. Mala Ramanathan, SCTIMST, Trivandrum Dr. S.N. Dwivedi, RDG Med. College, Ujjain Dr. Pankaj Bhardwaj, AIIMS, Jodhpur Dr. K.S. Nair, Quassim University, Saudi Arabia Dr. Dinesh Paul, Ex Director, NIPCCD Prof. Ram B Bhagat, Ex Prof., IIPS Prof. Sanjay Zodpey, President, PHFI</p>	<p>Dr. Madhulekha Bhattacharya, Ex Prof., NIHF Dr. Suneela Garg, Prof. of Excellence, MAMC B.S. Garg, Wardha Med. College Dr. Arvind Pandey Dr. Rajiv Kumar Jain, Ex Chief Consultant-Health, Indian Railways Prof. Sonu Goel, PGIMER Dr. C.M. Singh, AIIMS, Patna Uday S Mishra</p>
---	--

SUBSCRIPTION

	IN INDIA	FOREIGN
Annual:	Rs. 200.00	\$200 (US) including
Single copy:	Rs. 50.00	air-mail postage

(Bank Drafts may be drawn in favour of the Director, The National Institute of Health and Family Welfare, New Delhi)

Papers published in the journal- HPPI, represent the opinion of the respective author(s) and don't reflect the views and policies of the Institute.

All editorial correspondences should be addressed to:

The Editor, Health and Population: *Perspectives and Issues*,
National Institute of Health and Family Welfare, Baba Gang Nath Marg,
Munirka, New Delhi-110 067, India.

E. mail: editor@nihfw.org

Website: www.nihfw.org (Journal, at the bottom of Home Page)

April 2024 / 100 copies

HEALTH AND POPULATION: PERSPECTIVES AND ISSUES

VOLUME: 47, NUMBER 1, January-March 2024

CONTENTS

1.	Age at Menarche among Girls in Government and Private Schools of Delhi, India and Its Association with Diet, Physical Activity and BMI Rajendra Phartyal, Chayanika Biswas, Shubhangi Sharma, Joshna Bhatia, Tarang Yadav, Brototi Roy and Jyoti Singh	1-11
2.	Unravelling Barriers and Battle of Tuberculosis among Sahariya (PVTG) Tribes Praveen Kumar Patel, R.P. Mitra and Meerambika Mahapatro	12-22
3.	Role of ASHA Workers to Facilitate Health Services: A Case Study Neha Pandey	23-37
4.	Spatial Analysis of Health Services: The Case of Himachal Pradesh Suman Dadhwal and Vivek Nagpal	38-46
5.	NAFLD: The Upcoming Silent Epidemic of Non-Communicable Disease in India- Prevalence, Risk Factors, Government Responses and Public Health Policies Tanisha Garg and Kiran Rangari	47-57
6.	Low Diabetes Risk Perception among University Teaching Staff: A Cause of Concern Shonima Venugopal, *Sanchita Khanna and *Uma M Iyer	58-65
7.	Managing Quality of Maternal Diet in Lactating Mothers- An Exploratory Study Archana Gupta, Saba Khan and Saira Mehnaz	66-73
8.	Problem Behaviour in Children with Specific Learning Disorders and Skilled Learners: A Comparative Study Vidyut Singh Sheoran and Gopal Chandra Mahakud	74-82

Age at Menarche among Girls in Government and Private Schools of Delhi, India: Association with Diet, Physical Activity and BMI

*Rajendra Phartyal, **Chayanika Biswas, ***Shubhangi Sharma,
***Joshna Bhatia, ***Tarang Yadav, ***Brototi Roy and ***Jyoti Singh

*Department of Zoology, Sri Venkateswara College, University of Delhi, Dhoola Kuan, New Delhi, India;

**Department of Community Medicine, Seth Gordhandas Sunderdas Medical College and
King Edward Memorial Hospital, Mumbai, India;

***Department of Zoology, Maitreyi College, University of Delhi, Chanakyapuri, New Delhi, India;

E-mail: jyoti@maitreyi.du.ac.in

Abstract

Menarche is an important milestone in a female's life signifying physiological, psychological, behavioural and social changes. The present study was undertaken to explore the trends in menarche among girls in government and private schools in Delhi, India and the factors influencing the age at menarche. A random cross-sectional survey was conducted among school-going girls in Delhi, India (n=687). Only girls who had attained menarche were included in the study. Girls with known gynaecological disorders, suffering from known chronic diseases, or under any medication for a long duration were excluded from the study. The overall mean age at menarche of the sample population was 12.54 years and it was observed that girls from government schools attained menarche earlier than girls studying in private schools. The age of menarche among girls having non-vegetarian food was lower than those having an exclusively vegetarian diet. Girls performing moderate physical activity had a higher age at menarche as compared to girls who performed very little or intensive physical activity. As far as awareness about menarche before reaching puberty is concerned, more than 50 per cent of participants were aware of menstruation and the use of sanitary pads before actual menarche. Surprisingly, more girls studying in government schools changed their sanitary pads every 6 hours as compared to girls from private schools. The study provides important insights about the age at menarche in girls studying in government and private schools of Delhi, India, and factors influencing the age at menarche.

Key words: Menarche, Diet, Physical activity, BMI.

Introduction

Menarche or the onset of the menstrual cycle is a key event of puberty in females. In females, puberty is characterised by breast tissue growth, peak height velocity, and menarche. Menarche is the last event of puberty and occurs almost 6 months after the attainment of peak height velocity¹. It is considered a sign of fertility from both physiological as well as social perspectives². The onset of

puberty is associated with pulsatile GnRH (Gonadotropin releasing hormone) secretion by GnRH-secreting neurons in the hypothalamus. This is majorly brought about by the increased kisspeptin expression in the GnRH neuron under the influence of estrogen¹. The age of menarche varies among individuals and is dependent on both, genetic as well as environmental factors¹. Globally, menarche occurs around the age of 10 to 12 years, with the average age decreasing in recent decades³. Typically, the age at menarche has been decreasing by 3 months per decade⁴, although in developed countries there is levelling off and, in some cases, there has also been a delaying trend⁵. The declining trend of age at menarche in developed countries is largely attributed to better socioeconomic conditions resulting in better nutrition, fattier diets and change in BMI⁶.

The secular declining trend of menarcheal age is known to cause many health problems in women⁷. Studies have implicated early menarche with cardiovascular diseases⁸, breast cancer⁹, endometrial cancer¹⁰ and spontaneous abortions¹¹. In addition to these reported health issues, early menarche also leads to several social and emotional problems such as eating disorders and a lack of self-esteem among young girls⁷. On the other hand, late menarche is associated with osteoporosis, anxiety and depression in later life^{1,12}. Interestingly, our knowledge about the declining trends in menarche and determinants of menarcheal age is based on higher-income countries as data is scarce from middle-income and lower-income countries.

In the present study, we investigated the age at menarche of girls from Delhi, the national capital of India. We further explored how different factors known to influence age at menarche such as socioeconomic status, diet, BMI, and physical activity were associated with menarche. Since government schools in India are usually associated with students from weaker socioeconomic status, we also tried to find out whether the menarcheal age was different among girls studying in a government school and private school. Knowledge about menarche can play a crucial role in creating awareness regarding the factors that are implicated in lowering the menarcheal age and thus influencing overall public health.

Methodology

We carried out a questionnaire-based survey in selected private and government schools in Delhi. Delhi is situated in the Northern part of India at 28.63°N and 77.21°E having an area of 1484 square km and a population size of 37,764,000, as estimated in 2022-23¹³. A multistage random selection sampling technique was used for the survey. Firstly, four districts, namely South West Delhi, South Delhi, East Delhi and North Delhi were selected randomly. From each of these districts two government and two private schools were selected randomly, followed by a random selection of 687 girls including 351 girls from government schools and 336 girls from private schools in total. Permission was obtained from the Headmistress/Headmaster/ Principal of the school and written voluntary consent was obtained from the girls after explaining the study procedure in detail. The interview was conducted in English or Hindi as per the convenience of the participants. All the participants were assured of total discretion and were assured that they could leave the study at any stage. Girls with known gynaecological disorders, suffering from known chronic disease, or under any medication for a long duration were excluded from the study. Only girls who had attained

menarche were included in the study. For assessing the age at menarche, the recall method was used wherein the girls (aged 9-17 years) were asked to recall the age of their first menses¹⁴.

The questionnaire included 3 distinct sections:

1. Demography: This section included questions about their present age, age at menarche, body weight and height. The BMI was calculated using the standard formula (body weight in kilogram/ height in meters squared)
2. Determinants: The section included questions about some socio-economic and biological determinants that have been previously associated with age at menarche such as the household income per annum, physical activity and diet.
3. Menstrual awareness and hygiene: In this section, questions were asked to investigate the participants' knowledge about menstruation and sanitary napkins before menarche. To assess menstrual hygiene girls were asked the frequency of changing sanitary pads during menstruation.

Statistical Analysis

Student t-test was performed to test the statistical difference in menarchal age among the girls studying in government vs private schools and among girls consuming vegetarian vs non-vegetarian diets. One-way analysis of variance (ANOVA) followed by the Tukey multiple comparison test was used to test the statistical significance between different groups of BMI, physical activity, economic status, fats in food and consumption of junk food. The data was analysed using the statistical software GraphPad Prism 8.0.1.

Findings

A total of 687 girls, 351 studying in government schools and 336 from private schools participated in the present study. The mean age of the respondents was 13.82 years. Among the 351 participants from government schools, and 336 from private schools, majority had an annual family income of 1-5 lakh. In government schools, the maximum number of girls were of normal body weight (52.86%) whereas in private schools, the maximum number of girls were underweight (54.76%). Both private and government schools had very few overweight or obese girls (Table 1).

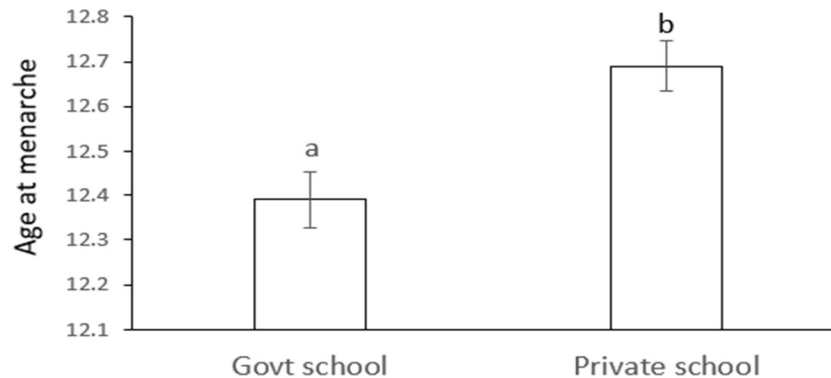
The mean age of menarche in the sample population was 12.54 ± 0.06 years. The age at menarche of girls from government schools was 12.39 ± 0.063 which differed significantly ($P < 0.05$) from the menarcheal age of girls from private schools (12.69 ± 0.057 years) (Fig 1).

Table 1
Socio-Demographic and Anthropometric Characteristics of the Sample Population (n=687)

Socio-demographic variables	Government school (n=351)	Private school (n=336)
Age of respondents(in years)		

a) 9-11	4.84% (n=17)	2.98% (n=10)
b) 12-14	64.6% (n=228)	64.29% (n=216)
c) 15-17	30.20% (n=106)	32.74% (n=110)
Age at menarche (in years)		
9	0.28% (n=1)	0% (n=0)
10	4.84% (n=17)	0.9% (n=4)
11	15.38% (n=54)	9.85% (n=33)
12	34.19% (n=120)	33.13% (n=111)
13	31.34% (n=110)	37.61% (n=126)
14	9.69% (n=34)	14.03% (n=47)
15	3.42% (n=12)	3.28% (n=11)
16	0.57% (n=2)	1.2% (n=4)
17	0.28% (n=1)	0% (n=0)
Annual income (in Lakhs)		
Less than 1 Lakh	33.62% (n=118)	22.91% (n= 77)
1-5 Lakh	41.60 (n=146)	42.85% (n=144)
5-12 lakh	19.09 (n=67)	29.46% (n=99)
< 12 lakh	5.70 (n=20)	4.76% (n=16)
Anthropometric variable		
Body mass index (BMI)		
Underweight (less than 18.5)	44.29% (n=155)	54.76% (n=184)
Normal (18.5-24.9)	52.86% (n=185)	40.48% (n=136)
Overweight (25-29.9)	1.43% (n=5)	4.46% (n=15)
Obese (more than 30)	1.43% (n=5)	0.30% (n=1)

Fig 1
Age at Menarche of Girls Studying in Government and Private Schools in Delhi

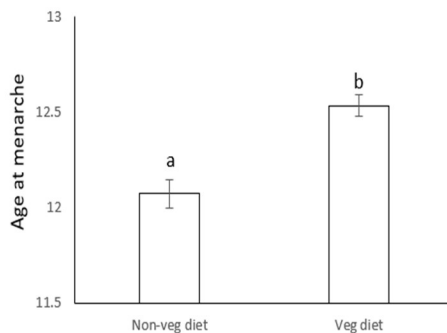


Data are represented as mean±SEM. The sample size of girls from government schools was 351, whereas in private schools the sample size was 336. Error bars with different superscripts denote significant difference ($p < 0.05$)

The mean age of menarche of girls from different economic classes did not differ significantly ($P < 0.05$, data not shown). The body mass index did not have any significant impact ($p < 0.05$) on the menarcheal age as the mean age of menarche in underweight (12.51 ± 0.0627 years), normal body weight (12.56 ± 0.06011 years), overweight (12.6 ± 0.2224 years) and obese girls (12 ± 0.327 years) were almost equal (data not shown).

The consumption of junk food did not have a significant effect ($p < 0.05$) on the age of menarche as it was observed that menarche in girls consuming junk food daily (12.45 ± 0.1023) or other groups (12.44 ± 0.0969) had almost the same age of menarche. Similarly, consumption of fatty food did not alter the age of menarche considerably (data not shown). However, girls consuming a non-vegetarian diet had significantly lower age of menarche (12.072 ± 0.0731) as compared to girls consuming a vegetarian diet (12.534 ± 0.0572 at $P < 0.05$) (Fig 2).

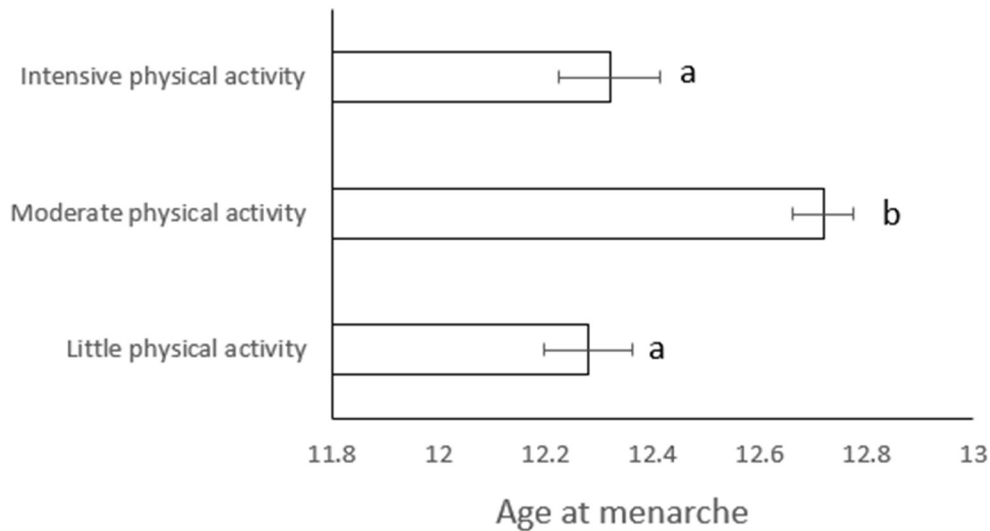
Fig2
Age at Menarche of Girls Consuming Non-Vegetarian Diet and Vegetarian Diet



Data are represented as mean±SEM. The sample size of girls consuming a non-vegetarian diet was 290 whereas the sample size of those consuming a vegetarian diet was 393. Error bars with different superscripts denote significant difference ($p < 0.05$, student t-test)

It was observed that physical activity also had a significant effect on the mean menarcheal age of respondents (ANOVA, $P < 0.05$). The girls performing moderate physical activity had significantly ($P < 0.05$) higher menarcheal age (12.72 ± 0.0568) than those performing little or intensive physical activities like sports etc. (Fig 3).

Fig 3
Age at Menarche of Girls Performing Little, Moderate and Intensive Physical Activity



Data are represented as mean \pm SEM. The sample size of girls performing little physical activity was 190, moderate physical activity was 387 and intensive physical activity was 97. Error bars with different superscripts denote significant difference ($p < 0.05$, ANOVA followed by Tukey)

In response to knowledge about menarche, 61.71% of girls in government schools and 55.22% of girls in private schools answered that they were aware of menarche before its onset (Table 2). Among respondents 51.43% and 51.64% from government and private schools respectively were aware about the use of sanitary napkins before the onset of the menarche. 56.12% of girls from government schools changed their sanitary pads every 6h, whereas only 35.82% of girls from private schools changed them every 6 hours (Table 2).

Table 2
Knowledge about Menstruation/Use of Sanitary Pads and Frequency of Sanitary Pad Change among Girls Studying in Government (Govt.) and Private (Pvt.) Schools

Variables	Govt	Pvt
Awareness about menstruation before menarche		
Yes	61.71% (n=216)	55.52% (n=185)
No	31.29% (n=134)	44.78% (n=150)
Knowledge about use of sanitary pad before menarche		
Yes	51.13% (n=180)	51.64% (n=173)
No	48.57% (n=170)	48.35% (n=162)
Frequency of napkin change		

Every 4 hours	23.64% (n=83)	29.25% (n=98)
Every 6 hours	56.12% (n=197)	35.82% (n=120)
Every 12 hours	17.37% (n=61)	25.37% (n=85)

Discussion

Menarche can be considered as an important milestone in a woman's life, from a physiological, psychological and social point of view. Many studies have shown that there is a trend towards lowering of the menarcheal age among girls in developed countries¹⁵. Various factors, such as genetics, geographical region, socio-economic status, better nutrition, physical exercise, BMI (body mass index) etc. have been attributed to this change in trend¹⁶.

Although the decline in menarcheal age is well established in the higher-income developed countries, our understanding of menarcheal age and the determinants is limited in lower-income and middle-income countries, primarily due to scarcity of data.

In the present study among girls in Delhi, it was observed that the overall mean age of menarche was 12.54 ± 0.06 years. This correlated well with other recent studies in the Indian subcontinent. Ramraj et al., in 2021 reported 12.5 years as the mean age of menarche among girls in Tamil Nadu, India¹⁴. Similarly, Campisi and co-workers recorded 12.9 years as age of menarche of girls in Pakistan¹⁷. However, in a study by Zeglen et al., in 2020, the mean age of menarche in girls from Kolkata, India, has been reported as 11.8 years¹⁸. This might be due to the predominantly non-vegetarian diet of people from eastern India. In studies carried out a decade earlier, a higher mean menarcheal age has been observed in the Indian sub-continent¹⁹. Thus, our study clearly substantiates a general secular declining trend in menarcheal age in Delhi, India as observed in developed countries.

Interestingly, in our study, we observed a significant difference in the mean age of menarche among girls from government schools and those studying in private schools, with a higher age at menarche among girls in private schools. A similar observation was also made in a study conducted in Ethiopia²⁰. This is surprising as it is generally believed that private schools have more students from a higher socioeconomic status as compared to government schools implying the availability of better nutrition²¹. However, in our study, we observed that the annual average income of girls from government schools and hence their financial status was comparable to that of girls studying in private schools. Moreover, we also observed that more girls in private schools were underweight compared to government schools. These observations imply that in Delhi there is little difference in socioeconomic status of girls in private and public schools.

Many studies have shown that the age of menarche is influenced by diet^{22, 23}. In our study, we observed that girls consuming a non-vegetarian diet attained menarche earlier than girls having a vegetarian diet. Our study is in agreement with the previous study conducted in China by Duan and co-workers¹⁶. They reported that a high intake of animal fat, milk and a low intake of vegetables and grains resulted in a lowering of menarcheal age. The vegetarian diet possibly imparts protective

benefits due to the high content of dietary fibres and isoflavones^{24, 25}. However, in our study, we observed that other dietary factors such as fats in diet and junk food consumption, had no significant effect on the age of menarche. This is contradictory to other studies wherein it was reported that a high intake of fats and fast food lowers menarcheal age²⁶. Several reports have indicated that for healthy pubertal growth, intake of appropriate amounts of dietary fats is pivotal²⁷.

Interestingly, in the present study, the investigators observed no significant influence of BMI on menarcheal age conforming to other reports wherein no association was found between BMI and menarcheal age^{28, 29, 30}. However, there are some studies that strongly correlate BMI with age at menarche^{18, 31}. In our study, we also observed no significant difference between the menarcheal age of girls belonging to different economic strata. This is unlike the study in Punjab by Karim et al where they observed delayed menarche in school girls belonging to lower or middle socioeconomic status³². A similar strong association of menarcheal age with socioeconomic status has been reported in other developing countries such as Columbia²², Peru, Vietnam³³, Mexico and Egypt³⁴.

Physical activity has also been reported as an indicator of menarcheal age³⁵. In our study, we observed that the girls performing moderate physical activities such as walking, household activities etc., had a higher menarcheal age as compared to inactive girls. This substantiates earlier studies^{36, 37} wherein moderate exercise was associated with increased age at menarche. However, in our study, we observed that girls involved in intensive physical activities also had a lower age of menarche, the reason for which was obscure.

As far as awareness about menarche was considered, more girls in government schools knew about menstruation before menarche as compared to girls studying in private schools. Nonetheless, the percentage awareness in both govt (61.71%) and private schools (55.22%) was much higher than that reported earlier by van Eijk and his co-workers in a metanalysis where they report that 48% of girls had premenarcheal awareness³⁸. This is likely due to the fact that the study was carried out in Delhi, the national capital of India, wherein the overall awareness among adolescents is quite high. Interestingly, when we consider menarcheal hygiene, a larger percentage of girls attending govt schools changed their sanitary pads every 6 hrs as compared to girls studying in private schools. The reason for the increased use of sanitary pads by government schools might be due to the various schemes of the government such as Kishori Yojana and Suvidha Sarathi scheme under which free sanitary napkins are provided to girls studying in government schools^{39, 40}.

Conclusion

Our study in Delhi clearly substantiates the declining trends in age at menarche similar to developed countries. The girls studying in government schools experienced menarche at an earlier age as compared to girls from private schools. Although the age at menarche was observed to be significantly lower among girls consuming non-vegetarian diet and having inactive lifestyles, we found no association of BMI, economic status, junk foods and fats in diet with age at menarche. A majority of respondents were aware of menstruation and sanitary pads before menarche. More girls

studying in government schools as compared to private schools, were concerned about menstrual hygiene as evident by the frequency of changing sanitary pads.

Acknowledgements: The authors are grateful to the Principal, Maitreyi College and Principal, Sri Venkateswara College, University of Delhi for their support and encouragement.

References

1. Karapanou O & Papadimitriou A (2010). Determinants of menarche. *Reproductive Biology and Endocrinology*; 8(1):115. <https://rbej.biomedcentral.com/articles/10.1186/1477-7827-8-115>.
2. Sommer M, Sutherland C & Chandra-Mouli V (2015). Putting menarche and girls into the global population health agenda. *Reproductive Health*; 12:1-3. <https://doi.org/10.1186/s12978-015-0009-8>.
3. Marques P, Madeira T & Gama A (2022). Menstrual cycle among adolescents: girls' awareness and influence of age at menarche and overweight. *Revista Paulista de Pediatria*; 40:e2020494. doi: 10.1590/1984-0462/2022/40/2020494.
4. Tehrani FR, Mirmiran P, Gholami R, Moslehi N & Azizi F (2014). Factors influencing menarcheal age: Results from the cohort of Tehran lipid and glucose study. *International Journal of Endocrinology and Metabolism*; 12(3):e16130 <https://doi.org/10.5812/ijem.16130>
5. Piras GN, Bozzola M, Bianchin L, Bernasconi S, Bona, G, Lorenzoni, G, Buzi F, Rigon F, Tonini G, De Sanctis & Perissinotto, E (2020). The levelling-off of the secular trend of age at menarche among Italian girls. *Heliyon*; 6(6): e04222. <https://doi.org/10.1016/j.heliyon.2020.e04222>.
6. Al-Awadhi N, Al-Kandari N, Al-Hasan T, Almurjan D, Ali S & Al-Taiar A (2013). Age at menarche and its relationship to body mass index among adolescent girls in Kuwait. *BMC Public Health*; 13: 29 <https://doi.org/10.1186/1471-2458-13-29>.
7. Yoo JH (2016). Effects of early menarche on physical and psychosocial health problems in adolescent girls and adult women. *Korean Journal of Pediatrics*; 59(9):355–361. <https://doi.org/10.3345/kjp.2016.59.9.355>.
8. Mueller NT, Odegaard, AO, Gross MD, Koh WP, Yuan JM & Pereira, MA (2012). Age at menarche and cardiovascular disease mortality in Singaporean Chinese women: the Singapore Chinese Health Study. *Annals of Epidemiology*; 22(10): 717-22.
9. Khalis M, Charbotel B, Chajès V, Rinaldi S, Moskal A, Biessy C, Dossus L, Huybrechts I, Fort E, Mellas N, Elfakir S, Charaka H, Nejari C, Romieu I & El Rhazi K (2018). Menstrual and reproductive factors and risk of breast cancer: A case-control study in the Fez region, Morocco. *PLoS one*; 13(1): e0191333. <https://doi.org/10.1371/journal.pone.0191333>.
10. Gong TT, Wang YL & Ma XX (2015). Age at menarche and endometrial cancer risk: a dose-response meta-analysis of prospective studies. *Scientific Reports*; 5:1405. <http://dx.doi.org/10.1038/srep14051>.
11. Helm P, Münster K & Schmidt L (1995). Recalled menarche in relation to infertility and adult weight and height. *Acta Obstetrica et Gynecologica Scandinavica*; 74(9): 718-722.
12. Petridou E, Syrigou E, Toupadaki N, Zavitsan X, Willet W & Trichopoulos D (1996). Determinants of age at menarche as early life predictors of breast cancer risk. *International Journal of Cancer*; 68: 193–198.

13. Delhi City Population. Literacy and Hindu Muslim Population. (n.d.). 2023 [Cited 2023 July 4] Available from :<https://www.census2011.co.in/census/city/49-delhi.html>
14. Ramraj B, Subramanian VM & Vijayalakshmi G (2021). Study on age of menarche between generations and the factors associated with it. *Clinical Epidemiology and Global Health*; 11: 100758. <https://doi.org/10.1016/j.cegh.2021.100758>.
15. Leone T & Brown LJ (2020). Timing and determinants of age at menarche in low-income and middle-income countries. *BMJ Global Health*; 5: e003689. <https://doi.org/10.1136/bmjgh-2020-003689>.
16. Duan R, Chen Y, Qiao T, Duan R, Chen M, Zhao L, Gong Y & Cheng G (2020). Modern dietary pattern is prospectively associated with earlier age at menarche: data from the CHNS 1997-2015. *Nutrition Journal*; 19(1): 95. <https://doi.org/10.1186/s12937-020-00622-z>.
17. Campisi SC, Humayun KN, Wasan Y, Soofi SB, Islam M, Hussain A, Shakeel, A, Vandermorris A, Söder O & Bhutta ZA (2020). The relationship between pubertal timing and under-nutrition in rural Pakistan. *Journal of Adolescence*; 88: 58-66.
18. Żegleń M, Marini E, Cabras S, Kryst Ł, Das R, Chakraborty A & Dasgupta P (2020). The relationship among the age at menarche, anthropometric characteristics, and socio-economic factors in Bengali girls from Kolkata, India. *American Journal of Human Biology*; 32(4): e23380. <https://doi.org/10.1002/ajhb.23380>.
19. Pathak PK, Tripathi N, & Subramanian SV (2014). Secular trends in menarcheal age in India-evidence from the Indian human development survey. *PloS one*; 9(11): e111027. <https://doi.org/10.1371/journal.pone.0111027>.
20. Gebremariam H, Gebremariam A, Tesfay G, Adem, OS, & Assefa H (2015). Mean Difference of Age at Menarche and Body Mass Index among Government and Private High-School Students of Mekelle City, Northern Ethiopia. *Journal of Nutrition and Food Science*; S3: 004.<http://dx.doi.org/10.4172/2155-9600.S3-004>.
21. Kumari P & Chahal D (2017). A-Study-Of-Children-Enrollment-In-Government-Elementary-School-In-Relation-To-Socio-Economic-Status. *International Journal of Scientific and Technological Research*; 9(2): 1-6.
22. Jansen EC, Herrán OF & Villamor E (2015). Trends and correlates of age at menarche in Colombia: Results from a nationally representative survey. *Economics & Human Biology*;19: 138–144.
23. Yang MZ, Xue HM, Pan J, Libuda, L, Muckelbauer R, Yang, M, Quan L & Cheng G (2018). High protein intake along with paternal part-time employment is associated with higher body fat mass among girls from South China. *European Journal of Nutrition*; 57(5):1845–1854. <https://doi.org/10.1007/s00394-017-1468-1>.
24. Koo MM, Rohan TE, Jain M, McLaughlin JR & Corey PN (2002). A cohort study of dietary fibre intake and menarche. *Public Health Nutrition*; 5(2): 353–360. <https://doi.org/10.1079/PHN2002261>.
25. Mervish NA, Teitelbaum SL, Pajak A, Windham GC, Pinney SM, Kushi LH, Biro FM & Wolff MS (2017). Peripubertal dietary flavonol and lignan intake and age at menarche in a longitudinal cohort of girls. *Paediatric Research*; 82(2):201–208. <https://doi.org/10.1038/pr.2017.34>.
26. Nguyen NTK, Fan HY, Tsai MC, Tung TH, Huynh QTV, Huang SY & Chen YC (2020). Nutrient intake through childhood and early menarche onset in girls: Systematic review and meta-analysis. *Nutrients*; 12(9): 2544. <https://doi.org/10.3390/nu12092544>.

27. Cheng G, Buyken AE, Shi L, Karaolis-Danckert N, Kroke A, Wudy SA, Degen GH & Remer T (2012). Beyond overweight: nutrition as an important lifestyle factor influencing timing of puberty. *Nutrition Reviews*; 70(3):133–152. <https://doi.org/10.1111/j.1753-4887.2011.00461.x>
28. Cuartero G B, Vergaz GA, Garcia FE, Canete AC, Martinez DE & Tolmo MD (2010). Assessment of the secular trend in puberty in boys and girls. *Anales de Pediatría.*; 73: 320-326.
29. ManeKS, Sharankumar H&BheemayyaB(2016). Age at menarche and factors associated among girls of a primary health centre area in Davangere, India. *National Journal of Community Medicine*; 7(5): 417-420.
30. Sidhu S (2002). Age at menarche among scheduled caste girls of Punjab. *Journal of Human Ecology*; 13: 327-328.
31. Wronka I (2010). Association between BMI and age at menarche in girls from different socio-economic groups. *Anthropologischer Anzeiger* ;68(1): 43-52.
32. Karim A, Qaisar R & Hussain MA (2021). Growth and socio-economic status, influence on the age at menarche in school-going girls. *Journal of Adolescence*; 86:40-53.
33. Aurino E, Schott W, Penny ME & Behrman JR (2017). Birth weight and prepubertal body size predict menarcheal age in India, Peru, and Vietnam. *Annals of New York Academy of Science*; 10.1111/nyas.13445. <https://doi.org/10.1111/nyas.13445>
34. Torres-Mejía G, Cupul-Uicab LA, Allen B, Galal O, Salazar-Martínez E & Lazcano-Ponce EC (2005). Comparative study of correlates of early age at menarche among Mexican and Egyptian adolescents. *American Journal of Human Biology*;17(5): 654-658.
35. Calthorpe L, Brage S & Ong KK (2019). Systematic review and meta-analysis of the association between childhood physical activity and age at menarche. *Acta Paediatrica*;108(6):1008-1015.
36. Chavarro JE, Peterson KE, Sobol AM, Wiecha JL, Gortmaker SL (2005). Effects of a school-based obesity-prevention intervention on menarche (United States). *Cancer Causes& Control*; 16(10): 1245–1252. <http://www.jstor.org/stable/20069583>
37. Ajita & Jiwanjot (2014). Overweight and physical activity as a measure of age at menarche in females. *American Journal of Sports Science and Medicine*; 2(1): 32-34. doi: 10.12691/ajssm-2-1-6.
38. van Eijk AM, Sivakami M, Thakkar MB, Bauman A, Laserson KF, Coates S & Phillips-Howard PA (2016). Menstrual hygiene management among adolescent girls in India: a systematic review and meta-analysis. *BMJ Open*; 6(3): e010290. doi: 10.1136/bmjopen-2015-010290.
39. Girl students to get free sanitary napkins. *Times of India*, 2011[Cited on June 22, 2023]. Retrieved from: <https://timesofindia.indiatimes.com/city/delhi/girl-students-to-get-free-sanitary-napkins/articleshow/10911948.cms>
40. Sanitary pads to be distributed in Delhi govt schools. *Indian Express*, 2023 [Cited on June 28,2023] Retrieved from: <https://indianexpress.com/article/cities/delhi/sanitary-pads-distributed-delhi-govt-schools-8426387/>.

Unravelling Barriers and Battle of Tuberculosis among Sahariya (PVTG) Tribes

*Praveen Kumar Patel, **R.P. Mitra and ***Meerambika Mahapatro

*Research Scholar, Department of Anthropology, University of Delhi; E-mail: ppatel@anthro.du.ac.in.

**Professor, Department of Anthropology, University of Delhi; E-mail: rmitra@anthro.du.ac.in.

Professor. National Institute of Health and Family Welfare, New Delhi; E-mail: meerambika@nihfw.org.

Abstract

Tuberculosis (TB) remains a global health burden, with India bearing a significant share of the disease. Sahariyas, a Particularly Vulnerable Tribal Group (PVTG), are disproportionately affected by TB due to various socioeconomic determinants. The present study aims to determine factors that influence prevention, diagnosis, and treatment among the Sahariyas (PVTG) Tribe. In addition, the paper will describe lived experiences and propose context-specific interventions to strengthen TB control efforts. The study involves the methods like – case study, interview schedule, survey and participant observation. Out of 510, almost 50% were adults and mostly males and 31.9% were adolescent and children. It has been found that there are three main risk factors socioeconomic, knowledge, attitude & practices and issues related to healthcare accessibility, availability and affordability responsible for the prevalence, detection and treatment of tuberculosis. Cultural practices, misconceptions, and a lack of knowledge hinder prevention and early diagnosis. Substance abuse, including smoking and alcohol consumption, further increase their susceptibility to TB. Inadequate testing instruments, under-resourced healthcare centers, and remoteness make it difficult for Sahariyas to access quality care. The study reveals a high prevalence of drug-resistant TB among Sahariyas, necessitating urgent attention. Comprehensive efforts are needed to tackle this endemic effectively.

Key words: Tuberculosis, Sahariya, Particularly Vulnerable Tribal group, Health

Introduction

Tuberculosis (TB) is one of the communicable diseases which remains a significant global health burden, particularly in communities with limited access to healthcare resources.¹ India holds the unfortunate distinction of being the country with the most significant burden of tuberculosis (TB) worldwide, representing 36 per cent of all the new TB cases globally and two-thirds of cases within the South-East Asia region^{2,3}. Also, two deaths are occurring in every three minutes from TB⁴. As per a report released by Health and family welfare, 'India TB Report 2023' 24.2 Lakh cases have been reported in India in 2022 which was 13 per cent higher than in 2021². There is a higher prevalence of tuberculosis (TB) among tribals in India^{5,6}. India is a home of almost 104 million tribes.

Out of these there are 75 Particularly Vulnerable Tribal Groups (PVTG)*¹, who are lacking behind in health sector. Additionally, Tribals are suffering from the triple burden (Communicable, Non-communicable and Reproductive) of the diseases. (MoHFW and MoTA, 2018)⁷. Sahariyas are one of the PVTG who are mostly inhabited in the central Indian region and they are relatively isolated and vulnerable in many facets of the life. Due to difficulties in data collection, there are hardly any relevant data and studies of tuberculosis available for tribals in India^{8,9}. Poverty, malnutrition, congestion, and poor living circumstances add to these tribes' susceptibility, making them more susceptible to illness and limiting their ability to seek timely diagnosis and treatment¹⁰. Moreover, cultural and traditional distinctiveness of them although rich and diverse but sometimes creates hindrance in control. Studies done by the health professionals shows the high incidence of the TB are due to deeply rooted beliefs, stigmas surrounding the disease, and a lack of understanding about its causes and transmission, delayed diagnosis, treatment non-compliance, and community reluctance to engage with healthcare interventions have been seen as factors responsible for prevalence of TB among Sahariyas. Barriers to diagnosis and treatment also include geographical challenges, economic difficulties, communication issues¹¹, non-adherence to treatment¹². Thus, TB control program do not cater to cultural requirement of the people.

The present study was done with Sahariyas a PVTG community of Madhya Pradesh, who have reported a very high prevalence of all forms of Tuberculosis. Pulmonary Tuberculosis (PTB) (Bacteriologically positive 1504, Smear positive 1106, and culture positive was 1084 per 1,00,000) and Multi-Drug Resistant TB (MDR-TB) among the Sahariyas. The MDR-TB was 1.95-fold among normal and 4.46-fold among smokers of Sahariyas than non-tribal. The prevalence was higher among the males (5497) than females (1376) out of 100,000 population^{8,9,13}. The report highlighted the link between the conditions we experience while growing, living, working, and aging, as well as the healthcare systems in place, and how they contribute to the uneven and unjust distribution of health outcomes among populations. These conditions point out towards the social, political, economic, cultural, environmental and structural factors¹⁴. Important factors shaping the epidemiology of tuberculosis (TB) include global socioeconomic disparities, extensive population movement, and rapid urbanization and population expansion. These circumstances lead to uneven distributions of crucial social determinants of TB, such as insufficient access to food and proper nutrition, inadequate housing and environmental conditions, transport issues and barriers related to finances, location, and culture that impede access to healthcare¹⁵. Sahariyas are primarily found in the states of Madhya Pradesh and Rajasthan in India, constitute 3 per cent of the total tribal population of Madhya Pradesh. The concentration of Sahariyas found in Shivpuri, Madhya Pradesh. Government has decided to eradicate the TB by the end of the year 2025 under the 'Revised National TB Control Program' (RNTCP). Despite the initiative of the government, Sahariyas being in the remote setting are unable to find adequate support and treatment. It is pertinent to understanding the lived experiences and challenges faced by the tribals. The present study aims to determine factors that influence prevention, diagnosis, and treatment among the Sahariyas (PVTG) Tribe. In

*1PVTG - -- Particularly Vulnerable Tribal Groups (PVTGs) defined by The Ministry of Tribal Affairs as "tribal communities with pre-agricultural technology, stagnant or declining population growth, an extremely low level of literacy, and a subsistence economy." Retrieved from <https://tribal.nic.in/downloads/NGO/Latter-Notice/14.pdf> on 8th June 2023.

addition, the paper will describe lived experiences and propose context-specific interventions to strengthen TB control efforts

Methodology

The study was approved by the Institutional Ethical Committee of Department of Anthropology, University of Delhi. Informed consent was taken from every participant before data collection and they were free to withdraw from study at any time. Community based cross-sectional study was conducted among the villages and urban fringe settlements (UFS)² of the Sahariya tribe in Shivpuri district of the Madhya Pradesh. The present study has been conducted among the Sahariya (PVTG) tribe of the Shivpuri district of the Madhya Pradesh. Data has been collected from the 11 villages and 6 Urban Fringe Settlements (UFSs) of two blocks namely Pohri and Shivpuri due to sizable population. Sahariyas constitute around 11.27 per cent of the total population of the district.¹⁶ The primary sources of income for the Sahariyas are labor-intensive work, selling the forest produces and agriculture. To sustain their livelihoods, they migrate in search of employment opportunities throughout the year. They are ranked as most educationally backward tribe in Madhya Pradesh.

The inclusion criteria for selecting the tribal population were those diagnosed and under treatment during October 2022 to March 2023. Also symptomatic, cured and some normal individuals have been involved for the detailed account. The district has reported 510 cases of TB during this time period of six months (October 2022 to March 2023). From these 50 (39 receiving treatment in field and 11 in district hospital, N=50) case studies have been taken. Further symptomatic undiagnosed (N=41), cured individuals (N=28) and normal individuals (N=68) were also taken into account. Thus, total of 187 individuals from different households have been purposively selected for detailed account. Beside this health officials and workers serving in the area have also been inquired which included Officials and Employees of district TB center (DTC), Block Medical Officer (BMO) Community Health Officers (CHOs) Auxiliary Nurse and Midwives (ANMs), Workers of Primary Health Centers (PHCs) and Community Health Centers (CHCs). The sample was collected purposively and the cardinal principle of the data saturation to the point where same answers were repeated was used for the study. All these risk factors were examined.

Data has been collected from the tribals and the healthcare providers. In-depth interview, focus group discussion and case study methods were used to illicit their narratives. House to house visit was conducted to get insight on the health services and experiences of the people. Medical history of the persons has been collected who have been affected with Tuberculosis ever. The fieldwork has been conducted from February 2023 to May 2023. Cases have been identified by visiting settlements and by inquiring the community health officer. Further District TB hospital, Community Health Center (CHC), Primary Health Center (PHCs) and Sub Centers (SCs) have also been visited to see the facilities for treatment and on-site experience of the Sahariyas.

² Urban Fringe Settlements (UFS) – These are places which were located in the outer vicinity of the Urban areas. They are counted under wards in the Municipality.

The analysis centered on creating coding categories to organize narrative information based on emerging themes. First of all, 510 cases have been divided in the age cohort of 10 years and the same have been analyzed in percentage wise distribution. Further gender wise and mode of treatment analyzed. Overall experiences and difficulties of the people have been presented in the form of risk factors of tuberculosis prevalence. Thematic analysis was conducted based on the data on categories like *socioeconomic factors, availability, accessibility and affordability, and knowledge attitude and practices*. Subcategories have been made to give narrative based ethnographical experience of the Sahariya tribe.

Findings

Table 1

Distribution of the number of cases based on various category among the Sahariyas of Shivpuri district. (N=510) * Cases have been taken from DTC, Shivpuri

Category	Subcategory	Number of cases (N) and %
Age group	1-10	18 (3.5)
	11-20	53 (10.4)
	21-30	151 (29.61)
	31-40	117 (22.95)
	41-50	93 (18.24)
	51-60	42 (8.24)
	60 & above	36 (7.06)
	Total	510
Gender	Male	393 (77.06%)
	Female	117(23%)
Treatment at facility	Government.	310 (60.78)
	Private Health Facilities (PVTHF)	200 (39.22)

Preliminary Analysis

There are 268 cases in the age span of 21 to 40 years which is almost 50% of the total cases then 135 cases have been reported in the age category of 41 to 60 years. There are 31.9 % cases found among the children and adolescent population and only 7.06% of the cases have been reported among the elderly population. Most of the affected are males (~77%) whereas only 23% are affected. In terms of healthcare, approximately 60% of people are getting treatment in public and rest are availing private amenities .

Risk Factors

Socio-economic Determinants

Poverty Associated with Burden-laden Work and Migration: Most of the Sahariyas are dependent upon labor-related work for their sustenance. They used to get 3-4 months of labor in rate of 250-300 Rs/day in year which was making their annual income to approximately 35000 to 40000 rupees which was too low in this surging dearness. It was impacting their good diet. They are living in extreme poverty and they won't be able to survive if they will not work. In many active cases of tuberculosis many were still migrating for work when I said that you should take rest then one patient in Kakra village said *agar kam nahi karange ta khange ka*, (No work, No food). Ecological hurdles, scarcity of water, stony land (Inappropriate for agriculture) was main reasons. This migration was a reason which hinder the medical supply and treatment. They say diseases like TB associated with high physical demanding labor grasps the population. Due to their yearlong involvement in work, they were unable to utilize the healthcare facilities appropriately. People of the villages like Majhera and Mahlauni are working in stone mines and other than these large-scale construction activities in the area involving locals infects their lungs. In fact, Majhera village is symbolized as 'village of TB' by people.

Malnutrition: Malnutrition increases the susceptibility to disease¹⁷. Malnutrition is one of the prominent factors reported among the Sahariyas tribes. They have been struggling to get two times meal. 72 per cent people were found to be underweight¹⁸. Also 42.4% chronic energy deficiency and 90 per cent households were found with low food security among Sahariyas¹⁹. Skinny body was observed among the all-age persons. As per the respondent *khave ko mil jat hai ta kha let hai* which deciphers that if we get food so we eat. In the place *Chandpata ka pathar* I found few persons picking dumped rotten onion for their vegetable needs. They use to make piles of the chapati and use to consume it whole day with salt which depicts the uncertainty of availability of food. They are dependent upon forest-based products for food along with Public Distribution System (PDS). PDS was either not functioning properly or they used to get lesser quantity of food which was insufficient for one family. Other reason behind malnutrition was land alienation, they are barred from the practicing agriculture in their own land because the outsiders like Sardars, Gurjars and Muslims had domination in their lands. Being indulged in labor related work they required extra energy which they were not getting.

Inadequate Housing Condition: Most of them have been found to be struggling with the land related issues. They are living in a small thatched house made of grass and mud which are called *tapaiya*. Some have also put heavy stone slab on roof and that was called *pator*. Congestion and overcrowding issues come due to expansion of their families and no physical distancing was followed. It was havoc kind of situation during the rainy season when their places fill from water and they didn't have secure place. Other than that, in the UFSs there were continuous water logging and dumped garbage in the nearby areas where some people of Sahariyas and their children use to pick useful material.

Lack of Education: Sahariyas have a low literacy rate, with less than 60 per cent having studied beyond some grades, which is below the national average of 78 per cent.²⁰ This lack of education leads to inadequate access to information, resulting in improper healthcare. For instance, a woman from Katmai lost her husband to TB because they couldn't provide the blood doctors requested, lacking the means to do so. Most Sahariyas are unaware of the causes, prevention, and treatment

options for various illnesses, making it challenging for them to access medical services. Patients report that doctors issue referrals without clear guidance, causing confusion due to their low literacy levels. Consequently, this fear of navigating public health facilities hampers their ability to seek proper healthcare.

Knowledge, Attitude and Practice (KAP) towards the Tuberculosis

Lack of Awareness: Most are unfamiliar with TB symptoms, transmission, and treatment options. They often hesitate to take medicine, sometimes taking it in front of health workers but later stopping due to fear and side effects. Family and villagers don't keep a distance from patients because they don't know TB spreads through contact. As per them it not new for us we are used to it. Many are unaware of the infection's name, bacterial origin, and its link to HIV. Lack of awareness leads to exploitation by middlemen for government support. They lack information about TB eradication programs and TB unit locations and procedures.

Cultural Practices: In the Kota village one participant was saying about tuberculosis that *je sab Bahari chakkar se ho jaat hai, je jhad foonk se hi sahi hai jayego, dawai den me hamayi mata naraj hai jayengi*, which translates that TB prevails with some outer factors and it will only be cured by exorcism, in case medicine taken our deity will get angry. It shows their faith in traditional care. It also leads to discrimination and social exclusion for those who do not follow. In most of cases it has been found that TB patients live freely and also participate in labor related work along with other members.

Lack of Prevention: Lack of awareness and the struggle for survival made it challenging for them to follow preventive measures. Patients lived closely together, and TB was common, with many seemingly unconcerned about their condition. Health workers were frustrated as preventive measures were often ignored. The focus on securing basic needs, like food and livelihood, took precedence. Lack of awareness led to cases like a lady with TB still feeding her children milk, highlighting the prevalence of such situations.

Smoking and Alcohol: A study found a 4.46-fold higher risk of MDR-TB among Sahariya tribe smokers compared to non-tribe members¹². This, along with their lax adherence to TB dietary guidelines, heavy alcohol consumption, and prevalent tobacco and *ghutka (smokeless tobacco)* use, contributed to TB prevalence. Substance abuse had become an identity symbol for them, with alcohol purchases using government support and wages adding to their financial burden. Banjaras in the area produced toxic alcohol with materials like leather and plastic. Some believed alcohol protected them from COVID-19. Individuals of all ages, like a 58-year-old TB patient, smoked 3-5 Bidis daily, citing habit as the reason. Excessive tobacco and alcohol use were major factors in TB prevalence.

Availability, Affordability and Accessibility issues of Health Care Facilities

Problem with Diagnosis: In remote areas, health workers such as CHO, TBHV, and ANM rarely visit for symptom detection and sample collection. Sometimes they collect samples but delay sending

them to the testing laboratory. For multi-drug resistant TB, the district TB center is the only option, which is far from rural areas and rarely accessed. This laxity and distance result in the destruction of negative samples. Only serious patients receive thorough checks at the DTC, as PHC and CHC lack diagnostic facilities for TB and co-morbidities like HIV and Malaria.

Lack of Testing Instruments: Tuberculosis diagnosis relies on methods like sputum, X-ray, smear microscopy, and culture. In most of the laboratory there was lack of testing instruments. No X-ray and microscopy instruments in the CHC of Pohri, PHC of Chharch and Shivpuri were found with lack of these basic instruments. Culture lab was only in Bhopal as per the health officials of the district TB hospital. Other than it there was no sample storing instruments in the laboratory of CHC and PHC. Subcenters were also not properly equipped, the only facilities they had related to vaccination and immunization. Blood testing instruments were not functioning properly in some places. NTEP says that there should be NAAT (Nucleic acid amplification test) level testing till subdistrict and peripheral level but in CHC and PHC of the above have found to be absent.

Workload Issue among the Community Level Health Worker: The failure of the health care services is also rooted in the burden of work which is provided to the ground level workers. Under Pohri tehsil there are 238 villages and only 32 CHOs are there and in Satanwada (Shivpuri) block there are only 26 CHOs. As per community level workers, they are indulged in many governments related works like making adhar, ayushman card, birth certificate etc. by using technical software's about which many of them are not handy. In some places one CHO has been allotted 8-10 villages which are in difficult areas so they are not able to visit regularly and distance also leads to contaminating collected samples by the sample collectors.

Limited and Poor Access to Healthcare Facilities: In Pohri and Shivpuri blocks, there are only a few PHCs, and people are reluctant to travel 116 km to Gwalior for better treatment. The district hospital is the sole place for proper testing, but it's far from remote villages. A prevailing sentiment is that public health facilities offer little for the poor, leading many to opt for private clinics or unregulated quacks. Despite the aim of decentralization by NTEP and through Ayushman Bharat Health and Wellness Centers (AB-HWC), these centers often remain closed due to remoteness and lack of equipment, leading locals to express dissatisfaction with program implementation. Phrases like '*gareeban ko kachu naiyan bhaiya*' (Nothing is there for poors), *sarkarin me koi sunwai naiyan* (In public health centers there is no hearing for them) were proves. Patients like Raghuveer, a 60-year-old TB sufferer, struggle to afford proper care and are forced to travel to Gwalior, where high costs pose a significant barrier, highlighting both the unavailability and affordability issues in the area, compounded by poverty.

Remoteness: In Pohri block, there are two PHCs (Chharch and Bairad) situated at 34 Km and 21.3 Km distances from the Sahariya-occupied outskirts near the forests. Among the 40 subcenters in the area, some in remote regions like Ahera and Jeegni were found locked and neglected, seemingly unused for months. CHOs rarely visited these locations, leading to delayed services. Both PHCs lacked proper diagnostic instruments, which were centralized at the distant CHC in Pohri. The

expectation was for patients to travel, but distance and their busy schedules limited access. Moreover, public transport was scarce in remote areas, compounding the accessibility issue.

High Dosage of Medicines: In Katmai, a woman had tuberculosis for a year but lacked awareness of her condition, leading to her health deteriorating. After diagnosis, she began a six-month treatment course at the district TB center but stopped due to medication side effects, which caused white patches on her body and weakened her to a paralytic state. This incident has eroded their trust in medicines. Further inquiry revealed that the high-dose medicines (around 800-1000 Mg) adversely affect Sahariyas, who often suffer from malnutrition and hunger-related issues, making them skeptical of medication.

Distrust towards Health Official and Lack of Support by the Participants: Sahariyas often don't complete their TB treatment, taking medicine in front of doctors but discarding it later. Some are hesitant to provide samples, injections, or blood, particularly among females due to shyness. Healthcare officials criticize their lack of precautions, hindering recovery. Locals believe officials are infrequent and neglectful in behavior, sharing reports and follow-ups. Locals say '*Ve ta kuttan ki naiya bhagavein*' (they treat us like dogs). According to the National TB Prevalence Survey 2019-21 (NATBPS), 64 per cent of symptomatic individuals avoid seeking healthcare, exacerbating the situation. (TB survey, 2023)². This lack of interest in health services stems from perceived neglect by officials.

Affordability Issue: The Sahariyas, among the most marginalized tribes, struggle with inadequate income for proper healthcare. Timely availability of medicines in public hospitals, CHCs, and PHCs is often an issue, forcing them to buy expensive medicines externally or even forgo treatment. This erodes their trust in public healthcare. Some resort to borrowing money from local leaders for medical care but struggle to repay, leading to land mortgaging and falling into bonded labor. Participants in the field report that *sarkari dawai mil jat hai ta kha let hain haman pe paisa kahan dharo* (We use govt medicine it get otherwise we don't have money) highlighting their income constraints and the high cost of medication.

Case Study: Srinam adivasi was a 35-year man from Hatod village who was working in a Self-Help Group (SHG) and was the sole person in his family as an earner. He had a wife with two sons and one daughter. During covid period he was infected with covid like symptoms but as per him, he didn't detect with the covid. He was suffering from a problem related to breathing, he wasn't even consuming any substances. Later he has been detected with TB. I met him during my pilot study in January 2022 at that she was in bedrest and having oxygen supply for breathing. But this time when I went on April 2023 in his house, I came to know that he died 2 months ago. I went to his house and found it locked, further fellow villagers told me that they had borrowed money from one of the Sardars for treatment and since they were not able to return it that's why his elder son, wife, and daughter are working under him as bonded labor. Their land was sold for treatment by their relatives so they were left with only few bighas (local unit of measurement of land) which was taken by the sardars. That day I stayed in the same village and thought of meeting his wife and family, in the evening I met her wife who became very weak and upon asking she said she is also ill. I asked about her condition

then she said '*Jab se ve gaye, hamayi jindagi me kachu nahi reh gao, human ne har jagah dikhai aur zameen bhi bech dayi paisan ke lane par ant me vinne kachu fayda nahi milo. Hamayi mauda maudin ki jindagi barbad hai gayi, maudi ki padhai choot gayi aur halko mauda bakaiyyan ko jan lago.*' She was saying that after the death of her husband nothing has left in her life, we sold our land for money but no benefits came in health. Our children's life got spoiled, the daughter was in 11th but she couldn't continue her education due to lack of money. My younger son started rearing goats. This shows the impact of tuberculosis on tribal life.

Discussion

Rather than focusing only in health matrix development this study has tried to go in depth with ethnographic account and lived experience of each risk factor along with participatory approach. As per Indian Council of Medical Research (ICMR) study in the 17 states in India there was higher prevalence of TB among the elderly population (Ingle,2008)²¹ but this study showed that around 50% of cases among Sahariyas were adults. These adults frequently migrate for work, exposing themselves to adverse conditions. If we see from perspective of gender, Males are having more than triple infections compared to females. It could be because males are the one who keeps of migrating for work and they get exposed to unfavorable environment.

In all the three major themes there are 5-8 subthemes. In the socioeconomic determinants' factors like poverty, malnutrition, lack of education, and poor housing contribute to the spread of infection. due to lack of education, they are not able to navigate inside the hospitals and act as per reports. These circumstances force them to migrate and search livelihood for the survival. Meanwhile they compromise with their health. Migration also hinders their treatment and healthcare. Under KAP the emerging factors are lying with issues related to awareness & prevention, their local practices, support from people and majorly habits of smoking and drinking. Substance abuse is widespread issue among Sahariyas making them susceptible to TB. It weakens their bodies, ultimately hindering treatment. It has also become the part of their daily practice and addition of many rough substances in drink severely affects their body.

The availability of affordable testing and care is a significant challenge. Further limited access quality care forces them to opt local strategies which sometime worsen the situation. Sahariyas are unaware of cause of disease prevalence and treatment. Poor immunity and excessive medication are a problematic combination for them. Also, many cases remain unnoticed due to inadequate testing facilities and healthcare workers' leniency. Healthcare institutions typically respond only in severe cases also they are not tribal friendly. Further due to their appearance and language tribes are not treated properly by health officials. They shout upon them which creates a kind of fear among them related to public health institution. The phrases like '*sarkari me kou sunwai naiyan*' (there is no hearing in government hospital) proves their distrust towards the public health facilities.

Drug-resistant TB cases are rising among Sahariyas, which is a pressing public health concern. This aspect needs more attention and research. Vulnerable individuals often have coexisting conditions like HIV and diabetes, which are hard to detect through samples, leading to underreporting.

Ignorance of these comorbidities is harmful for Sahariyas. Government initiatives like – *Directly Observed Therapy Short Course (DOTS)*, *National Tuberculosis Elimination Program (NTEP)*, *Pradhan Mantri TB Mukh Bharat Abhiyan (PMTBMBA)*, "*poshan mah*" and "*nikshay yojna*", aimed at addressing malnutrition, substance abuse counseling, enhancing treatment facilities and support centers, as well as Antiretroviral therapy (ART) centers for HIV. But all these have fallen short in implementation properly. They are still dream for the people of remote areas.

Conclusion and Recommendations

Thus, suffering of the tribes like Sahariyas related to tuberculosis has remained unnoticed since a long period of time. Sahariyas have a shorter lifespan due to lack of care and improper health services. Due to above mentioned factors, they are still not getting over from this endemic. Other side government has planned to eradicate TB by 2025 which seems to be impossible when we look towards Sahariyas. Despite multi-sectoral efforts, TB remains a major communicable disease. Timely detection, quick treatment, risk identification, and prevention are crucial for TB control. A comprehensive plan is needed to effectively address these issues.

While treatment is prioritized, prevention through awareness and health literacy should be emphasized along with community level testing and contact tracing. There is need to have a check on dosage of medicines while strengthening the nutrition, livelihood, sanitation and water condition.

References

1. Lopez AD (Ed.) (2006). Global burden of disease and risk factors. The International Bank for Reconstruction and Development / The World Bank; New York: Oxford University Press; 2006. ISBN-10: 0-8213-6262-3.
2. Ministry of Health and Family Welfare (2022) WHO Global TB Report 2022. PIB Delhi. Retrieved from <https://pib.gov.in/PressReleasePage.aspx?PRID=1871626> on 11 July 2023.
3. Central TB Division, Ministry of Health and Family Welfare. (2023). Leading the way: India's TB report 2023. New Delhi. <https://tbcindia.gov.in/showfile.php?lid=3680>.
4. <https://www.who.int/india/health-topics/tuberculosis> accessed on 10th September 2023.
5. Indian Council of Medical Research (ICMR). (2020). Burden of Tuberculosis among the Tribal Population in India. Policy Brief. Retrieved from https://main.icmr.nic.in/sites/default/files/upload_documents/Edited_final_tribal_policy_brief_revised_after_referees_comments_17112020.pdf.
6. Thomas BE, Adinarayanan S, Manogaran C & Swaminathan S. (2015). Pulmonary tuberculosis among tribals in India: A systematic review & meta-analysis. *Indian J Med Res.*; 141:614–23.
7. Ministry of Health and Family Welfare (MoHFW), Govt. of India & Ministry of Tribal Affairs (MoTA), Govt. of India. Tribal Health in India: Bridging the Gap and Roadmap for the Future. In National Health Mission. Ministry of Health and Family Welfare, Government of India, New Delhi.

8. Bhat J, Yadav R, Sharma RK, Muniyandi M, Rao VG (2022) High incidence of pulmonary tuberculosis in an indigenous Saharia Tribe in Madhya Pradesh, central India- A prospective cohort study. *PLOS Glob Public Health* 2(6): e0000039. <https://doi.org/10.1371/journal.pgph.0000039>.
9. Rao, V. G., Bhat, J., Yadav, R., Muniyandi, M., Sharma, R., & Bhondeley, M. K. (2015). Pulmonary tuberculosis- A health problem amongst Saharia tribe in Madhya Pradesh. *The Indian Journal of Medical Research*, 141(5), 630–635. <https://doi.org/10.4103/0971-5916.159560>
10. Duarte R, Lönnroth K, Carvalho C, Lima F, Carvalho A, Muñoz-Torrico M & Centis R. (2018). Tuberculosis, social determinants and co-morbidities (including HIV). *Pulmonology*, 24(2), 115-119. <https://doi.org/10.1016/j.rppnen.2017.11.003>.
11. Chemtob, D., Weiser, S., Yitzhak, I., & Weiler-Ravell, D. (2000) Medical anthropology: An important adjunct to international TB control. In Reichman, L. B. & Hershfield, E. S. (eds) *Tuberculosis: A comprehensive international approach*. Marcel Dekker, New York, pp. 745–770.
12. Greene, J.A. (2004) An Ethnography of nonadherence: Culture, Poverty, and Tuberculosis in Urban Bolivia. *Culture, Medicine and Psychiatry* 28, 401-425.
13. Prakash, R., Kumar, D., Gupta, V. K., Jain, S., Chauhan, D. S., Tiwari, P. K., & Katoch, V. M. (2016). Status of multidrug resistant tuberculosis (MDR-TB) among the Sahariya tribe of North Central India. *Journal of Infection and Public Health*, 9(3), 289-297. <https://doi.org/10.1016/j.jiph.2015.10.008>
14. World Health Organization. (2011). Closing the gap: policy into practice on social determinants of health: discussion paper. Accessed on July 5th, 2023.
15. Hargreaves, J. R., Boccia, D., Evans, C. A., Adato, M., Petticrew, M., & H. Porter, J. D. (2011). The Social Determinants of Tuberculosis: From Evidence to Action. *American Journal of Public Health*, 101(4), 654-662. <https://doi.org/10.2105/AJPH.2010.199505>.
16. <https://shivpuri.nic.in/en/about-district/> accessed on 2nd August 2023.
17. Van Lettow, M. et al. (2004). "Malnutrition and the Severity of Lung Disease in Adults with Pulmonary Tuberculosis in Malawi." *International Journal of Tubercular Lung Disease*. Vol. 8(2), pp. 211–17.
18. Kodavanti, M. R., Rachakulla, H. K., & Venkaiah, K. (2005). Nutritional Status of Saharia-A Primitive Tribe of Rajasthan. In Article in *Journal of human ecology*. <https://www.researchgate.net/publication/265874027>.
19. Ghosh Jerath S, Singh A, Bhattacharya A, Ray S, Yunus S & Zodpey SP (2013). Dimensions of nutritional vulnerability: assessment of women and children in Sahariya tribal community of Madhya Pradesh in India. *Indian journal of public health*, 57(4), 260–267. <https://doi.org/10.4103/0019-557X.123268>
20. <https://www.wadanatodo.net/post/leave-no-sahariya-behind> accessed on 12th September 2023.
21. Ingle GK & Nath A (2008). Geriatric Health in India: Concerns and Solutions. *Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine*, 33(4), 214-218. <https://doi.org/10.4103/0970-0218.43225>.

Role of ASHA Workers to Facilitate Health Services: A Case Study

***Neha Pandey**

*Department of Geography, Indira Gandhi National Tribal University, Amarkantak; E-mail: pneha080496@gmail.com.

Abstract

Accredited Social Health Activists (ASHAs) are an important part of the National Rural Health Mission. Their main concern is about maternal and child health care, but at the grassroots level, they contribute to making all the health programs of every government reach the people. The main aim and objective of the present study is to investigate the role of ASHA workers in facilitating health services in the Gorakhpur district. This study is based on primary and secondary data. Primary data has been collected from different villages of four different blocks namely Chargawan, Khorabar, Belghat, and Urwa and secondary data has been collected from verified sites and sources. The data and information mentioned are from the Census of India 2011, by the National Health Mission under the National Health and Family Welfare Uttar Pradesh (ASHA Database). Various research papers, reports, and magazines have also been referred to for this study. This study shows that ASHA workers are doing a great job in the study area. However, in many places, they are lacking in numbers and face the extra burden of government policies and programs to make them applicable in every block and their respective villages. In the study, there is a minor increase in the number of ASHA workers appointed in 2011 and 2020 but still can arrange their work and contribute their part to the progress of the country to make India cope with any type of health challenge.

Key words: ASHA workers, Health and nutrition, Community Health Center, PHC, CHC.

Introduction

In India, the concept of medicines has been practiced for years in our Vedas, especially in Ayurveda and Unani. Health has always been the priority of Indian planning and hence the Bhore Committee was set up in 1943 by Sir Joseph Bhore and submitted its report on the remodelling of health services in India. After India's independence, the government started to act with the first five-year plan (1951-1956) in which there were plans for water supply and sanitation, health care for the rural population, maternal and child health services, health education and training, self-sufficient in drugs and equipment, and, family planning and population control¹. The Indian Government has initiated the National Health Mission in 2005 that was fully operationalized during the Eleventh five-year plan (April 2007) and has a sub-division of the National Rural Health Mission and National Urban Health

Mission. Within this program (NRHM), the initiative ASHA (Accredited Social Health Activist) was introduced. They are selected from the same village and cover a population of 1000 (The Annual Report to People on Health). NRHM decided to select them as the point of contact between the health centers and the community and so they are also known as community health workers.

The study area is the blocks of the Gorakhpur District. Gorakhpur has an extent of 26° 46' north latitude and 83° 22' east longitude. There are a total of 19 blocks in the district with 3,319 villages and 1,233 Gram Panchayats. The district has a population of 4,440,895 of which 3,604,766 are rural populations. According to the official site, Gorakhpur District has at least 1 CHC and 1 PHC, a dispensary, and a maternal center in each block. Each center consists of a medical officer, a health visitor, midwives, a compounder, and two other employees. The centers are administered by the Deputy Chief Medical Officer.

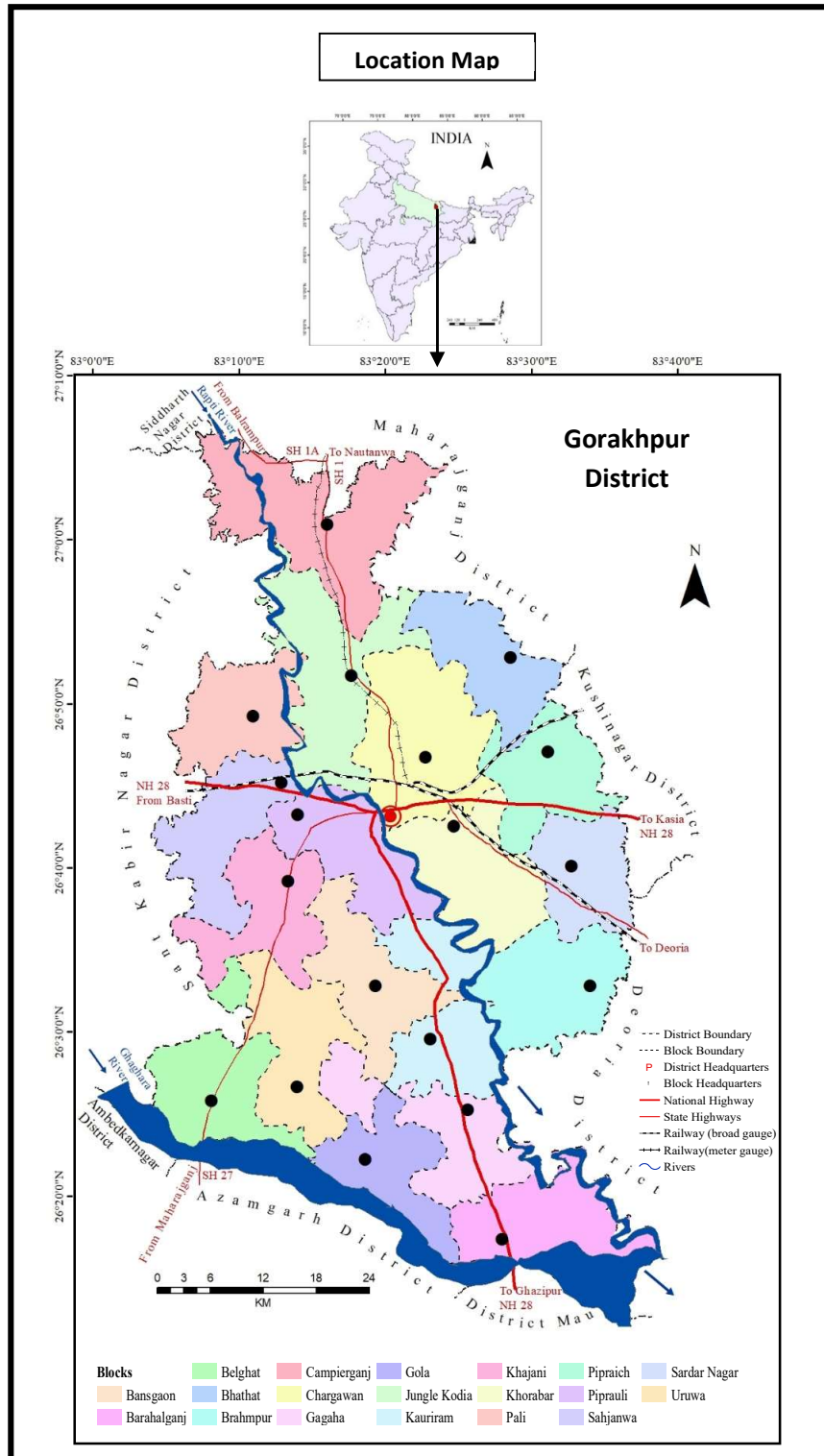
Methodology

A Random Purposive Sampling is used for collecting the data from four different blocks namely Chargawan, Khorabar, Belghat, and Uruwa of Gorakhpur district, Uttar Pradesh. The main aim of selecting the following blocks is to know the impact of the objectives in the areas near to the Gorakhpur City and far from the city. There is presently 2,403 ASHA in the district, earlier it was 2,336 which shows the addition of 67 ASHA in 2011 and 2020. The survey was done on 60 ASHA, and 60 women respondents from the blocks. The data are accumulated in qualitative and quantitative form from the villages including women getting antenatal care or post-natal care or the women having children below 5 years of age, and the ASHA appointed in those villages. The secondary sources are collected from verified sites and sources. Different research papers, reports, and magazines have also been referred for this study. SPSS 20 is used for analysing the data and map presentation is done using ArcGIS 10.8.2.

Table 1 depicts the Blockwise distribution of healthcare facilities and the number of ASHA working in the respective villages in the Gorakhpur district, Uttar Pradesh. There are a total 3,319 number of villages with the highest number of villages in the block of Uruwa (385) and the lowest in the Chargawan block (59). The number of the Healthcare facilities in Gorakhpur district namely CHC, PHC, and SC also vary in 2011 and 2020. The CHC in the year 2011 was 15 which is now 21 in number whereas the PHC was 44 in 2011 and in 2020 it has increased to 66 but more than all these SCs have shown a major increase from 09 SCs in 2011 to 594 in the year 2020.

In Gorakhpur district, the number of ASHAs was 2,336 in the year 2011 which has marked the increase of 67 more ASHAs, and in 2020 it accounts for 2,403 in numbers. Many ASHA in the year 2011 were in the blocks of Uruwa (246) followed by Gola (177). The blocks which have a smaller number of ASHA workers compared to other blocks are Chargawan (49) followed by Khorabar (65). The year 2020 has marked increase in overall appointments of ASHAs in the district and it varies as Campianganj (164) has large number of ASHAs followed by Brahmpur (153) and the lowest is in the block of Chargawan (87) followed by Belghat (103). India has launched steps to establish "(ASHAs) in every village."

Figure 1



Findings

Table 1

S.No.	Blocks	No. of Village	CHCs	PHCs	SCs	No. of ASHA workers	CHCs	PHCs	SCs	No. of ASHA workers
Year		2011	2011			2020				
1.	Campierganj	142	1	2	1	119	1	4	44	164
2.	Jungle Kaudia	186	1	4	2	117	1	5	37	134
3.	Pali	171	0	2	2	95	1	3	29	124
4.	Bhathat	97	1	0	1	78	1	3	31	118
5.	Chargawan	59	0	4	0	49	1	5	30	87
6.	Pipraich	86	0	2	0	81	2	2	30	141
7.	Sahjanwa	151	0	1	0	112	1	3	29	118
8.	Piprauli	154	0	2	0	100	1	3	29	105
9.	Khjani	244	2	4	0	158	2	3	31	131
10.	Bansgaon	212	1	3	0	141	1	4	30	108
11.	Sardar Nagar	78	1	2	0	69	1	3	29	126
12.	Brahmpur	121	1	2	0	100	1	3	31	153
13.	Kauriram	215	3	3	0	153	1	4	30	138
14.	Uruwa	385	0	3	1	246	1	4	32	140
15.	Belghat	258	1	2	1	175	1	3	31	103
16.	Gaugaha	240	0	3	0	168	1	3	30	136
17.	Gola	222	0	3	0	177	1	3	31	136
18.	Khorabar	92	1	1	1	65	1	5	30	131
19.	Barhalganj	206	2	1	0	133	1	3	30	110
	Total	3,319	15	44	9	2,336	21	66	594	2,403

Sources: Census of India 2011, Directorate of Medical and Health Services, Uttar Pradesh, ASHA database (National Health Mission) Uttar Pradesh, and Uttar Pradesh National Health Mission

Figure 2

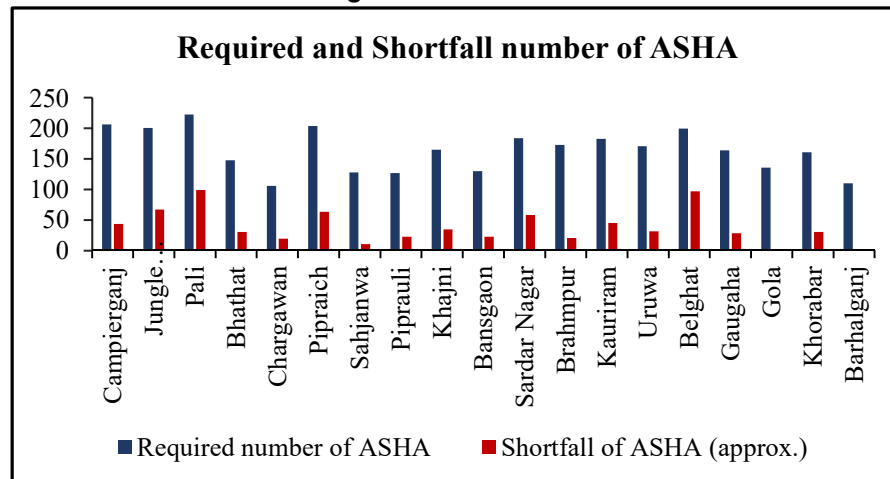


Table 2
Availability, Required, and Shortfall of ASHA in 2020

S.No.	Block	Population covered by ASHA 2020	Available No. of ASHA workers in 2020	Required number of ASHA	Shortfall of ASHA (approx.)
1.	Campierganj	2,07,918	164	207	43
2.	Jungle Kaudia	2,01,257	134	201	67
3.	Pali	2,23,606	124	223	99
4.	Bhathat	1,48,911	118	148	30
5.	Chargawan	1,06,332	87	106	19
6.	Pipraich	2,04,553	141	204	63
7.	Sahjanwa	1,28,168	118	128	10
8.	Piprauli	1,27,122	105	127	22
9.	Khjani	1,65,024	131	165	34
10.	Bansgaon	1,30,770	108	130	22
11.	Sardar Nagar	1,84,210	126	184	58
12.	Brahmpur	1,73,500	153	173	20
13.	Kauriram	1,83,965	138	183	45
14.	Uruwa	1,71,709	140	171	31
15.	Belghat	2,00,475	103	200	97
16.	Gaugaha	1,64,686	136	164	28
17.	Gola	1,36,665	136	136	0
18.	Khorabar	1,61,580	131	161	30
19.	Barhalganj	1,10,000	110	110	0
	Total	30,38,086	2,403	3,038	635

Source: ASHA database (National Health Mission), analysed by researcher

The ASHAs are the backbone of NRHM and are recommended for village selection and accountability. They must provide prevention, promotion, and health care services to the rural community. During the initial phase, much greater focus was placed on (ASHA) enrolment and training (Taksande et al., 2021). Table 2. shows that in the Gorakhpur District, 2,403 number of ASHAs covers the population of 30,38,086. There is total requirement of 3,038 in the district and hence the district runs into the shortfall of 635 ASHA in the year 2020. As per the data shows that these community health workers are overburdened by the number of populations, they must render their service. The highest shortfall is in the blocks of Pali (99), Belghat (97), and Jungle Kaudia (67). Gola and Barhalganj block have no lade on ASHAs as there is not any shortfall as per the population covered by them.

Table 3. describes the population served by ASHAs in 2020. The table depicts the load hinge on community health workers. Approximately 93.67% of ASHA employees cover populations ranging from 1000 to 2000, while 4.53% cover populations ranging from 2001 to 3000. About 0.04% ASHAs cover around 8001-9000 and 10,001-20,000 people, respectively. Around 933 ASHAs covers the population size of 1000 where in Barhalganj block the equal population size of 1000 is distributed

among them. The villages named Mohnag in Campierganj and Pipraich town covers the population of about 9000 and 12125 respectively by ASHA workers.

Table 3
Population Covered by ASHA

S.no.	Population covered by ASHA	Number of ASHA	Percentage
1.	1000-2000	2,251	93.67
2.	2001-3000	110	4.58
3.	3001-4000	34	1.42
4.	4001-5000	4	0.17
5.	5001-6000	2	0.08
6.	6001-7000	Nil	0.00
7.	7001-8000	Nil	0.00
8.	8001-9000	1	0.04
9.	9001-10,000	Nil	0.00
10.	10,001-20,000	1	0.04
Total		2,403	100.00
Source: ASHA database (National Health Mission), analysed by researcher			

Awareness about ASHA: Out of 60 respondents (23.3%) know about the duty allotted to the ASHA worker whereas (63.3%) partially know about what does ASHA do for them especially the responsibility during women's pregnancy and on the other hand (13.3%) are totally unaware about ASHAs duty toward them.

ASHAs visit: 43.3% women viewed that ASHA visits them more than twice in a month to render their duty. Another 26.7% supervised the village women over regular phone calls and visits mostly during their pregnancy and 13.3% and 10% respectively mentioned that ASHA visit them once and twice in a month although 6.7% says that ASHA never visited them in a while.

The response of ASHA when needed: Every respondent responded that ASHA visit to them whenever needed. Some of these community health workers also visit to the health center along with the people.

Does ASHA provide information/ assistance for nutrition, basic hygiene and sanitation, timely use of existing health services, and healthy living and working conditions: As per the response of women (60%), ASHAs do provide all the information/assistance related to nutrition, basic hygiene and sanitation, timely use of existing services, and healthy living and working conditions whereas 20% of women are not in favour of such work done by ASHA. Around 16.7% reported that they not provide all of this information and 3.3% says that they got the aforesaid assistance during corona only whereas some have the view that they provide this kind of information but are not explained in detail and on the other hand they are agreeing of the fact that ASHAs are performing this duty with honesty and dedication but people do not follow their instructions.

Table 4
Response of Beneficiaries

<i>Awareness about ASHA</i>	<i>Percentage</i>
Fully	23.3
Partially	63.3
Not At All	13.3
Total	100.0
<i>When do ASHA visit them</i>	
Once In a Month	10.0
Twice In a Month	13.3
More Than Twice in a Month	43.3
Never	6.7
Others	26.7
Total	100.0
<i>The Response of ASHA when needed</i>	
Immediate	100.0
<i>Does ASHA provide information/ assistance for Nutrition, Basic Hygiene and Sanitation, timely use of existing Health Services, and Healthy Living and Working Conditions</i>	
Yes	60.0
No	20.0
In Some Cases,	16.7
Others	3.3
Total	100.0
<i>Explanation given by ASHA workers</i>	
Understanding	83.3
Partially Understanding	16.7
Total	100.0
<i>Knowledge of ASHA</i>	
Excellent	56.7
Very Good	26.7
Good	16.7
Total	100.0
<i>Advise for Monthly Check-Ups of Mother and New-Borns</i>	
Yes	90.0
No	10.0
Total	100.0
<i>Which type of Service is provided the most by ASHA</i>	
Immunization	10.0
All The Above	56.7
Others	33.3
Total	100.0
<i>They conduct group meetings regarding the health problems</i>	
Once In a Month	16.7
Twice a Month	3.3
Never	73.3
Others	6.7

Total	100.0
<i>How responsive is ASHA during emergency</i>	
Immediate	100.0
<i>Do they ask for money on behalf of their duty</i>	
No	76.7
Sometimes	10.0
Others	13.3
Total	100.0
<i>Faith on ASHA</i>	
Totally	86.7
Not At All	13.3
Total	100.0
<i>Behaviour of ASHA</i>	
Polite	93.3
Neutral	6.7
Total	100.0
<i>Supply of Drug Kit</i>	
Surplus	20.0
Sufficient	46.7
Lack Sometimes	6.7
Others	26.7
Total	100.0
<i>Do they provide DOTS to the needy under the revised National Tuberculosis Control Programme</i>	
Yes	26.7
No	63.3
Sometimes	10.0
Total	100.0
<i>Do they Provide Primary Medical Care for Minor Ailments Such as Diarrhoea, Fevers, First Aid for Minor Injury, etc</i>	
Yes	53.3
No	13.3
Sometimes	16.7
Others	16.7
Total	100.0
<i>Are they capable of providing New-Born Care and Management of a range of common ailment particularly childhood illnesses</i>	
Yes	73.3
No	6.7
Sometimes	6.7
They Don't Know	3.3
Others	10.0
Total	100.0
<i>Do they promote the construction of household toilets under the total sanitation campaign</i>	
No	100.0

<i>Rate the changes that occur due to ASHA's awareness and respond among the population</i>	
7-9	76.7
4-6	23.3
Total	100.0
<i>Do they help to mobilise the community for Immunization, ANC, PNC, ICDS, Sanitation, other services</i>	
Yes	60.0
No	10.0
In Some Cases,	30.0
Total	100.0
<i>How would you rate the overall care you receive from ASHA</i>	
0-5	26.7
5-10	73.3
Total	100.0
Source: Based on Personal Survey, 2022	

Explanation given by ASHA: Majority (83.3%) of the respondents are satisfied with the explanation given by the ASHAs related to the schemes initiated by the government as they do get the same instructions on going to the health centers but 16.7 per cent responded that they do not understand everything explained by them and some respondents are saying that ASHAs do not explain in the sense of making things understand or have very little conversation with these community health workers.

Knowledge of ASHA: More than half (56.7%) of the respondents accept that they know what are the pros and cons of conditions related to mother or child care but 26.7 per cent and 16.7 per cent believe that their knowledge about their work is very good or just good respectively because somewhere they lack in what they should know.

Advice for monthly check-ups of mother and newborns: Mostly women (90%) affirms that ASHAs do gives the advice for the monthly checkups of mother and child, some of the ASHAs call and inform about vaccination and if they do not get any reply then they visit to the home of the respondents even some of these workers go along with them to the healthcare centers but 10 per cent of the respondent make a response of not getting any advice for the mother and child checkups.

Type of services provided the most by ASHA: 56.7 per cent women says that they get guidance related to counselling women, and families on birth, importance of safe delivery, breastfeeding and complementary feeding, immunization, contraceptive, and prevention of infections including Reproductive Tract Infections/ Sexually Transmitted Infections (RTIs/STIs). 33.3 per cent respondents are of the view that ASHA workers do not provide all the aforesaid information whereas 10 per cent are in favour of information provided for immunization only in which some of them visit to health centers with the women for vaccination. There is a fact that if respondents opt for government healthcare centers related to maternal and child health care then they look after their

ANC and PNC-related problems and check-ups but if respondents opt for private hospitals, then they do not perform the task regarding pregnancy, delivery or child-care.

Group meetings regarding the health problems: Majority (73.3%) of the women responded that there is no meeting held by ASHA in fact meetings are conducted by Anganwadi Workers in which they organize camps for women and advise them about hygiene, and other issues related to women through posters, photos, and videos. 16.7 per cent of women responded that ASHAs do conduct meetings once in a month but only 3.3 per cent answered that the meeting is always twice in a month.

Response of ASHA during Emergency: ASHA workers respond very immediately for any emergency. Many of the women mentioned that these workers pay a visit even at night in an emergency and some of them also go along with them to the health centers.

Do they ask for money for duty: There is considerable amount given to ASHAs for their work and these amounts differ according to their work that is either for vaccination, promotion of government schemes, or job related to maternal and child health and so nearly 76.7 per cent of the women says that they do not ask for money in behalf of their work but 10 per cent mentioned that they ask for money if they help during emergency or on the occasion of safe and healthy child's birth whereas some have the view that they never ask for money but they accept if someone offers them.

Faith on ASHA and their behaviour: 86.7 per cent ASHA have built their faith among the villagers but 13.3 per cent do not have faith on them and so they do not prefer them during any kind of medical need and 93.3 per cent of these community health workers are polite for their people but 6.7 per cent says that they are neutral in their behaviour and do not mingle with them that easily.

Supply of drug kit: According to 46.7 per cent out of the 60 respondents ASHAs have sufficient supply of drug kit especially related to the pregnancy and child health care all time but 26.7 per cent answered that they do have the medicines in sufficient amount at the time of corona and only 20 per cent says that they always have surplus medicine. 26.7 per cent expressed that ASHAs do not give the necessary medicines such as calcium, protein, vitamins to pregnant women and only 6.7 per cent said that they lack medicine sometimes.

DOTS to the needy (under the Revised National Tuberculosis Control Programme): Majority (63.3%) answered that ASHAs do not ever inform about DOTS and do not give any medicine. Respondents were not knowing that ASHAs do have the job of providing these medicines whereas 26.7 per cent are in favour of ASHA providing these facilities to the needy one. 10 per cent have a view of ASHA providing medicines to the patients in the village but are not seriously concerned about that or they put a very rare appearance to check if patient is taking its regular medicines after preferred by health care centers.

Provide primary medical care for minor ailments such as diarrhoea, fevers, first aid for minor injury, etc.: 53.3 per cent women responds as ASHA providing the primary medical care for minor ailments such as diarrhoea, fevers, first aid for minor injury, etc. and attend patients routinely until

they get better. 13.3 per cent states that they do their job purely regarding maternal and child health issues but 16.7 per cent answered that they do provide this primary medical care as absolute priority and sometimes they take care of patients only when informed. Some interviewee marked saying that they do not ask ASHA for such type of health issue until it is an emergency.

New-born care and management of a range of common ailments particularly childhood illnesses: 73.3 per cent of villagers are satisfied with the service provided by ASHA for newborn care and management of a range of common ailments, particularly childhood illnesses but approximately 4 (6.7%) of every 60 respondents have a point of view that the ASHA workers manage the aforesaid health issue sometimes only or not at all respectively. 10 per cent presented their thought saying that in such cases when villagers ask for help, they advise them to visit the health care center or go along with them (only up to block hospitals) and 3.3 per cent said that they do not know the correct treatment for new-born as one suggested for having medicine from the health center to the new-born after he gets fever after vaccination but their doctor denies saying that child should not be given any medicine within 24hours of vaccination.

Promoting the construction of household toilets under the total sanitation campaign: Regarding the promotion of the construction of household toilets under the total sanitation campaign, no respondent favoured ASHA doing and promoting such campaigns.

Help to mobilise the community for Immunization, ANC, PNC, ICDS, sanitation, other services: 60 per cent of the respondents agreed with the fact that the ASHA help them for immunization, Antenatal Care (ANC), Perinatal Care (PNC), Integrated Child Development Services (ICDS), sanitation, and related health problems and some of them even go and stay with them at the health centers especially with the pregnant women until the issue gets resolved whereas some expressed that if ASHAs are informed about the problem then they take immediate action for further treatments and they responds immediately even at night. Some of them also added that these community health workers also inform about female sterilization. 30 per cent say that they help with only some of the above-mentioned problems, 10% do not get such type of service by ASHAs. They just told to make birth certificate but do not visit to mother even after two months of delivery.

Changes that occur due to ASHA's awareness and response from the population: 76.7 per cent accepts that because of ASHAs, villagers are enjoying many health-related solutions and now they find someone among them who is ready to help them anytime. 73.3 per cent are satisfied with the overall care received from these community health workers.

ASHAs are well-accepted by the society and are an asset to India's health-care system. This programme began with RMNCH activities but has since expanded to include many health programmes such as disease prevention, detection, treatment, and follow-up for diseases such as malaria, tuberculosis, diarrhoea, malnutrition, water and sanitation awareness, common NCDs, FP, and recently added COVID-19 case detection and follow-up during the pandemic. ASHAs also devote time to administrative work and surveys, attending meetings at PHCs, Anganwadi centres, and Gramme Panchayat offices, and collecting medicines and other consumables². Previous

research has found weaknesses in the interaction between the government health system and the communities, resulting in uncertainty regarding their roles and duties. In general, insufficient knowledge and inconsistent funding will increase the likelihood of ASHAs being unwilling to actively participate in health programmes (Shet et al., 2018)

Table 5 shows the response of ASHAs when they visit to the population to serve their duty and how the population cooperate with them.

Work, their visits in village, and behaviour of villagers: All ASHA workers responded that they do not prefer only women and child rather they work for the whole village especially in case of giving information about pregnancy and measures that should be taken by all the family members for the safety and health of mother and child, and guide the public on prevention and cure of any disease along with giving information about the government's initiative for health. They always visit them twice in a month and these respondents also agrees that all villagers have a polite behaviour towards them.

Villagers prefer them if faced any health issue: 73.3 per cent ASHAs say that villagers always give first preference to them if they have any health-related problem but some 26.7 per cent of these workers say that they are contacted only in maternal or child-health cases.

Table 5
Response by ASHA

Do they work for whole village?	Percentage
Yes, always	100.0
How many visits in a month to the village?	
More than twice	100.0
Behaviour of people when ASHA visit them?	
Polite	100.0
Do the villagers prefer them if faced any health issue	
Yes	73.3
Sometimes	26.7
Total	100.0
Does the villagers follow the health instructions given by ASHA?	
Yes, always	86.7
Sometimes	13.3
Total	100.0
Do you know about health and nutrition?	
Yes	86.7
No	13.3
Total	100.0
When is monthly Village Health Nutrition Day organized?	
Once	60.0
Twice	13.3
Never	13.3
Others	13.3

Total	100.0
Is there any type of report submitted by them in the PHC?	
Yes	100.0
Do ASHA receive government convenience to visit PHC for meeting or emergency?	
Yes	40.0
Others	60.0
Total	100.0
Do the government expenditure sufficient for them?	
Yes	40.0
No	40.0
Others	20.0
Total	100.0
Source: Based on Personal Survey, 2022	

Do the villagers follow the health instructions given by ASHA? Out of total 60 ASHAs, 86.7 per cent responded that people follow their instructions on health but only when they are taking treatment from Sub-Center (SC), Primary Health Center (PHC) or Community Health Center (CHC) but there are 26.7 per cent of them who says that people either deny for following their instructions or accept but do not follow the measure advised by these community health workers?

Monthly Village Health Nutrition Day (VHND): Around 60 per cent ASHAs responded that monthly health and nutrition day is organized once in a month in which some workers mentioned that it is organized on 2nd Thursday every month or some days like this while approx. every 7(13.3%) out of 60 community health workers has answered that it is organized twice, never, or in some cases respectively. On this day VHND is also intended to serve as a bridge between the community and the health-care system. ASHAs, AWWs, and others will mobilize the people, particularly women and children, to gather to the nearest AWC on the designated day.

Type of report submitted by them in the PHC: All ASHA have the responsibility to submit the reports related to the villager's health and treatment given to them with special preference given to maternal and child-health care. They have to enter data manually which includes Village Health, Sanitation, and Nutrition Committee Register, home visit under newborn home care program (home visit form), Asha Boucher (NHM, Uttar Pradesh) for regular vaccination operations, family register, Filariasis Sequencing Program, National Leprosy Eradication Program, etc. All community health workers are performing their duty with absolute (100%) responsibility. For presenting their reports some ASHA mentioned that either BCPM or MOIC take meetings of ASHA and ask about their reports and findings.

ASHAs receive government convenience to visit PHC for meeting or emergency: Only 40 per cent ASHA agreed that they are provided with convenience for meeting or emergency whereas majority (60%) responded that they get convenience (ambulance for delivery 102, 108 for another emergency) only during any emergency. There is not even any TA/DA for them if they are paying by self for the convenience.

Is the Government expenditure sufficient for them? They are segregated equally (40%) on the opinion that the expenditure of government for them are satisfactory or not. Some has shared that they get Rs. 5000 for the delivery of 1st baby and Rs. 1400 for next delivery, Rs. 600 for one case, Rs. 200 to attend meeting. 20 per cent are not satisfied by saying that the expenditure of government is pleasing in some cases i.e., cases registered by ASHA, deliveries done by them but they have a complain of not getting payment on time. There is a form “Payment form of incentive amount to Asha” in which there is fixed reimbursement amount for ASHA for maternal health, child health, Mission Family Development District, Family Welfare, Immunization National Programme. They are paid based on ‘work done in a month,’ ‘total estimated amount in the month,’ ‘balance details in last month,’ total estimated amount (total estimated amount in the month + balance details in last month)

Discussion

As per the Sample Registration System Report 2020 (Uttar Pradesh) the Crude Birth Rate was 25.1 while in rural areas it was 26.1. The total Sex ratio (females per 1000 males) of the state was 905 (Rural: 890), General Fertility Rate (87.3), Rural (92.4), Total Fertility Rate (2.7), Rural (2.9) and, Infant Mortality Rate (38), Rural (40). These data show the need and scope for improvement in the healthcare facilities. This study is on the role of ASHA workers who are 24*7 volunteers working in their respective regions. It shows that despite many critical conditions as the recent example of COVID-19, they are continuously working and cooperating with the India Government to have a better and healthier future. On 22 May 2022, the ASHA workers were awarded “The Global Health Leaders” at the 75th World Health Assembly by the World Health Organization. ASHAs have received widespread recognition for their significant contributions to increasing community access to care in categories ranging from reproductive, maternal, newborn, child, and adolescent health (RMNCHA) to communicable diseases and, more recently, non-communicable diseases. ASHAs are also an important component of community platforms such as Village Health and Sanitation Committees (VHSNC), Mahila Arogya Samiti (MAS), and Community-Based Planning and Monitoring (CBP&M) under the National Health Mission. ASHAs have played a critical part in the country's response to COVID-19 prevention and management. ASHAs continued to assist community people in accessing basic health services in addition to conducting COVID-19-related responsibilities³.

Conclusion

The major role of ASHA workers is to strengthen the Primary Health Services and so they are active in all fields of health. Presently they got the major issue is deal with the virus of COVID-19 and along with them, to vaccinate the mother and child who were left behind due to the pandemic. They were also paying attention to the diseases which spread with change in season i.e., malaria, drinking water, sanitation, etc. At present, the ASHA workers are working in programmes related to Intensified Mission Indradhanush 4.0, Sub-center level *Jan Arogya Smiti*, High-Risk Newborns, Family Planning Services, Childhood Anemia, COVID vaccination, Importance of Nutrition in Safe Motherhood, *Ghar-Ghar par Dastak*, etc. The lack of numbers does not hinder their mode of work and they are working

with full efficiency to justify their role but the authority should pay attention towards work load on them and incentives paid to them.

References

1. Duggal R (1991). Bhore and relevance today. *Indian Journal of Pediatrics*, 58(4), 395–406.
2. Manjunath U, Sarala R, Rajendra D, Deepashree M R, Chokshi M, Mokashi T & N M S. (2022). Assessment of Workload of ASHAs: A Multi-Stakeholder Perspective Study for Task-sharing and Task-shifting. *Journal of Health Management*, 24(1), 62–73. <https://doi.org/10.1177/09720634221079084>.
3. MoHFW (2021). *Annual ASHA Update 2020-21* (pp. 12–13). <https://nhsrcindia.org/sites/default/files/202207/Annual%20ASHA%20Update%202020-21.pdf>.
4. Shet S, Sumit K & Phadnis S (2018). A study on assessment of ASHA's work profile in the context of Udupi Taluk, Karnataka, India. *Clinical Epidemiology and Global Health*, 6(3): 143–147. <https://doi.org/10.1016/j.cegh.2017.08.004>.
5. Taksande V D, Ashtankar P A, Bansod C R, Bawane A V, Burchunde P S, Dudhe D V & Gawande M D (2021). To Assess the Job-Related Difficulties and Dissatisfaction of Asha Workers in Selected Rural Area. *Journal of Evolution of Medical and Dental Sciences*, 10 (2): 98–101. <https://doi.org/10.14260/jemds/2021/20>.
6. WHO (2018). Declaration of Astana. *Declaration of Astana, Global Conference on Primary Healthcare*, 1–12. <https://www.who.int/docs/default-source/primary-health/declaration/gcphc-declaration.pdf>.

Spatial Analysis of Health Services: The Case of Himachal Pradesh

*Suman Dadhwal and **Vivek Nagpal

*Former Guest Faculty, Geography Department, Panjab University Chandigarh.

**Senior Consultant Project Management Unit (PMU) SCERT, GNCTD Varun Marg Delhi.

Abstract

Health is prerequisite for development of any society. The individual behavior, biological, social factors and provision of health services are determinants of health. So, to provide good health every state and nation has always been progressive to deliver good health infrastructure with the help of various health policies and programmes in the rural and urban areas. Rural Health Services have been found to be having comparatively low health status as compared to urban areas. The present paper throws light on the growth of Rural Health Services and studies their availability and accessibility in the state of Himachal Pradesh. The data has been analysed in simple percentages and tabulation and figures presented. Additionally, maps have been drawn using Arc GIS-10.3.

Key words: Health Services, Growth, Availability, Accessibility and Rural Areas.

Introduction:

The public health system in India has evolved over time as a large chain of population based health sub-centres (HSC), primary health centres (PHC), community health centres (CHC), district hospitals (DH) and the medical college hospitals. The setting of such chains of health centres with the necessary budget provisions from the Union Government began in independent India with the implementation of the recommendations of the Health Survey and Development Committee set up under the chairmanship of Sir Joseph Bhore popularly called as the Bhore Committee which surveyed the health conditions in the population of the country in 1943 and submitted its report in 1946. The health sub-centers and primary health centres in the rural areas and urban areas which were initially set up at the rate one for 5000 population and one for 20,000 population respectively were intended to provide basic health care services to the population focusing on preventive services and treatment of minor ailments. The population served by these centres was reduced over time on the recommendations of a number of subsequent government committees such as the Mudaliar committee (1961), Srivastava committee (1970), Kartar singh committee (1973) and the National Health Policies of the Government of India formulated in 1983 and 2002¹.

Later, in 2005, government health policy known as National Rural Health Mission focused on provision of effective healthcare to rural population. These several recommendations of committees and government policies played an important role in improving health care in the country.

Rural health services in the state are predominantly focused on primary health which provides health status for all. Primary health includes sub health centres, primary health centres and community health centres. The three tier system of rural health services work in chain system. In this health centres chain, sub health centre is operationalized at the bottom, primary health centre at the middle and community health centres at the top. As per their hierarchy the services offered by these health centres are also at the varied levels.

The state of Himachal Pradesh is hilly and mountainous state, having difficult terrain and topography. Himachal Pradesh is the only state in the country whose 89.97 per cent of the population lives in rural areas, while only 10 per cent constitute the urban population². Despite having varied topography, the state has marked consistent progress in all the socioeconomic domains ever since it came into being in 1948. The state government's numerous initiatives to build infrastructure, implementing different schemes, programs, and policies have ensured that health services available, accessible and affordable to people. In this regard the state of Himachal Pradesh over the years has created adequate infrastructural facilities for the provision of health care to its people. Therefore, improvement in national standard of health has been recorded higher priority in social welfare programmes.

The number of health facilities has increased from 1705 in 1984 to 2699 in 2011. Similarly, the number of beds has also increased from 4047 in 1984 to 9644 in 2011³. This substantial improvement has led to a significant fall in the crude death rate from 10.3 per thousand populations in 1984 to 6.8 per thousand population in 2016. The Infant mortality has also declined from 90 to 25 per thousand live births⁴. There has also been a significant decline in the incidence of the number of epidemics. As a result of these initiatives, the state ranked 5th position in health index⁵.

However, in spite of all this progress, the health status indicators are not uniform all over the state. For example, infant mortality rate in rural areas is 25 per thousand live births to 19 per thousand live births in the urban areas. This may be attributed to a host of factors as availability, accessibility, affordability and the quality of services in addition to various socioeconomic factors and personal health beliefs⁶. With this, most of the hospitals, which serve as one of the prime healthcare services in India, are located in urban areas; hence it is inconvenient for the rural people to have access to these services. The differences in urban-rural health indicators are a harsh reality.

Himachal Pradesh has been included among 18 states of the country for the implementation of National Rural Health Mission (NRHM) to providing accessible and affordable health care to all citizens living in rural areas particularly to the poorer and weaker sections⁷.

The rural areas are required to improve the health status of people. For this the adequate health infrastructure is necessary. The state has, no doubt, established a network of health institutions in far flung areas. The locational gaps in health indicators however are yet to be bridged. These locational gaps are not only due to the peculiar topography and hostile climate of the state but also due to the lack of proper and efficient service provision in the state. The roadmap for health development in the state makes it clear that the objective of the public health services is to provide

better status of health to all people leading towards improvement in the quality of their lives with main emphasis on access and equity. The rural areas of Himachal Pradesh still lack in terms of health status of people. So, this paper has focused on to know the status of health services in terms of growth, availability and accessibility in the rural areas of state.

Objectives

The primary objectives of the study are to

- study the growth of rural health services in Himachal Pradesh; and
- analyze the availability and accessibility of rural health services in Himachal Pradesh.

Methodology

The Directory of Directorate of Health Services, Himachal Pradesh; various reports and documents released by the Health Department of Himachal Pradesh and other Government agencies; gazetteers and Census of India have been taken as the main sources of data to examine the rural health services in the state. The spatial patterns of distribution of rural health services have been examined in terms of availability and accessibility of health services at state level. Availability of health services in proportion with population was calculated in terms of number of health institutions. Accessibility for health services are calculated taking into account distances from the villages for all type of health services within block boundary. The simple percentages have been calculated and suitable tables and figures have been drawn to represent the collected data and information. Geo-referenced maps, showing spatial variations in the accessibility of distribution of health services in the form of health care institutions have been drawn to represent accessibility of rural health services in Himachal Pradesh. Arc GIS-10.3 version has been used to prepare maps.

Findings

Growth of rural health services: Health is a state subject. So, the state has main responsibility for providing health services to all people living in the state with the assistance of state health administration. The state administration provides organization, integration and development of health care services/delivery system across levels, health policy and planning, national programmes, public health, human resources; indigenous system of medicine, drugs and pharmaceuticals. With that, several committees and commissions have been appointed by the government to examine issues and challenges facing the health sector. Table 1 presents the major developments in the rural health services as per the recommendations of health committees.

Table 1
Himachal Pradesh: Growth of Rural Health Services, 1981-2017 (6th Plan-12th Plan)

Type of Health Institutions	Sixth Plan (1981-85)	Seventh Plan (1985-90)	Eighth Plan (1992-97)	Ninth Plan (1997-2002)	Tenth Plan (2002-07)	Eleventh Plan (2007-12)	Twelfth Plan (2012-17)
Sub-Health Centre	1299	1851	1980	2069	2071	2065	2065
Primary Health Centre	106	190	260	302	443	472	500
Community Health Centre	28	35	42	65	71	76	78
Total	1433	2076	2282	2436	2585	2613	2643

Source: Directorate of Health Services. Directories of medical and public health institutions. 1985, 1990 1997, 2002, 2007, 2012, 2017. Department of Health and Family Welfare, Himachal Pradesh, Shimla⁸.

Bhore committee for rural areas suggest that one primary health centre as the basic structure for rural health services should cover a population of 40,000. Additionally, in each primary health centre two doctors; one nurse, four public health nurses, four midwives, four trained dais, two sanitary inspectors, two health assistants, one pharmacist and fifteen other class-IV employees should be there⁹. In the First Two Five Year Plans (1951-56 and 1956-61), for development of basic health infrastructure and skilled personnel, emphasis was laid on the recommendations of Bhore Committee report. In Himachal Pradesh, during these plans, ministerial staff was proposed, new allopathic and ayurvedic dispensaries were opened, provision of beds was made and conversion of three dispensaries to primary health centres was done^{10,11}. During the Third Five Year Plan with the upgradation of health centres, emphasis was also laid on health programmes. In the Fourth Five Year Plan (1969-74) to provide curative and preventive health services in rural areas through the establishment of a primary health centre in each community development block. During this plan, the efforts were made to strengthen health services in rural areas by providing an effective base of primary health centres¹². The Kartar Singh Committee (1973) recommended the conversion of uni-purpose workers, including Auxiliary Nursing Midwives into multi-purpose male and female workers. It recommended that each pair of such worker should serve a population of 10,000 to 12,000¹³.

In 1983 (National Health Policy) rural health care received special attention and a massive program of expansion of primary health care facilities was undertaken in the 6th and 7th five year plans to achieve the target of one primary health centre per 30,000 population and one sub-centre per 5000 population. The National Health Policy (1983) has provided special attention and expansion of primary health care facilities¹⁴. The Sixth Five Year Plan (1980-84) was influenced by two policy documents: the Alma-Ata declaration and the ICMR/ICSSR report on 'Health for All by 2000'. The plan emphasized the development of a community based health system. The main provision of health services to the rural areas was to be on a priority basis¹⁵. The Seventh Five Year Plan (1985-90) re-highlighted the rural health services. This plan attained their objectives with the goal of "Health for All" by 2000 A.D. as mentioned in National Health Policy (NHP) 1983. This plan emphasized on strengthening the rural health services through the alliance of the health infrastructure, the

strengthening of the three-tier system like health sub centers, primary health centers and community health centers¹⁶. The Eighth Five Year Plan (1992-97) keeping in view the Minimum Needs Programme and under the target of “Health for All” by 2000 A.D., established 52 new primary health centres and 8 community health centres¹⁷.

The Ninth Five Year Plan (1997-2002) emphasized on provision of basic minimum services like construction of health sub-centres/primary health centres, community health centres with staff quarters and also strengthening of other health programmes¹⁸. In 2005 national rural health mission focused on increasing utilization of health services in rural areas in selected states of country on the basis of poor health status indicators, in which Himachal Pradesh was also included. The 11th Five Year Plan (2007-2012) also proposed opening of new health sub-centres and the primary health centres and made provision of residential accommodation at primary health centre level, provision for the appointment and training of dais in the tribal and difficult areas¹⁹. The 12th Five Year Plan (2012-17) focused on providing health institutions that were reachable in all areas and this provision increased accessibility to health services for women and older people²⁰. Table 1 shows that in each five-year plan, the health services in terms of primary health centres, community health centres and health sub-centres has increased. The increase in health services was more rapid after the introduction of National Health Policy (1983).

Availability of Rural Health Services:

The health sub-centre (HSC) is the most peripheral health institution available to the rural population in Himachal Pradesh. It is the first contact between community and health care at the village level. According to norms, the state health sub-centres are supposed to serve 3000 population per health sub-centre in hilly areas and 5000 population per health sub-centre in plain areas. But from table 2 revealed that the state has served a higher number of persons per sub-health centre than the prescribed government limit of 3000 persons per health sub-centre in hilly areas.

Table 2
Himachal Pradesh: Availability of Rural Health Care Services, 2016

Sr. No.	Type of Health Institution	Number	Population Served Per Health Institution
1.	Sub- Health Centre	2083	3296
2.	Primary Health Centre	516	13303
3.	Community Health Centre	81	84748
	Total	2680	2561

Source: Directorate of Health Services, Department of Health and Family Welfare, Shimla, 2016²¹.

Census of India, Series-A, General Population Tables, Himachal Pradesh, 2011²².

*Total Population Served is 6864602

After the sub- health centres, the next higher level health institution at village level is primary health centre. Primary health centres are supposed to provide supervision of 6 health sub-centres. According to norms of Government of India, one primary health centre has to cover 20,000 persons in hilly areas and 30,000 persons in plain areas. Table 2 shows that in Himachal Pradesh one primary

health centre served 13,303 persons. Many rural dispensaries health /sub-centres have been upgraded to create primary health centres in Himachal Pradesh. Primary health centres provide all preventive, promotive and curative services. Next in hierarchy, after the primary health centre comes the community health centre. One community health centre is supposed to serve a population of 80,000 persons in hilly areas and 1,20,000 persons in plain areas. In Himachal Pradesh presently one community health centre serves a population of 84748 persons and one community health centre serves as a referral centre for four primary health centres.

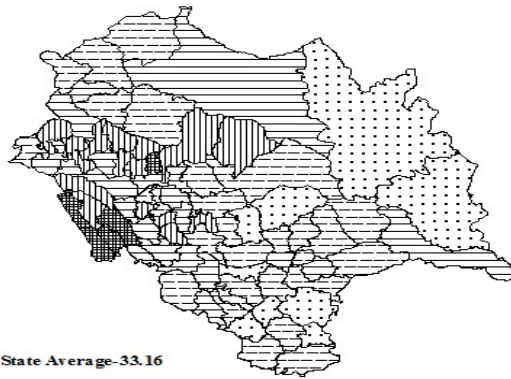
Accessibility of rural health services: The provision of accessibility to health services can ensure better health condition of the inhabitants. In Himachal Pradesh, the villagers have faced inaccessibility in terms of distance to access any health services. The significant proportion of villages does not have access to basic health care. Fig.1 shows that only 33 percent villages have health services within less than 5 km. 37.4 percent villages have health services within 5-10 km and 29.2 percent villages have health services more than 10 km. Disparity exists in the distances covered by villages.

The Shillai block has only 6 villages with health services of less than 5 km while Bangana block has 78 villages with health services of less than 5 km. The state has variations to access health centres (Sub-Health Centres, Community Health Centres and Primary Health Centres) in terms of distance. The significant proportion of number of villages does not have access to health services.

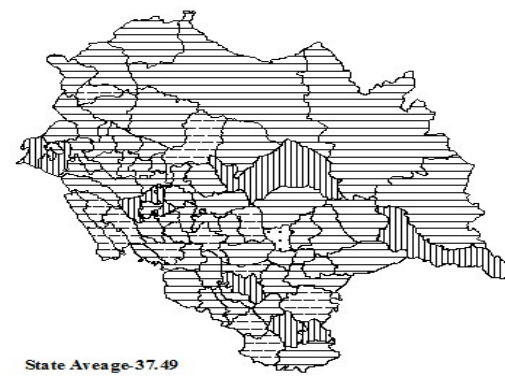
**HIMACHAL PRADESH
VILLAGES COVERED BY DISTANCE WISE
FROM HEALTH INSTITUTIONS
2011
(Data by Blocks)**



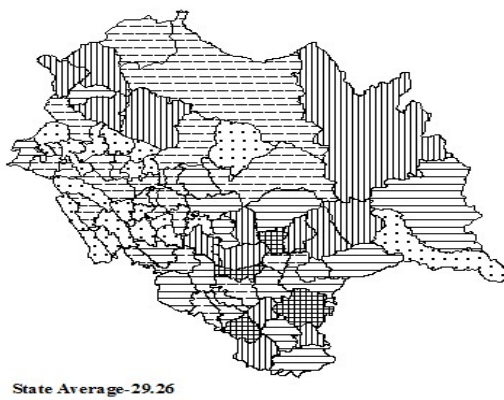
A) Less than 5 Kms



B) Between 5-10 Kms



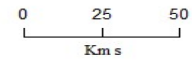
C) Above 10 Kms



Villages as per cent to total Villages

	> 60	45-60	30-45	15-30	< 15
Less than 5 Kms	5	15	19	29	9
Between 5-10 Kms	0	11	52	13	1
Above 10 Kms	4	14	18	21	20

No. of Blocks



Source: Census of India, 2011. Village Amenities, District Census Handbook, Himachal Pradesh²³

Conclusion

The state has made tremendous effort in improving the health infrastructure in the state. The state had introduced various government plans, programmes as per the recommendation of Government of India, accordingly the health infrastructure has improved as per the different plan periods. Right from the First Five Year Plan to the Twelfth Five Year Plan emphasis was made on the fulfillment of the health needs of rural population under the directions set by the above mentioned committees, by creating health infrastructure including a three tier structure (health sub-centres, primary health centres and community health centres). The provision of health services at different hierarchical levels of sub-health centres, primary health centres, community health centres differs at varied levels. The population served by all these health centres at different levels was above the standard norms prescribed by the government except for primary health centre where the population served was well below the prescribed limit. On an average only 13,303 persons were served by one primary health centre while the limit prescribed by the government was 20,000 persons per primary health centre. The accessibility of health institutions varies as the significant proportion of number of villages does not have access to health care within prescribed limits. The analysis of health institutions in the state shows an increase in the number of health institutions. But in spite of that there are still variations in spatial distribution of health institutions. Overall the State has performed well, but Inaccessible terrain, tough physiography, sparse settlements has created disparity in access to health services. Due to this disparity in establishments of health institutions the people are still lacking in getting access to health services and it affects the health status of the state.

Recommendations

The State Government has to emphasize its focus on ubiquitous distribution of health services. At macro (national and state) and micro (district and regional) levels, the issue of rural health services should be tackled in terms of the demands of rural citizens. In hilly areas there should be special plans for opening up of health institutions as compared to other regions. Accessibility of health services will improve through additional services and reorganization of existing health services. This study helps highlight the role of committees; plans and policies to maintain welfare of society in terms of increasing availability and accessibility of health services in rural areas. A qualitative study consisting of a case study of any one District / region from the state for micro level analysis may be extended besides similar spatial analysis for other states and then a comparative analysis may be undertaken.

References

1. Planning Commission of India (2011). High level expert group report on universal health coverage for India. Available on <http://planningcommission.nic.in/reports>.
2. Census of India (2011). Series-3, Population Totals, Himachal Pradesh. Available on <http://www.censusindia.gov.in/2011>.
3. Directorate of Health Services (2011). Directories of medical and public health institutions. Department of Health and Family Welfare, Himachal Pradesh, Shimla.

4. Govt. of India (2016). Basic health parametres (CBR, CDR and IMR) - State-wise time series data. Planning Commission. [cited on 12 June, 2016]. Available on <http://planningcommission.gov.in>.
5. Ministry of Health & Family Welfare (2019). Healthy States Progressive India. Health Index <http://social.niti.gov.in/>
6. Ram Usha and Manas Ranjan Pradhan (2007). Contact with health providers improves reproductive health services: Evidence from Orissa. *Demography India*, Vol. 36, No. 2.
7. Ministry of Health & Family Welfare (2013). Report on 7th common review mission *Himachal Pradesh*. Government of India. Available on <http://nrhm.gov.in/>.
8. Directorate of Health Services, Directories of medical and public health institutions. 1985, 1990 1997, 2002, 2007, 2012, 2017, Department of Health and Family Welfare, Himachal Pradesh, Shimla.
9. Bhore, J. (1946). Report of the health survey and development committee, Volume-I to III, Government of India, Delhi. Available on <http://www.nihfw.org>.
10. Government of Himachal Pradesh (1951). First Five Year Plan (1951-56), An Appraisal, Planning Department, Government of Himachal Pradesh: Shimla.
11. Government of Himachal Pradesh (1956). Second Five Year Plan (1956-61), Planning Department, Directorate of Economics and Statistics, Himachal Pradesh Administration: Shimla.
12. Government of Himachal Pradesh (1966). Third Five Year Plan (1961-66), Planning Department, Himachal Pradesh Administration Press: Shimla.
13. Kartar Singh Committee (1973). Report on the committee on multipurpose workers under health and family planning programmes. Ministry of Health and Family Welfare, New Delhi.
14. Ministry of Health and Family Welfare (1983). National health policy. Ministry of Health and Family Welfare. Govt. of India: New Delhi.
15. Government of Himachal Pradesh (1980). Sixth Five Year Plan (1980-84), Planning Department, Government of Himachal Pradesh, Shimla.
16. Government of Himachal Pradesh (1985). Seventh Five Year Plan (1985-90), Planning Department, Government of Himachal Pradesh, Shimla.
17. Government of Himachal Pradesh (1992). Eighth Five Year Plan (1992-97), Planning Department, Government of Himachal Pradesh, Shimla.
18. Government of Himachal Pradesh (1997). Ninth Five Year Plan (1997-2002), Planning Department, Government of Himachal Pradesh, Shimla.
19. Government of Himachal Pradesh (2007). Eleventh Five Year Plan (2007-12), Planning Department, Government of Himachal Pradesh, Shimla.
20. Government of Himachal Pradesh (2012). Twelfth Five Year Plan (2012-17), Planning Department, Government of Himachal Pradesh, Shimla.
21. Directorate of Health Services (2016). Directories of medical and public health institutions, Department of Health and Family Welfare, Himachal Pradesh, Shimla.
22. Census of India (2011). Census of India, Series-A, General Population Tables, Himachal Pradesh. Office of the Registrar General and Census Commissioner India.
23. Census of India (2011). Village Amenities, District Census Handbook, Himachal Pradesh. Office of Registrar General & Census Commissioner, India, Ministry of Home Affairs, Government of India.
24. Suman (2018). Health services in Himachal Pradesh: A Geographical Analysis (Unpublished Thesis), Panjab University Chandigarh.

NAFLD: The Upcoming Silent Epidemic of Non-Communicable Disease in India- Prevalence, Risk Factors, Government Responses and Public Health Policies

***Tanisha Garg and *Kiran Rangari**

*MPH, AIIMS Jodhpur.

**Reader, Department of Reproductive Biomedicine, NIHF, New Delhi; E-mail: krangari@gmail.com.

Abstract

Non-alcoholic Fatty Liver Disease (NAFLD) is emerging as a silent epidemic of non-communicable disease in India, contributing significantly to chronic liver diseases and posing a substantial economic health burden. This paper provides an overview of the prevalence, risk factors, government responses, and public health policies related to NAFLD in India. NAFLD is closely associated with modifiable risk factors such as obesity, diabetes, and metabolic syndrome, all of which are on the rise in India. The disease affects individuals across all age groups, including children, making it a growing public health concern. Diagnosis of NAFLD is challenging, often relying on radiologic imaging studies or invasive liver biopsy. However, serum markers like FIB-4 and NFS offer a non-invasive alternative for risk stratification.

India has taken steps to address NAFLD by integrating it into the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS). Additionally, measures such as prohibiting the sale of unhealthy food in school premises, ensuring food safety standards, and regulating misleading food advertisements have been implemented. Health promotion campaigns, teleconsultation services, and nutrition programs are also part of the comprehensive approach. The paper emphasizes the need for increased awareness among healthcare professionals and the general population about NAFLD's severity and implications. Furthermore, it recommends extending health insurance coverage for obesity-related treatments and fostering research for medical interventions. Policies to promote healthier lifestyles, whole-grain diets, and physical activity are crucial to curb the rising prevalence of obesity and diabetes, which are significant risk factors for NAFLD. In conclusion, India is making strides in addressing NAFLD, but concerted efforts are required to combat this growing epidemic effectively. Strong public health policies, awareness campaigns, and comprehensive interventions are essential to mitigate the impact of NAFLD on public health and healthcare costs in India.

Key words: NAFLD (Non-alcoholic Fatty Liver Disease), India, Chronic liver diseases, FIB-4 score, Non-Alcoholic Steatohepatitis (NASH), Liver transplants, Non non-communicable diseases

Introduction

Non-alcoholic fatty Liver Disease (NAFLD) is the emerging cause of chronic liver diseases in India. It is responsible for approximately one-third of cases involving elevated liver enzyme levels

in individuals without symptoms. Moreover, it has been noted that nearly two-thirds of liver cirrhosis cases are linked to NAFLD¹. In India, NAFLD is a leading cause of liver transplants causing a major portion of the economic health burden². As NAFLD affects every age group it is becoming a public health concern globally.

As most of the risk factors responsible for NAFLD are modifiable public health policies and programs aimed at mitigating these modifiable risk factors such as obesity and diabetes can effectively lower the incidence of NAFLD^{3,4}. India is the first country to recognize the need for action for NAFLD and therefore has started taking some measures to reduce the upcoming epidemic. On February 21, 2021, the integration of NAFLD (Non-Alcoholic Fatty Liver Disease) into the NPCDCS (National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke) program was announced. Dr. Harsh Vardhan, the Minister of Health and Family Welfare, unveiled the operational guidelines for this integration⁵.

Epidemiology and Disease Burden

India, is the world's most populous country and witnesses a substantial burden of chronic liver diseases, accounting for 18.3 per cent of global deaths which totals to two million. NAFLD contributes to 10-15 per cent of these deaths. Notably, the prevalence of liver diseases in India has been steadily rising compared to other Asian countries where the disease remains nonprogressive. This increase is observed across all age groups, including children, which is partly attributed to shifting sedentary lifestyles and the adoption of Western dietary habits^{6,7}.

The pooled prevalence of NAFLD in the adult population of India stands at 38.6 per cent, while among Indian children, it is 35.4 per cent. It is important to note that India has a youthful demographic, with 29.5 per cent of the population being under 19 years of age according to the 2011 census⁸. As the risk of developing NAFLD is not limited to adults but extends equally to the younger generation it should be taken into consideration as a major upcoming public health problem in India. NAFLD is closely associated with various risk factors such as prediabetes, diabetes, metabolic syndrome, and obesity, all of which are on the rise in India. Approximately 77 million people in India have diabetes, and 25 million are prediabetic. India is known as the capital of diabetes⁹. Additionally, over 135 million individuals in India are obese, with a high prevalence of abdominal obesity, a risk factor for cardiovascular diseases¹⁰. India is undergoing a rapid transition from a high prevalence of communicable diseases to a surge in non-communicable diseases¹¹. As a result, NAFLD, a major contributor to chronic liver diseases, is expected to become a significant public health concern. Cardiovascular disease is the leading cause of death among NAFLD patients, followed by extrahepatic complications and liver-related issues.

It's important to note that while obesity is a major predisposing factor for NAFLD, the condition is also found in non-obese individuals specifically in the Asian population (4). Research indicates that the prevalence of Non-Alcoholic Steatohepatitis (NASH), a more severe form of NAFLD, is notable in both overweight and lean individuals, with similar prognoses regardless of obesity status¹².

Definition

NAFLD is characterized by the accumulation of fat in more than 5% of liver cells in individuals with metabolic risk factors, particularly obesity and type 2 diabetes, and without excessive alcohol consumption or other chronic liver diseases. NAFLD encompasses a spectrum, ranging from simple steatosis that is fat accumulation known as non-alcoholic fatty liver (NAFL) to non-alcoholic steatohepatitis (NASH)¹³. NAFL involves simple accumulation of fat without any inflammation or liver cell damage while NASH involves liver cell inflammation and can progress to fibrosis, cirrhosis, and liver cancer and various other manifestations for which one may need a liver transplant to survive⁵. NASH represents a substantial burden in NAFLD, with more than 60 per cent of NAFLD patients having NASH, and 35 per cent experiencing advanced fibrosis².

Diagnosis

NAFLD is mostly an incidental finding while investigating for other causes of health issues or routine investigation as most of the patients suffering from the disease are asymptomatic. Liver enzyme levels are commonly estimated to diagnose liver diseases but they often appear normal in over half of NAFLD cases⁵. NAFLD is mostly diagnosed by the radiologic imaging studies such as abdominal ultrasound or CT scan which shows the presence of fat in liver. The challenge is not to make the diagnosis of the presence of fatty liver but to stratify the disease as a mere presence of fat in the liver or the progressive inflammation in the liver cells leading to NASH.

The only gold standard method for this stratification of the disease is through liver biopsy. Although biopsy is the gold standard diagnostic criteria it cannot be employed on a large scale because of the invasiveness and complications related to the test. As NAFLD has a high prevalence, diagnostic test needs to be cost effective and acceptable by the population. Imaging studies mostly miss out this differentiation of the disease stages in the earlier phase of the disease but it still the most preferred diagnostic criteria used clinically because of the non-invasive nature and feasibility of the test⁷. Abdominal MRI is more accurate than ultrasound but is primarily employed in research rather than clinical practice because of the cost and the expertise required to conduct the test¹³. Due to their higher cost and the need for specialized expertise, many imaging studies can be challenging to implement for diseases with high prevalence. Additionally, access to these imaging studies is often limited at peripheral healthcare levels. Hence, there is a need for alternative diagnostic criteria⁴.

As it is a known fact that only a few people diagnosed with fatty liver will progress to NASH, liver fibrosis and its complications therefore serum markers which can rule out these conditions attract the physicians. FIB-4 and NFS are the commonly used serum markers with high negative predictive value which can be implemented at the primary health care facility. "Patients identified as high-risk using FIB-4 or NFS scoring systems can undergo Fibroscan, a diagnostic procedure that assesses liver fibrosis by measuring liver stiffness^{4,5}.

FIB-4 is a simple blood test which checks the estimation of AST (Aspartate Aminotransferase) and ALT (Alanine Aminotransferase) and platelet levels. Elevated AST and ALT levels can indicate liver damage or inflammation. Platelet count can decrease in individuals with advanced liver fibrosis or cirrhosis.

$$\text{FIB-4 Score} = (\text{Age} \times \text{AST}) / (\text{Platelet Count} \times \sqrt{\text{ALT}})$$

Lower FIB-4 scores generally indicate a lower likelihood of advanced fibrosis, while higher scores suggest a higher likelihood of significant fibrosis or cirrhosis. It's important to note that the FIB-4 score is not a definitive diagnosis but rather a tool to help healthcare providers assess the risk of liver fibrosis and determine whether further evaluation or monitoring is necessary¹⁴. The development of effective treatments for NAFLD has been hindered by several challenges. These include the invasiveness of liver biopsy, the inherent variability in histological findings, and the absence of a validated alternative surrogate marker that reliably predicts long-term clinical benefits⁴.

Factors Leading to Increased Prevalence in India

Indians face a higher risk of developing insulin resistance, which increases the likelihood of diabetes and in turn NAFLD. The high prevalence of conditions such as diabetes, hypertension, and abdominal obesity in India makes the population more susceptible to NAFLD. Remarkably, even non-obese individuals with NAFLD in India often exhibit metabolic syndrome or other abnormalities which may be due to the accumulation of the visceral fat. Studies have shown that nearly 93 per cent of NAFLD patients have at least one metabolic risk factor which is predisposing the individual to NAFLD. (2)The changing lifestyle which includes the changing dietary habits and the adoption of the sedentary lifestyle is also a major risk factor for these diseases¹⁵.

Management

As of now, there is no medical intervention that has proven to entirely reverse the condition. Only the modification of lifestyle and changing of dietary habits have shown to be effective in preventing the advancement of the disease by reversing the condition in the early stage⁵. Reducing weight regress the fat in the liver and reduces the fat related inflammation in the liver therefore weight loss is an important intervention at the early stage of disease. A systematic review and meta-analysis demonstrated that one kg of the weight loss was associated with a 0.83-unit reduction in alanine aminotransferase (U/L), a 0.56-unit reduction in aspartate transaminase (U/L), and a 0.77 percentage point reduction in steatosis assessed by radiology or histology¹⁶. A study estimated that greatest improvements in NASH happened when weight losses were more than 10 per cent of the body weight¹⁷. As liver is the only organ in the human body that has capacity to regenerate, initiatives like weight loss is helpful in reversing the condition back to normal. Although once the disease has advanced to end stage liver transplant is the only available solution for the survival of the patient.

The frequency of liver transplants is on the rise with each passing day. Approximately 200,000 individuals are diagnosed with end-stage liver disease annually, and around 0.02 per cent of the population, equivalent to 25,000 people, require liver transplants each year. Quarterly Newsletter from the National Centre for Disease Control mentioned that 30 per cent of the liver transplants happening in India were due to NAFLD in 2013. Another study conducted by Narendra S. Choudhary et. al. also mentioned that 26.5 per cent of the liver transplants happening in India are due to NAFLD. The study also mentioned that the five-year survival rate after liver transplant in Indian adults is 75.5 per cent and in children is 87 per cent¹⁸. While there is a lack of specific

studies estimating the expenses associated with liver transplants in India, research conducted in the United States highlights the considerable cost burden, which can pose a significant barrier for patients seeking treatment in India^{3,19}. The direct medical expenses related to NAFLD in India have not been quantified, but studies conducted in the United States have estimated an annual direct medical cost of \$103 billion. Among individuals aged 45-65, the treatment expenses are notably the highest⁵.

Public Health Policies for NAFLD

Incorporated in the NPCDCS Programme

NAFLD is now included in the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS): This program aims to prevent and control non-communicable diseases (NCDs), including diabetes, hypertension and its complications. As NAFLD coexists with these conditions the programme includes interventions for lifestyle management and early detection. Screening for the disease by identifying the risk factors and stratifying high risk individuals is done under the initiative. FIB-4 score is calculated for the at risk individuals at the community health centre level and referral to the higher centres is made for the complicated cases. Prevention of the disease at the primordial and primary level is focused to reduce the further health burden in the health system⁵.

Prohibition of Sale of Unhealthy Food in the School Premises and Surrounding Areas

India has also taken measures to reduce obesity which is a major risk factor of NAFLD. Childhood obesity is on rise in India with estimated prevalence of 12.64 per cent children as overweight and 3.39% as obese²⁰. The Ministry of Health and Family Welfare (MOHFW) has urged state chief ministers and health ministers to enforce a ban on the sale of junk food within school premises. This request aligns with a 2011 recommendation from the World Health Organization (WHO) which advises prohibiting the sale of unhealthy food items within schools and their surrounding playground areas. The objective of these measures is to foster a nutritious diet among students and combat the issue of childhood obesity. In response to above suggestion the governments of Delhi and Uttar Pradesh have issued directives to schools, instructing them to prohibit the sale of unhealthy or junk food in their canteens²¹.

Food Safety and Standards Authority of India Ensuring Safe Food Consumption

The Food Safety and Standards Act of India was developed with the aim of consolidating regulations concerning the manufacturing, storage, sale, and distribution of food products, ensuring their safe delivery and consumption. This legislation led to the creation of the Food Safety and Standards Authority of India (FSSAI), which is responsible for establishing science-based standards for food items and regulating the entire process, from manufacturing and processing to distribution, sale, and the import of food. The primary goal is to ensure the safety and quality of food for human consumption²². Street foods, which are often affordable and readily available, contribute significantly to the growing burden of obesity and cardiovascular diseases (CVD) in both rural and urban low-income populations. One of the concerning aspects of street foods is the predominant use of trans fats in cooking, which increases the risk of obesity and

CVD among consumers. Under the purview of the FSSAI, there is oversight over food inspectors, food samplers, and designated officers who play vital roles in enforcing food safety regulations and standards across the country. Recently FSSAI (Food safety and standards authority of India) has launched the “The Eat Right Movement” which has banned the sale unhealthy food in and around the school premises from December 2019. And has also issued the “good food tax policy” to increase the tax on the unhealthy food²³.

Front of Food Packaging Label

As the consumption of high calorie packed food is increasing day by day measures have been taken for the food packaging which should indicate all the contents present clearly and in a understandable manner. This food packaging was governed by the Prevention of Food Adulteration Act of 1954²⁴. The Prevention of Food Adulteration Rules from 1955 require that food labels not only provide essential information but also include the disclosure of health and nutritional claims²¹.

Regulations for Advertisements to Give the Correct Information

Advertisements are also a major driving component behind the food habits of the community. These advertisements targets children and promoted high calorie content food with false claims has high nutrition content therefore regulations need to be made for these advertisements. Advertising Standards Council of India (ASCI) has also issued some guidelines to regulate the advertisements which can be misleading. The ASCI guidelines emphasize the importance of ensuring that advertisements do not mislead consumers into believing that using the promoted products will lead to positive personal changes. These guidelines also advise against the indiscriminate promotion of products that can be harmful to individuals or society. For food and beverage advertising, the ASCI has established specific rules, including the requirement that all claims about the nutritional and health benefits of these products must be backed by scientific evidence to prevent misleading customers. Additionally, when advertising to children, it is essential to accurately represent the products in a way that aligns with children's comprehension abilities. These measures aim to promote responsible advertising, particularly for products with high sugar and fat content²¹.

Nutrition Programme

In India, both malnutrition and over-nutrition pose significant challenges, making it crucial to ensure sufficient nutrition to combat the prevalence of NAFLD. To address this issue, the government has initiated several programs designed to offer balanced and nutritious meals. These initiatives include the Mid-Day Meal Program in government schools and *Poshan Abhiyan* for pregnant women, mothers and children, which strive to provide wholesome, nourishing diets. Although nutrition programme till now in India were more focused on providing high calorie diet to combat malnutrition but now the time has come to revise the nutrition plans so that a complete balanced diet can be provided which fulfils all the requirements of body preventing over-nutrition among children²¹.

Health Promotion Campaigns

Prevention is consistently more effective than treatment, and the primordial level represents the optimal stage for prevention. Numerous developing countries, along with various government and private organizations, are engaged in health promotion initiatives aimed at reducing obesity. These efforts include advocating for healthy eating habits and promoting regular physical activity. India is actively involved in such activities, recognizing that raising public awareness about the gravity of the issue can drive behavioural changes, ultimately alleviating a significant healthcare burden on the system. The government has also implemented measures like raising taxes on high-calorie and unhealthy foods, rendering them costlier as part of its strategy²⁵.

Providing Tele-consultation

As digitalization continues to advance, the Indian government is proactively addressing the integration of digital technologies into healthcare services. The COVID-19 pandemic has seen a significant rise in teleconsultations, introducing an innovative approach to improving healthcare accessibility in remote areas and among underserved populations²⁶. Diabetes, a disease affecting both urban and rural communities, posed challenges in delivering adequate treatment and management before the widespread adoption of teleconsultation services²⁷. mDiabetes is a collaborative initiative between the Ministry of Health and Family Welfare (MoHFW) and the WHO Country Office aimed at preventing and managing diabetes²⁸.

Discussion

India is ranking highest when compared with other countries on the basis of preparedness to tackle the pandemic of NAFLD. India scores 42.7 and United Kingdom scores 40 when compared with other 32 countries are scoring zero out of hundred²⁹. India though comparatively better but is still lacking the preparedness because of the high prevalence of predisposing factors and associated conditions which in turn predisposes Indian at a higher risk to the upcoming silent epidemic of NAFLD. There exists a significant knowledge gap among both physicians and the general population regarding the gravity of Non-Alcoholic Fatty Liver Disease (NAFLD). Typically, primary care physicians are the first point of contact in managing this condition during its initial stages. Consequently, when patients incidentally discover they have NAFLD, they might not immediately seek out a specialist. It becomes crucial, therefore, for primary care physicians to effectively communicate to patients the seriousness of the disease and its progression³⁰.

As NAFLD is set to be incorporated into public health policies, it will naturally lead to increased awareness among physicians and the general public regarding the disease's severity and its associated consequences. To make a substantial impact, these policies must convey clear and concise messages about NAFLD, its implications, and the necessary actions to address it. These messages should be customized for specific target groups, including healthcare professionals specializing in liver and gastroenterology, primary care providers, experts from related fields, as well as stakeholders such as high-risk populations, media outlets, and policymakers⁴.

To increase the treatment availability and reduce the catastrophic cost on the patient's government health insurance schemes need to provide the adequate coverage for cost of chronic

liver diseases and all the associated conditions. Rajasthan government state health insurance scheme that is *Mukhyamantri Chiranjeevi Swasthya Bima Yojana*, provide coverage for the costs associated with the treatment of chronic liver disease, and even include coverage for liver transplant expenses. It provides this insurance scheme to all the members of the states and is available at both the private and the government hospitals. It provides a coverage of rupees twenty-five lakh for each family; and therefore, covers the cost of organ transplant as well³¹. Health insurance plans should encompass the expenses associated with weight loss medications and surgical interventions, including bariatric surgery. Currently, numerous health insurance providers deny claims for bariatric surgery expenses, thus restricting patient access to essential treatment due to the substantial costs involved. By including coverage for such procedures, health insurance could significantly improve the accessibility of treatment options for patients³².

Way Forward

It is widely acknowledged that countries with effective public health policies for a particular disease tend to reduce its prevalence. Hence, it is crucial to prioritize the development of strong public health policies for NAFLD before it escalates into a major public health issue. India has recognized the impending threat of this emerging pandemic and has taken proactive steps by incorporating NAFLD into its Non-Communicable Disease (NCD) programme. This approach facilitates early disease screening at both the primordial and primary levels, thus preventing severe cases of the disease. Given that NAFLD is often asymptomatic and there is a general lack of awareness about this condition, steps should be taken to raise awareness using digital media and formulate new policies that specifically address the disease. These measures would not only enhance knowledge among healthcare professionals but also help patients better comprehend the seriousness of the condition.

Additional policies addressing various risk factors need to be incorporated into public health initiatives. Obesity, being a significant contributor to this disease, should be a focal point for these policies. Encouraging individuals to lead healthier lifestyles and promoting the adoption of dietary choices conducive to weight reduction are essential strategies. Moreover, government hospitals should offer consultations with doctors specializing in obesity reduction, and government health insurance schemes should encompass the expenses associated with weight-reduction methods, including bariatric surgery. Private health insurance companies should also extend coverage to include outpatient consultations, medications, and surgeries related to obesity treatment. Despite the availability of weight-reduction measures, many individuals struggle to adopt them due to the high associated costs and the lack of coverage by insurance companies.

There should be increased support for research aimed at discovering medical treatments for the disease, as well as an emphasis on promoting nutritionally balanced diets. Regulations need to be established to govern advertisements promoting high-calorie diets, and food labeling should be improved, including comprehensive disclosure of unhealthy ingredients. Moreover, stringent food labelling guidelines should be put in place to ensure consumers are well-informed about the fat content in specific foods. Misguiding advertisements should be checked and digital media should be used promote substitutes for this unhealthy diet.

Promoting awareness about the advantageous aspects of whole grain cereals is crucial, as they not only aid in reducing obesity but also lower the glycaemic index and possess antioxidant properties. Moreover, they have demonstrated effectiveness in improving elevated liver enzyme levels. Therefore, the government should leverage digital media, which is now readily accessible to the community, to disseminate information. Restaurants should be incentivized to offer whole grain cereal-based meals, and food delivery platforms should include a special category for healthy diet options. This approach would foster greater awareness and acceptance among individuals, encouraging them to transition to healthier dietary habits³³.

The government should also prioritize the reduction of diabetes prevalence in India through public education about the detrimental effects of the disease. People need to be informed that diabetes is not merely a condition associated with age or genetics; rather, it demands a combination of lifestyle adjustments and medical management. To address this, the government should strategize for urban areas with ample space to create walking and cycling tracks, encouraging individuals to embrace these healthier practices. Corporates should play a role in promoting physical activity among their employees by establishing on-site sports facilities within office premises. Furthermore, office cafeterias should incorporate whole grain diets into their offerings and encourage employees to consume nutritious food³⁴.

As non-communicable diseases continue to surge in India, the twin challenges of obesity and diabetes are not only significant risk factors for these conditions but are also formidable health challenges in their own. India must urgently address these issues to prevent them from becoming a widespread epidemic and exacerbating the prevalence of other upcoming non-communicable diseases.

References

1. Golabi P, Paik JM, AlQahtani S, Younossi Y, Tuncer G, Younossi ZM. Burden of non-alcoholic fatty liver disease in Asia, the Middle East and North Africa: Data from Global Burden of Disease 2009-2019. *J Hepatol.* 2021 Oct 1; 75 (4): 795–809.
2. De A, Duseja A. Nonalcoholic Fatty Liver Disease: Indian Perspective. *Clin Liver Dis.* 2021;18(3):158–63.
3. Díaz LA, Fuentes-López E, Ayares G, Idalsoaga F, Arnold J, Márquez-Lomas A, et al. The establishment of public health policies and the burden of non-alcoholic fatty liver disease in the Americas. *Lancet Gastroenterol Hepatol.* 2022 Jun 1; 7 (6): 552–9.
4. Lazarus JV, Mark HE, Anstee QM, Arab JP, Batterham RL, Castera L, et al. Advancing the global public health agenda for NAFLD: a consensus statement. *Nat Rev Gastroenterol Hepatol.* 2022 Jan; 19 (1): 60–78.
5. Operational guidelines of Non Alcoholic Fatty Liver Disease (NAFLD) into NPCDCS | Ministry of Health and Family Welfare | GOI [Internet]. [cited 2023 Sep 14]. Available from: <https://main.mohfw.gov.in/newshighlights-42>.
6. Mondal D, Das K, Chowdhury A. Epidemiology of Liver Diseases in India. *Clin Liver Dis.* 2022 Jan 28;19(3):114–7.
7. Duseja A. Nonalcoholic fatty liver disease in India – a lot done, yet more required! *Indian J Gastroenterol.* 2010 Nov 1; 29 (6): 217–25.

8. Shalimar, Elhence A, Bansal B, Gupta H, Anand A, Singh TP, et al. Prevalence of Non-alcoholic Fatty Liver Disease in India: A Systematic Review and Meta-analysis. *J Clin Exp Hepatol.* 2022;12 (3): 818–29.
9. Diabetes - India [Internet]. [cited 2023 Sep 7]. Available from: <https://www.who.int/westernpacific/health-topics/diabetes>
10. Ahirwar R, Mondal PR. Prevalence of obesity in India: A systematic review. *Diabetes Metab Syndr.* 2019; 13 (1): 318–21.
11. Status of Non-Communicable Diseases (NCDs) in India [Internet]. [cited 2023 Sep 7]. Available from: <https://www.pib.gov.in/www.pib.gov.in/Pressreleaseshare.aspx?PRID=1796435>
12. Ye Q, Zou B, Yeo YH, Li J, Huang DQ, Wu Y, et al. Global prevalence, incidence, and outcomes of non-obese or lean non-alcoholic fatty liver disease: a systematic review and meta-analysis. *Lancet Gastroenterol Hepatol.* 2020 Aug;5(8):739–52.
13. Powell EE, Wong VWS, Rinella M. Non-alcoholic fatty liver disease. *Lancet Lond Engl.* 2021 Jun 5;397(10290): 2212–24.
14. Fatty Liver Foundation [Internet]. [cited 2023 Sep 19]. FIB-4 Index. Available from: https://www.fattyliverfoundation.org/fib_4_index
15. Singh SP, Singh A, Misra D, Misra B, Pati GK, Panigrahi MK, et al. Risk Factors Associated With Non-Alcoholic Fatty Liver Disease in Indians: A Case-Control Study. *J Clin Exp Hepatol.* 2015 Dec; 5 (4): 295–302.
16. Koutoukidis DA, Koshiaris C, Henry JA, Noreik M, Morris E, Manoharan I, et al. The effect of the magnitude of weight loss on non-alcoholic fatty liver disease: A systematic review and meta-analysis. *Metabolism.* 2021 Feb; 115: 154455.
17. Vilar-Gomez E, Martinez-Perez Y, Calzadilla-Bertot L, Torres-Gonzalez A, Gra-Oramas B, Gonzalez-Fabian L, et al. Weight Loss Through Lifestyle Modification Significantly Reduces Features of Nonalcoholic Steatohepatitis. *Gastroenterology.* 2015 Aug;149 (2): 367-378.e5; quiz e14-15.
18. Choudhary NS, Bhangui P, Soin AS. Liver Transplant Outcomes in India. *Clin Liver Dis.* 2022 Jan 24;19(1): 32–5.
19. Witkowski M, Moreno SI, Fernandes J, Johansen P, Augusto M, Nair S. The Economic Burden of Non-Alcoholic Steatohepatitis: A Systematic Review. *PharmacoEconomics.* 2022 Aug 1; 40 (8): 751–76.
20. Midha T, Nath B, Kumari R, Rao YK, Pandey U. Childhood Obesity in India: A Meta-Analysis. *Indian J Pediatr.* 2012 Jul 1; 79 (7): 945–8.
21. Khandelwal S, Reddy KS. Eliciting a policy response for the rising epidemic of overweight-obesity in India. *Obes Rev.* 2013;14(S2):114–25.
22. FSSAI [Internet]. [cited 2023 Sep 22]. Available from: <https://www.fssai.gov.in/index.php?page=about-us.php>
23. Ban proposed on sale, ads of junk food in school - The Hindu [Internet]. [cited 2023 Sep 22]. Available from: <https://www.thehindu.com/sci-tech/health/ban-proposed-on-sale-ads-of-junk-food-in-school/article29891500.ece>
24. Compendium_Labelling_Display_23_09_2021.pdf [Internet]. [cited 2023 Sep 21]. Available from: https://www.fssai.gov.in/upload/uploadfiles/files/Compendium_Labelling_Display_23_09_2021.pdf

25. Cecchini M, Sassi F, Lauer JA, Lee YY, Guajardo-Barron V, Chisholm D. Tackling of unhealthy diets, physical inactivity, and obesity: health effects and cost-effectiveness. *The Lancet*. 2010 Nov 20; 376 (9754): 1775–84.
26. Sarveswaran G, Rangamani S, Ghosh A, Bhansali A, Dharmalingam M, Unnikrishnan AG, et al. Management of diabetes mellitus through teleconsultation during COVID-19 and similar scenarios - Guidelines from Indian Council of Medical Research (ICMR) expert group. *Diabetes Metab Syndr*. 2021; 15 (5): 102242.
27. Ranasinghe P, Jayawardena R, Gamage N, Sivanandam N, Misra A. Prevalence and trends of the diabetes epidemic in urban and rural India: A pooled systematic review and meta-analysis of 1.7 million adults. *Ann Epidemiol*. 2021 Jun; 58: 128–48.
28. mDiabetes | National Government Services Portal [Internet]. [cited 2023 Sep 22]. Available from: <https://services.india.gov.in/service/detail/mdiabetes-1>.
29. Lazarus JV, Mark HE, Villota-Rivas M, Palayew A, Carrieri P, Colombo M, et al. The global NAFLD policy review and preparedness index: Are countries ready to address this silent public health challenge? *J Hepatol*. 2022 Apr 1; 76 (4): 771–80.
30. Younossi ZM, Ong JP, Takahashi H, Yilmaz Y, Eguc Hi Y, El Kassas M, et al. A Global Survey of Physicians Knowledge About Nonalcoholic Fatty Liver Disease. *Clin Gastroenterol Hepatol Off Clin Pract J Am Gastroenterol Assoc*. 2022 Jun; 20 (6): e1456–68.
31. RajCovid Info [Internet]. [cited 2023 Sep 20]. कोविड-19 जागरूकता अभियान-कोरोनावॉरियर्स शपथ. Available from: <https://covidinfo.rajasthan.gov.in/>.
32. Gärtner D, Hoyer M, Hornung A, Andus T, Bischoff S, Hesse U. [Obesity surgery: the refusal rate of health care cost reimbursement despite expert opinion]. *Dtsch Med Wochenschr* 1946. 2006 Feb 10; 131(6): 258–62.
33. Olagunju AI. Multigrain porridge possesses superior nutritional quality, its consumption alleviates hyperglycemia, hypercholesterolemia and oxidative stress in obese-diabetic wistar rats. *J Food Biochem*. 2022 Nov; 46 (11): e14309.
34. Verma R, Khanna P, Mehta B. National programme on prevention and control of diabetes in India: Need to focus. *Australas Med J*. 2012 Jun 30; 5 (6): 310–5.

Low Diabetes Risk Perception among University Teaching Staff: A Cause of Concern

***Shonima Venugopal, *Sanchita Khanna and *Uma M Iyer**

*Department of Foods and Nutrition, Faculty of Family and Community Sciences,
The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India; E-mail: shonima118@yahoo.co.in.

Abstract

Low diabetes risk perception could be an impediment in efforts aimed at promoting healthy lifestyle behaviours. The study aimed to assess diabetes risk perception in teaching staff from a university in Vadodara city, Gujarat, India and to determine associated factors. A total of 194 non-diabetic subjects completed a self-administered questionnaire used to assess diabetes risk perception. Around 50 per cent of the subjects perceived themselves to be at 'no to low' risk of developing diabetes in their lifetime based on family history of diabetes and in the next ten years based on lifestyle habits such as diet and exercise. About 45.7 per cent of the subjects were not worried at all about developing diabetes in their lifetimes. More females as compared to males were worried about developing diabetes. Educational interventions for improving diabetes knowledge and diabetes risk perception in teaching staff need to be planned and implemented.

Key words: Diabetes, risk perception, teaching staff

Introduction

The prevalence of diabetes continues to escalate around the globe and in India. India was home to 74 million diabetics in 2021, a number that is set to increase to 125 million by 2045¹. Teachers are an important productive sector in the economy. In higher education institutions, university staff may not have adequate time to seek screening services for hypertension and diabetes early enough probably due to unawareness that they could be suffering from such disease conditions². Several relevant stress factors may affect teachers adversely, putting them at risk of developing diabetes³.

The prevalence of diabetes among 520 college teachers from Chhattisgarh, India was reported to be 11.35 per cent⁴. In another study, 50 per cent of college lecturers enrolled from the city of Chennai, India were found to be at high risk of diabetes and 36 per cent were at moderate risk⁵. Prevalence of diabetes mellitus was reported to be 36.5 per cent in school and university teachers from Mogadishu, Somalia³. The prevalence of diabetes among male working personnel from the faculty of science at Taibah University in the kingdom of Saudi Arabia was found to be 14.1 per cent⁶.

Promoting positive lifestyle changes may be an effective strategy to decrease the burden of diabetes, however, bringing about changes in lifestyle is a massive challenge. An individual's perceived susceptibility to a threat or disease risk perception is an important determinant of health behaviour⁷. Greater personal risk perception could lead to adoption of healthier lifestyles whereas lower risk perceptions could be an impediment and create challenges in interventions aimed towards preventive health behaviours⁸. The health of staff and students who live and work in higher education environments can be improved through academic institutions. In order to plan effective strategies for diabetes prevention, it is imperative to understand the risk perception for developing diabetes in the population. Therefore, the present study was planned to assess diabetes risk perception in university teaching staff from Vadodara, Gujarat, India and to determine the associated factors.

Methodology

This cross-sectional study was carried out in a university located in Vadodara city, Gujarat, India. All the teaching staff of the university (N=approximately 1200) were emailed the link to a self-administered pretested questionnaire prepared using Google forms. Individuals with self-reported diabetes were not included in the study. A total of 194 non-diabetic subjects completed the questionnaire. The description and purpose of the study was explained in the Google form and the form included a question requesting informed consent for participation before completing the questionnaire. The study was approved by the Institutional Ethics Committee for Human Research (IECHR/FCSsc/2020/49). The questionnaire was designed after reviewing literature^{9,10,11}. The contents of the questionnaire were reviewed by experts and were revised accordingly. Pretesting of the questionnaire was carried out. The questionnaire included questions related to demographic details of subjects, anthropometry, medical and family history, and diabetes risk perception. Body mass index (BMI) was calculated from self-reported weight and height. Results are expressed as percentages and chi-square values. A result was declared to be statistically significant only if the p-value of an analysis was less than 0.05 on two-tailed testing. The statistical analysis was carried out using Microsoft® Office Excel 2003 and OpenEpi open source online software.

Findings

Of the total 194 subjects, 75 subjects were males and 119 were females (Table 1). Mean age of the subjects was 41.8 years. Around 48.6 per cent of the male subjects and 60.2 per cent of the female subjects had a family history for diabetes. Based on the Asia Pacific classification of BMI¹², majority of the male (49.3%) and female (57.9%) subjects were found to be in the obese category (BMI ≥ 25). Almost a quarter of the male subjects (24.7%) and 15.8 per cent female subjects were in the overweight category (BMI ≥ 23 - < 25).

Table 1

Anthropometric Data and Family History of Diabetes among Non-Diabetic Subjects N (%)

	Male (N=75)	Female (N=119)	Total (N=194)
Age (N=190; M=74; F=116)	43.7±11.4	40.5±11.3	41.8±11.5
Family History of Diabetes (N=192; M=74; F=118)	36 (48.6)	71 (60.2)	107 (55.7)
BMI (N=187; M=73; F=114)	25.3±3.6	26.5±4.7 * (p=0.045)	26.0±4.3
< 18.5	3 (4.1)	3 (2.6)	6 (3.2)
18.5 - ≤ 22.9	16 (21.9)	27 (23.7)	43 (23.0)
≥23 - < 25	18 (24.7)	18 (15.8)	36 (19.3)
≥ 25	36 (49.3)	66 (57.9)	102 (54.5)

BMI=Body Mass Index; * Significantly different from males at p <0.05

Based on lifestyle habits such as diet and exercise, 20.6 per cent subjects perceived that they were at no risk, 29.4 per cent subjects perceived that they were at low risk, 25.7 per cent subjects perceived that they were at moderate risk, and around 5.1 per cent subjects perceived that they were at a very high risk of developing diabetes in the next ten years (Table 2). Alarming, 50 per cent of the subjects perceived themselves to be at 'no to low risk' of developing diabetes. Risk perception of developing diabetes in the next ten years based on lifestyle habits was observed to be higher in females than males in the very high-risk perception category (6.7% vs 2.6%) and moderate risk perception (30.2% vs 18.6%) category. About 19.1% of the subjects were not sure whether they were at risk of developing diabetes. When risk perception of developing diabetes in the lifetime based on lifestyle habits was assessed, it was found that 17 per cent, 25.7 per cent, 30.4 per cent and 6.1 per cent subjects perceived themselves to be at no risk, low risk, moderate risk, and very high risk of developing diabetes respectively. One-fifth of the subjects reported not being sure whether they were at risk of developing diabetes. Around 43 per cent of the subjects believed themselves to be at 'no to low risk' of developing diabetes. Very high (7.5% vs 4%) and moderate (34.4% vs 24%) risk perception of diabetes development was found to be greater in females as compared to males. Around 50 per cent of the subjects perceived that they were at 'no to low risk' of developing diabetes in their lifetime based on family history of diabetes. Moderate risk and very high risk of developing diabetes based on family history was perceived by 28.3 per cent and 9.3 per cent subjects respectively. In comparison to males, more females (31% vs 24%) perceived themselves to be at moderate risk of developing diabetes. Perception of no risk was slightly higher in females (29.4% vs 25.3%) as compared to males.

Table 2

Diabetes Risk Perception among Non-Diabetic Subjects N (%)

Based on your lifestyle habits such as diet and exercise, do you think you are at risk of developing diabetes in the next ten years?			
	Male (N=75)	Female (N=119)	Total (N=194)
Very high risk	2 (2.6)	8 (6.7)	10 (5.1)
Moderate risk	14 (18.6)	36 (30.2)	50 (25.7)
Low risk	22 (29.3)	35 (29.4)	57 (29.4)

No risk	21 (28)	19 (15.9)	40 (20.6)
Not sure	16 (21.3)	21 (17.6)	37 (19.1)
Based on your lifestyle habits such as diet and exercise, do you think you are at risk of developing diabetes in your lifetime?			
	Male (N=75)	Female (N=119)	Total (N=194)
Very high risk	3 (4)	9 (7.5)	12 (6.1)
Moderate risk	18 (24)	41 (34.4)	59 (30.4)
Low risk	22 (29.3)	28 (23.5)	50 (25.7)
No risk	12 (16)	21 (17.6)	33 (17.0)
Not sure	20 (26.6)	20 (16.8)	40 (20.6)
Based on your family history, do you think you are at risk of developing diabetes in your lifetime?			
	Male (N=75)	Female (N=119)	Total (N=194)
Very high risk	7 (9.3)	11 (9.2)	18 (9.3)
Moderate risk	18 (24)	37 (31.0)	55 (28.3)
Low risk	17 (22.6)	25 (21.0)	42 (21.6)
No risk	19 (25.3)	35 (29.4)	54 (27.8)
Not sure	14 (18.6)	11 (9.24)	25 (12.8)

In response to the question about whether the subjects were worried about developing diabetes in their lifetime (Table 3), 45.7 per cent of the subjects reported that they were not worried at all, 46.3 per cent of the subjects reported that they were slightly worried, and only 7.8 per cent of the subjects reported that they were very worried about developing diabetes. Females were more worried about developing diabetes as compared to males. When subjects were asked if they planned to make changes in their lifestyle habits that they thought could decrease their risk of developing diabetes, 83.8 per cent of the subjects replied in the affirmative. Around 84.6 per cent of the subjects reported planning to make changes in both, their dietary habits and physical activity pattern.

Table 3
Diabetes Risk Perception among Non-Diabetic Subjects-Dimension of being Worried about Developing Diabetes N (%)

Are you worried about developing diabetes in your lifetime?			
	Male (N=71)	Female (N=119)	Total (N= 190)
Very worried	3 (4.2)	12 (10.08)	15 (7.8)
Slightly worried	28 (39.4)	60 (50.4)	88 (46.3)
Not worried	40 (56.3)	47 (39.4)	87 (45.7)
Do you plan to make any changes in your lifestyle habits such as diet and exercise in the near future that you think will decrease your risk of getting diabetes?			
	Male (N=73)	Female (N=119)	Total (N=192)
Yes	58 (79.4)	103 (86.5)	161 (83.8)
No	15 (20.54)	16 (13.4)	31 (16.1)
If yes in which?			

	Male (N=73)	Female (N=104)	Total (N=177)
Diet	5 (8.4)	5 (4.8)	10 (6.1)
Exercise	6 (10.1)	9 (8.6)	15 (9.2)
Both	48 (81.3)	90 (86.5)	138 (84.6)

In the study, a meaningful difference in the perceived risk for diabetes was observed with a family history of diabetes at a p-value=0.0001 and with gender at a p-value=0.026 as shown in Table 4.

Table 4

Association between Perceived Diabetes Risk and Potential Determinants in Non-Diabetic Subjects N (%)

Variable	'No to low' risk perception for diabetes	Moderate and high risk perception for diabetes	χ^2 (p value)
Age			
20-30 (N=32)	19 (59)	13 (41)	5.468 (0.24)
31-40 (N=46)	25 (54)	21 (46)	
41-50 (N=36)	21 (58)	15 (42)	
51-60 (N=34)	23 (68)	11 (32)	
>60 (N=6)	6 (100)	-	
Gender			
Male (N=59)	43 (73)	16 (27)	4.93 (0.026)
Female (N=98)	54 (55)	44 (45)	
Family History of Diabetes			
Present (N=90)	44 (49)	46 (51)	14.38 (0.0001)
Absent (N=66)	52 (79)	14 (21)	
BMI			
< 18.5 (N=4)	3 (3.2)	1 (1.7)	3.247 (0.35)
18.5 - ≤ 22.9 (N=36)	25 (26.6)	10 (17.2)	
≥23 - < 25 (N=33)	18 (19.1)	9 (15.5)	
≥ 25 (N=89)	48 (51.1)	38 (65.5)	
BMI=Body Mass Index			

Discussion

This exploratory study investigated risk perception of diabetes in university teaching staff. In a German nationwide survey on adults without known diabetes, it was found that even if actual diabetes risk was high, perceived diabetes risk was low¹³. In the KORA FF4 study, 74 per cent of participants with undiagnosed diabetes mellitus believed that their chances of having undetected diabetes was low or very low and 72 per cent of the participants with prediabetes believed that they were not at risk of developing diabetes¹⁴. Data from participants in the National Health and Nutrition Examination Survey program revealed that almost 71.8 per cent of adults with undiagnosed prediabetes reported no perceived risk for diabetes¹⁵. In a sample of five hundred and thirty-five 18–60-year-old Hindustani Surinamese (South Asians) from Netherlands, less than half of the study population (44.2%) perceived themselves to be susceptible to the onset of diabetes¹⁶. Majority of the subjects in the current study reported that they were not worried at all or were only slightly worried about developing diabetes. Similar findings have been

reported in an Italian population where a large majority of the participants were found to be not worried about developing diabetes¹⁷.

In the present study, more females than males perceived themselves to be at risk of developing diabetes and were more worried about developing diabetes. This finding is consistent with previous research. Age and gender differences in health risk perception in 625 adolescents from Korea were studied and it was reported that in comparison to females, male adolescents perceived their own likelihood of a variety of health risks as considerably lower¹⁸. Young South Asian female caregivers of parents living with type 2 diabetes mellitus have been reported to have a higher risk perception of developing diabetes (34.2%) as compared to their male counterparts (20.5%)¹⁹. In the KORA FF4 study, male subjects perceived themselves to be at risk for diabetes less often than women¹⁴. A study on 660 college students reported similar findings, with women having a higher level of risk perception for type 2 diabetes onset than men⁹.

In this study, high perceived risk of diabetes was associated with being a female or having a family history of diabetes, consistent with other literature. In a study on 150 non-diabetic primary care patients, those who had high risk perception of developing diabetes were more likely to be women and to have self-reported positive family history of diabetes²⁰. Similar results were obtained in 527 parents of children attending public schools in Naples where females and those who had close relatives with diabetes were more likely to perceive a higher risk for developing diabetes¹⁷. In a German nationwide population-based survey, perceiving oneself at increased diabetes risk was significantly associated with a family history of diabetes¹³. The authors found no significant association of age and BMI with perceived risk of diabetes.

In the present study, majority of the subjects planned to make changes in their lifestyle habits such as dietary habits and physical activity that they thought could help decrease their risk of developing diabetes. Better risk perception of diabetes could aid in efforts aimed at reducing diabetes risk such as attempting weight loss. Individuals who perceived themselves to be at risk for diabetes or prediabetes were found to be significantly more likely to report attempting weight loss in the past year as compared to individuals who reported no risk perception²¹. A limitation of the study was pandemic induced restricted personal communication with the study subjects due to which online self-administered questionnaires were used.

Conclusion

In the study, university teaching staff strongly underestimated their probability of developing diabetes. Given the increasing burden of diabetes in India, the severity of diabetes and the availability of preventive measures, the low-risk perception for developing diabetes in the study sample is worrisome. Results from this study have implications for improving risk perception of diabetes and diabetes knowledge among this population of teaching staff members. Teachers may have the opportunity of influencing diabetes related knowledge of students and their families and hence can form an important target group for diabetes education. In order to avoid misperceptions of diabetes risk, in addition to improving knowledge about diabetes, easy to calculate non-invasive diabetes risk scores could be used for identifying subjects at high risk of developing diabetes. There is a need to plan effective educational interventions to improve

diabetes knowledge and to facilitate adoption of healthy lifestyle behaviours by members of the public in order to reduce the burden of diabetes.

References

1. International Diabetes Federation (2021). India Diabetes report 2000 — 2045. IDF Diabetes Atlas 10th Edition. Available from: <https://diabetesatlas.org/data/en/country/93/in.html>
2. Amanyire J, Tumwebaze M, Mugisha MK & Bright LW. (2019). Prevalence and risk factors for hypertension, diabetes and obesity among lecturers and support staff of Bishop Stuart university in Mbarara, Uganda. *Open Journal of Applied Sciences*; 09(03): 126-137.
3. Ibrahim ME, Sönmez RE, Guleid AY & Alimoğlu O. (2020). The prevalence of diabetes mellitus among high school and university teachers in Mogadishu, Somalia. *International Journal of Human and Health Sciences*; 4(2): 94-97.
4. Nishad S, Venugopal R & Srivastava P. (2017). Prevalence and awareness of diabetes among college teachers in Chhattisgarh. *International Journal of Physical Education and Sports*; 2(11): 6-9.
5. Vijayalakshmi M & Sivapriya T. (2022). Identification of type 2 diabetes risk and the impact of nutrition education among college lecturers. *Journal of Applied Sciences*; 22(3): 117-121.
6. Abou-Gamel M, Abdul-Nassir M, Rajeh A, Makhdoom A, Surrati A, Kateb A & Albouq F. (2014). The prevalence of diabetes mellitus among working personnel in the faculty of science, Taibah university, Almadinah Almunawwarah, KSA. *Journal of Taibah University Medical Sciences*; 9(1): 85-88.
7. Ferrer RA & Klein WMP. (2015). Risk perceptions and health behavior. *Current Opinion in Psychology*; 5: 85-89.
8. Antwi J, Lavin R, Sullivan S & Bellavia M. (2020). Perception of and risk factors for type 2 diabetes among students attending an upstate New York college: A pilot study. *Diabetology and Metabolic Syndrome*; 12: 25.
9. Reyes-Velazquez W & Sealey-Potts C. (2015). Unrealistic optimism, sex, and risk perception of type 2 diabetes onset: Implications for education programs. *Diabetes Spectrum*; 28(1): 5-9.
10. Simonds VW, Omidpanah A & Buchwald D. (2017). Diabetes prevention among American Indians: The role of self-efficacy, risk perception, numeracy and cultural identity. *BMC Public Health*; 17: 763.
11. The Michigan Diabetes Research and Training Center (MDRTC). Risk Perception Survey for Developing Diabetes (RPS-DD), adapted for women with histories of gestational diabetes. Available from: <http://diabetesresearch.med.umich.edu/peripherals/profs/documents/svi/RPS-DDwritten.pdf>
12. WHO Expert Consultation. (2004). Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *The Lancet*; 363(9403): 157-163.
13. Heidemann C, Paprott R, Stühmann LM, Baumert J, Mühlenbruch K, Hansen S, ... & Scheidt-Nave C. (2019). Perceived diabetes risk and related determinants in individuals with high actual diabetes risk: Results from a nationwide population-based survey. *BMJ*

- Open Diabetes Research and Care; 7(1): e000680.
14. Kowall B, Rathmann W, Stang A, Bongaerts B, Kuss O, Herder C, ... & Meisinger C. (2017). Perceived risk of diabetes seriously underestimates actual diabetes risk: The KORA FF4 study. *PLoS One*; 12(1): e0171152.
 15. Joiner KL, Adams MP, Lee KA, Piatt G & Davis MA. (2022). Perceived risk for diabetes among U.S. adults with undiagnosed prediabetes. *Preventive Medicine*; 160: 107089.
 16. Vlaar EMA, Nierkens V, Nicolaou M, Middelkoop BJC, Stronks K & Van Valkengoed IGM. (2015). Risk perception is not associated with attendance at a preventive intervention for type 2 diabetes mellitus among South Asians at risk of diabetes. *Public Health Nutrition*; 18(6): 1109-1118.
 17. Pelullo CP, Rossiello R, Nappi R, Napolitano F & Di Giuseppe G. (2019). Diabetes prevention: Knowledge and perception of risk among Italian population. *BioMed Research International*; 2019: 2753131.
 18. Kim YH, Park IK & Kang SJ. (2018). Age and gender differences in health risk perception. *Central European Journal of Public Health*; 26(1): 54-59.
 19. Koipuram A, Carroll S, Punthakee Z & Sherifali D. (2020). Diabetes knowledge, risk perception, and quality of life among South Asian caregivers in young adulthood. *BMJ Open Diabetes Research and Care*; 8(2): e001268.
 20. Hivert MF, Warner AS, Shrader P, Grant RW & Meigs JB. (2009). Diabetes risk perception and intention to adopt healthy lifestyles among primary care patients. *Diabetes Care*; 32(10): 1820-1822.
 21. Murillo R, Katic BJ, Gonzalez T, Vasquez E & Echeverria S. (2019). The association of prediabetes and diabetes risk perception with leisure-time physical activity and weight loss. *American Journal of Health Promotion*; 33(4): 534-540.

Managing Quality of Maternal Diet in Lactating Mothers- An Exploratory Study

*Archana Gupta, **Saba Khan and ***Saira Mehnaz

*Research Scholar, E-mail: garchana495@gmail.com;

Associate Professor; *Professor; department of Community Medicine, A.M.U., Uttar Pradesh.

Abstract

In India, lactating mothers from low-income settings are a vulnerable group due to feeding stress, frequent pregnancies, poor purchasing power, and high maternal mortality rates. Post-delivery mothers face decreased dietary intake, increased metabolic demand, malabsorption, and parasitic infections. Taboos about lactating mothers' diets often lead to insufficient balanced diet intake, leading to malnutrition. The study focuses on assessing the nutritional status of lactating mothers in the local survey and creating nutritional awareness among them. The nutrient intake of most lactating women was below the recommended dietary allowances of iron, vitamin A, and vitamin B12 intake. A nutrition awareness program was conducted for lactating mothers at the Rural Health Training Centre, Aligarh, to share low-cost iron and protein-rich recipes and cooking techniques. This initiative was found to be very effective and efficient in making women aware of utilizing the low-cost resources available to them for enriching their diet.

Key words: Lactating mothers, Low-cost recipes, Nutrition counseling, RDA.

Introduction

The World Health Organization terms quality of diet (QOD) as "individuals' perception of their position in life about their goals, expectations, standards, and concerns in the context of the culture, nutrition, and value systems in which they live." QOD is a comprehensive notion that can be extensively influenced by the subject's physical health, psychological condition, nutritional status, level of independence, social connections, and interactions with crucial components of an individual's environment. Therefore, this is based on several objective criteria (related to the standard of the environment and living conditions) and subjective factors (associated with the personal sphere and measurably linked to happiness and well-being).

Mothers must consume approximately 500 extra calories per day to encourage breastfeeding and preserve maternal reserves since lactation requires more nutrition than pregnancy because breastfeeding mothers produce 0.7 to 0.8 L/d of milk^{1,2}. Nutritional surveys in India showed that some of the population suffered from malnutrition despite increased food production. Lactating mothers from lower economic strata are vulnerable to malnourishment. Due to the nursing process, mothers are at risk of nutritional stress. Multiple pregnancies with repetitive lactating period increases the risk of maternal mortality ratio. One of the significant health problems that they suffer from is anemia. Post-delivery mothers are at risk mainly due to decreased dietary intake, increased metabolic demand, malabsorption, or parasitic infections like hookworm.

Scarcity of suitable food, lack of family purchasing power, and traditional beliefs and taboos about the mother's diet often lead to an insufficient balanced diet and malnutrition.

Researchers have suggested that the nutritional and health status of Indian women tend to worsen, which is associated with the traditions and cultural practices evident in the nation. Indian women are vulnerable, especially when it comes to lactation and pregnancy. One crucial point is that the influence of the nutritional status of mothers is more pervasive when compared to other factors affecting the child's birth weight. Breast milk is the global standard for infant feeding³. WHO and the American Academy of Paediatrics recommend exclusive breastfeeding for the first six months and at least one year of life.

The nutrient is mobilized from maternal stores to produce breast milk, and the lactating women are vulnerable to depletion of their nutrient stores. They are encouraged to consume foods high in calcium, Vitamin A, B1 (thiamine), B2 (riboflavin), Vitamin B6, B12, folate, and iodine to minimize losses and maintain their health and well-being. Adequate nutrition for women is essential for their health as well as for the health of their offspring. Poor health of pregnant women, lactating mothers, and their children has repercussions for them and the whole of society. Information on lactating women's nutritional status and associated factors is urgently required for prioritizing, designing, and initiating intervention programs to improve maternal nutrition. Including millet and whole grains in the diet can improve the daily iron, protein, calcium, and fiber intake. Millets are "yesterday's coarse grains and today's nutri-cereals." India accounts for approximately 80 per cent of total millet production⁴. To create awareness and increase the production and consumption of millets, the United Nations, at the behest of the Government of India, declared 2023 the International Year Millets. Millets are nutrient-dense with ample amount of fibers and are rich source of proteins, micronutrients and others phytonutrients. The millets contain 7-12 per cent protein, 2-5 per cent fat, 65-75 per cent carbohydrates, and 15-20 per cent dietary fiber. The most effective probability for a safe pregnancy and ideal perinatal outcomes is a diet with a balanced consumption of macronutrients. Diets high in fruits, vegetables, whole grains, nuts, legumes, fish, and oils rich in monounsaturated fat and fiber are considered nutritious; diets low in fatty red meat and refined grains are considered unhealthy. Healthy diets also avoid processed foods, trans and saturated fats, and simple carbohydrates.

The potential significance of this study is that firstly it would facilitate early preventive treatment and will thereby improve the outcome for mothers and child. Secondly it would enhance health care literacy in relation to dietary practices. The study assessed the nutritional status of lactating mothers attending post-natal care service at the Rural Health Training Centre, Jawan, Aligarh, and created nutritional awareness among lactating mothers. The methodology adopted for performing the study was an exploratory research design. The lactating women (aged 20-40 years) of infants aged 0-12 months free from any non-communicable disease attending Anganwadi Centre Care during the data collection period and willing to participate were included. The lactating women of infants aged more than 12 months and having any infectious diseases were excluded.

Lactating mothers were randomly chosen for this study. Data were collected from selected respondents using a standardized pretested questionnaire that included closed-ended questions about the frequency of eating fast food, missing meals, drinking carbonated beverages, eating a

balanced diet, and general awareness of health concerns. Height and weight was assessed by measuring body weight (kg) and height (cm). The standard procedure was used to measure the height and weight for anthropometric measurement and BMI was calculated. Food and nutrient intake of pregnant women was assessed using 24hour dietary recall method. 24hour dietary survey is the most widely used method dietary assessment. In this method, subject was asked to recall the food intake for the previous day at each meal and in between meals. Three-days recall was done on each individual with two working days and a holiday. The standard household measurements such as plate, bowl, cup, glass and different spoons, etc. were used to facilitate the quantification of portion sizes. One medium Karachi of rice was taken as 100g, full plate as 400g, one cup of liquid as 150 ml, one glass of liquid as 200 ml, a tablespoon as 15g, and a teaspoon as 5g.

After recording all meals and amount of food eaten in 24hours, the total no. of servings was added up according to each food group. The nutrient values for these amounts were then calculated using ICMR's "Nutritive value of Indian foods". The day's total intake of different nutrients was then compared with RDA ICMR – (2020). All statistical analyses were performed with SPSS for IBM statistical software package version 19.0. All responses of survey questionnaire were coded and then data was updated in SPSS version 19.0.

Descriptive statistics including percentages, means, frequencies and standard deviation were computed for demographic profile, nutritional status and pregnancy related clinical complications. In the next section of the study, an awareness program was conducted, focusing mainly on three fundamental concepts- utilization of available resources in an effective manner, preparation of low-cost recipes, and time management. Fortification of commonly preferred food products with available resources was explained, and prepared recipes were tested using a 5-point hedonic scale.

Findings and Discussion

The study was conducted to create awareness among lactating mothers for the betterment of their health. It was found that most respondents were between the age group of 24-27 years. The age of the maximum number of respondents (45%) at first pregnancy was between 24 to 27 years. Most respondents (52.6%) belonged to the lower middle class and were living in a nuclear family type. The majority (64%) had one previous pregnancy wastage.

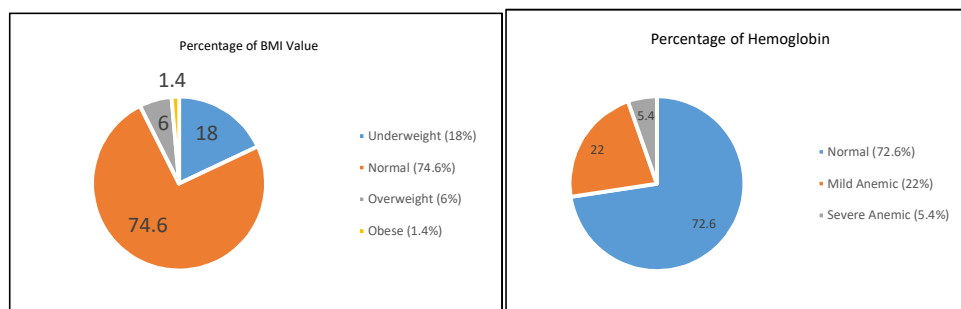


Fig 1. (a) BMI and 1. (b) hemoglobin value of Lactating Women

The mean height of subjects was 151 + 3.2 cm, and weight was 49.3 + 6 kg. Most of the respondents (74.6%) fall under the normal BMI category (presented in Fig. 1); 18 per cent were underweight, 6 per cent were overweight, and only 1.4 per cent were obese. The majority of lactating women had normal hemoglobin levels, and 27.4 per cent of women were anemic. Clinical assessment found that about 80 per cent of lactating women were suffering from back pain and irregular menstrual cycles. About 52 per cent were suffering from heartburn. Around 15-20 per cent were suffering from nausea, severe headache, abdominal pain and extreme weakness. Data regarding food and nutrient intake is presented in Table 1.

Table 1
Data of Lactating mothers (N=150)

S.No.	Parameters	Lactating women	
		(N=150)	%
1.	Meal Pattern		
	>7meal/day	16	11
	6-7meal/day	111	74
	4-5meal/day	23	15
2.	Vegetables		
	3-4 times/day	30	20
	1-2times/day	49	32.7
	3-4 times/week	71	47.3
3.	Fruits		
	a) 1-2times/day	31	20.7
	b) 1-2times/ week	117	78
	c) Never	2	1.3
4.	Food intake	Mean \pm SD	% Adequacy
	Cereals& Millets	198 \pm 45	73
	Pulses,legumes and chicken	48 \pm 63	53
	Green-leafy vegetables	25 \pm 15	20
	Other vegetables	100 \pm 30	50
	Roots& tubers	55 \pm 30	60
	Fruits	70 \pm 40	37
	Milk&milk products	230 \pm 90	46
	Fats & oils	32 \pm 5.5	106
	Sugar& Jaggery	22.5 \pm 11.2	113

The maximum number of respondents were non-vegetarian and followed 6-7 meals/day. Data (presented in Table 1) revealed that the maximum number of respondents were eating vegetables 1-2 times/week (47%), fruits 1-2 times/day (78%), pulses and chicken 1-2 times/day (75%). The reason for less consumption of meat and meat products is the poor purchasing power of respondents. It was also revealed that most respondents included foods high in fats, sugars, and salts daily.

In the 24-hour dietary recall, it was found that the mean daily intake of cereals, pulses, green leafy vegetables, other vegetables, fruits, milk, and milk products needed to be revised. From Table 1, it is revealed that the intake adequacy of fruits, milk, milk products, and green leafy vegetables was very low (<50%). The adequacy percentage of cereals and millets, pulses, legumes and chicken, other vegetables, roots, and tubers was between 50 – 75 per cent. Fats and oils and sugar and jaggery intake was adequate >100 per cent.

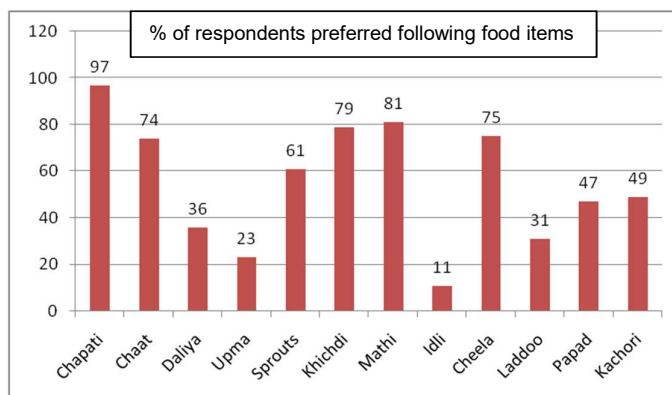
Table 2
Nutrient Intake of Respondents (N=150)

S.No.	Nutrient Intake	Lactating women	
		(N=150)	%
1.	Energy	1410 ± 294.6	63
2.	Protein	44 ± 9.5	54
3.	Total Fat	57 ± 5.5	114
4.	Calcium	912 ± 303.5	76
5.	Iron	14 ± 1.4	40
6.	Vitamin A Retinol	220 ± 311.2	28
	B carotene	2563 ± 601.5	40
7.	Vitamin C	48.06 ± 6.2	80
8.	Thiamine	0.9 ± 0.2	75
9.	Riboflavin	0.7 ± 0.3	50
10.	Niacin	8 ± 3.5	57
11.	Pyridoxine	1.3 ± 0.9	52
12.	Dietary fibre	320 ± 78	64
13.	Vitamin B ₁₂	0.4 ± 0.2	34
14.	Magnesium	154 ± 39	50
15.	Zinc	7.1 ± 3.3	59
16.	Folic acid	318.1 ± 54.2	64

Using 24-hour dietary recall method, nutrient intake was calculated using C. Gopalan Nutritive value of Indian Food. The nutrient intake of the majority of women presented in Table 2, was below the recommended dietary allowances when compared with RDA. The intake adequacy of iron, vitamin A, and vitamin B₁₂ was below 50 per cent. The mean intake adequacy of energy, protein, riboflavin, niacin, pyridoxine, dietary fiber, magnesium, zinc, and folic acid was between 50 and 75 per cent, and that of calcium and vitamin C was between 75 and cent per cent.



After collecting data, a nutrition awareness programme was conducted for lactating mothers attending PNC at the Rural Health Training Centre, Aligarh. The program discussed low-cost iron and protein recipes, along with a brief explanation of the fortification of their daily dietary food items with millet and whole grains. With the help of a survey, information regarding the most preferred food was collected and presented in Figure 2, the survey most preferred home food according to food groups. The list of home-based foods was purposely created as these foods are sources of essential nutrients and are easily accessible by local people.

Figure 2
Data of 150 Respondents regarding Most Preferred Home Foods



This was revealed in figure 2, that wheat flour chapati, chaat, sprouts, mathi and khichdi are the most preferred homemade food products. Hence, fortifying with millet and whole grains in these food products was beneficial for the selected population. Adding millets ragi, jowar, bajra, and barley to these food products enhanced their nutrient quality in terms of protein, fiber, calcium, and other nutrients. Cooking techniques and ingredients used for making dishes- ragi-chiwra chaat, kodo millet khichdi, kuttu-matthi, sprouts chaat, and millet flour chapati (presented in Table 2) were demonstrated during the session to make people aware and effectively utilize the resources available in their surroundings. The acceptability of fortified recipes was measured using a 5-point hedonic scale.

Table 3
Nutrient Information and Ingredients of Recipes

S.no	Recipe	Ingredients	Acceptability (N=150)					Modifications
			Dislike very much	Dislike slightly	Neutral	Like slightly	Like very much	
1.	 Ragi-chiwra chaat	General recipe: Poha, sugar, oil, salt						
		Fortified recipe: Ragi poha, sesame seeds, ground nuts, curry leaves, sugar, salt, oil.	105	24	14	7	-	The cost of ragi is high.
2.	 Kodo millet khichdi	General recipe: Rice, Dal, jeera, salt, oil						
		Fortified recipe: Kodo millet, green moong dal, curry leaves, bay leaves, mixed vegetables, cloves, jeera, salt, oil.	8	14	33	62	33	Availability of Kodo millet is low in selected area.
3.		General recipe: sooji, oil, jeera, salt.						

	 Kuttu mathi	Fortified recipe: Kuttu ata, sooji, coriander leaves, peanut, salt, jeera, oil.	9	19	31	72	19	Inclusion of kuttu differed as per cultural beliefs.
4.	 Moong dal chana sprouts chaat	General recipe: Moong dal, vegetable, lemon, salt. Fortified recipe: moong dal, chana, mix vegetable, lemon, coriander leaves, salt.						
5.	 Millet flour chapati	General recipe: Wheat flour Fortified recipe: Ragi, Jowar, Barley, Bajra						
			-	8	22	76	54	Proportion and seasonal variations changes acceptability.

From table 3, it was revealed that the majority of respondents positively accepted the change and fortification in the recipe with millet. Replacing rice flakes with ragi increases the nutrient content as ragi is a good source of vitamins B1, B2, B6, calcium, and iron. Kodo millet offers many proteins, fibers, vitamins, and minerals like calcium and magnesium. Buckwheat (Kuttu) is rich in carbohydrates, fiber, and essential micro-nutrients. Pearl millet (bajra) is rich in proteins, carbohydrates, iron, and carotene. After soaking, germinating, and cooking, its anti-nutrients get reduced, increasing nutrient absorption.

Ragi-chiwra chaat : It was found that ragi chiwra was not highly accepted by most people. Therefore, the recipe was further revised by changing the percentage of ragi to 30% and poha to 70%. Increasing the content of poha increased the acceptability of lactating mothers.

Kodo millet khichdi : There was no significant difference in the acceptability of kodo millet khichdi. However, the consumption of this khichdi in real-time is low because of the reason that kodo millet is not readily available and is comparatively more expensive than rice.

Kuttu mathi : Kuttu is a nutrient-dense, but acceptability differs because of different cultural beliefs. It is generally observed that Hindu people consume kuttu during fasting. Its consumption differs according to region, local culture, and religious beliefs.

Moong dal chana sprouts chaat : Adding chana to moong dal sprouts enhanced respondents' nutrient availability and acceptability. These sprouts can be consumed in various forms-

- can be added in pulao and poha if they cannot be consumed as separate dish.
- can be added as stuffing in chapati (sprout roll)

Millet flour chapati : Millet flour can be added to wheat flour to increase the nutrient content of flour. Flour fortification was purposively explained as chapati is the staple food of selected

populations. The proportion of addition of millet to prepare 1.3 kg millet flour is Wheat: Ragi: Bajra: Jowar: 1kg:100gram:100gram:100gram. Adding millet in proportion to 3portion of wheat and 1portion of millet is considered highly acceptable.

Also, during the awareness program, more emphasis was given to including easily available grains, seasonal fruits, and vegetables in daily diet as they are comparatively more nutritious. A healthy plate concept (Paushtik thali) was explained in detail to respondents available during the study. None of the respondents knew the term 'paushtik thali,' different food groups, and different sources of proteins, calcium, and iron. Hence, this awareness program came out to be effective in terms of creating awareness and interacting with the target population to clear their myths with the facts. A study carried out in the Hadiya zone in Southern Ethiopia and the Raya district in Northern Ethiopia supports this conclusion⁵.

Conclusion

Many studies found that breastfeeding mothers consume less protein and micro nutrients, leading to under nutrition. Nutritional status is determined by the quality of nutrients consumed and the body's ability to utilize them for metabolic needs. Fortified food can improve nutritional intake and overall health, particularly among breastfeeding mothers. This study suggests that increasing daily meal frequency can improve calorie intake and meet the Estimated Average Requirement (EAR). Nutrient interaction is crucial for women's absorption, with calcium inhibiting iron absorption and Vitamin C enhancing it. Avoiding milk with chickpeas or sprouts and incorporating rice and lentils into a complete protein source is recommended. Information sharing and positive feedback can help modify recipes for lactation-related health benefits. Although fortified recipes may not be popular, they can gradually become part of the diet. Nutrition education is essential for promoting health and improving nutritional status.

References

1. Alemayehu M, Argaw A & Mariam A G (2015). Factors associated with malnutrition among lactating women in subsistence farming households from Dedo and Seqa-Chekorsa districts, Jimma zone, 2014. *Developing Country Studies*, 5 (21): 117-8.
2. Roba K T, O'Connor T P, Belachew T & O'Brien N M (2015). Seasonal variation in nutritional status and anemia among lactating mothers in two agro-ecological zones of rural Ethiopia: a longitudinal study. *Nutrition*, 31 (10): 1213-1218.
3. Kominiarek MA & Rajan P (2016). *Nutrition Recommendations in Pregnancy and Lactation*. Medical Clinics of North America.
4. Millet Explorer - India. (2023, January 2). Millet Explorer - India.
5. Sitotaw I K, Haileslasie K & Adama Y (2017). Comparison of nutritional status and associated factors of lactating women between lowland and highland communities of District Raya, Alamata, Southern Tigray, Ethiopia. *BMC nutrition*, 3: 1-12.

Problem Behaviour in Children with Specific Learning Disorders and Skilled Learners: A Comparative Study

***Vidyut Singh Sheoran and **Gopal Chandra Mahakud**

*Ph.D. Scholar, School of Humanities and Education, Singhanian University, Jhunjhunu, Rajasthan,
E-mail: kavita vidyut@gmail.com.

**Assistant Professor, Department of Applied Psychology, University of Delhi-110021.

Abstract

Problem behavior is one of the increasing issues in most of the developing countries. The issues of behavioural problem is more aligned with children with low academic performances. In this regard, it can be said that, because of the poor academic performances, children with specific learning disorders are more prone to the problem behavior- both internalizing and externalizing. In contrary it is also observed that skilled learners are lesser affected by problem behaviour and more focused to their academic performances. Very negligible studies conducted to see the problem behavior between children with Specific Learning Disorders and Skilled learners. Therefore, the present study was planned to see whether any significant difference of problem behaviour exist between children with specific learning disorders and skilled learners. A total of (N=120) school going children with problem behaviours were participated in the present study. Out of the total participants, n1=60 were from the population of children with Specific Learning Disorders (SLD) and n2=60 were from population of children with Skilled Learners. Child Behavior Rating Scale (Cassel, 1962) and Problem Behaviour Checklist (Veeraraghavan & Dogra, 2000) were used to collect the information related to Problem behaviour from both the Children with Specific Learning Disorders and Skilled Learners. The results of the present study affirmed that children with Specific Learning disorders have significantly higher level of problem behaviour than to their counterparts-skilled Learners. Hence it can be suggested that healthy peer interaction, warm relationship of teachers and parent and early attention of problem behaviour can be suggested to manage the problem behaviour in school aged children in general and Children with Specific Learning Disorders in Particular.

Key Words: Externalizing Problem behaviour, Internalizing Problem behaviour, Social-withdrawal, Stress, Anxiety, Depression.

Introduction

The association between problem behaviour and Specific Learning disorders are more common. The association is two directional. In other words, it can be said that because of learning disorders, the child may exhibit problem behavior or due to the problem behavior the poor performance in learning may be occurred. In this context, Diakakis, et. al.¹ affirmed that 24 per cent to 52 per cent of children with specific learning disorders present with behavioural problems.

Children with SLD are barely affected with their emotions². It may be because of the social negligence³⁻⁴, inappropriate treatment in the family⁵ and the school setting and bullying from the peers and other social agents⁶. Researchers⁷ stated children who internalize their emotions suffer from depression, anxiety and experience a loss of interest in everyday activities including their schoolwork. Primarily children with SLD are not explicitly able to express the emotional turmoil which is the repercussions of poor academic performance⁸. Beside this as the children with learning disorders are mistreated by every member of the society, he/she mislay his rationalization of behavioral manifestation and exhibits mal-adaptive behavior⁹. These mal-adaptive behaviors are manifested in the form of both internalizing and externalizing problem behavior¹⁰.

Internalizing problems are those which cannot be explicitly expressed and are not visible to people around. Internalizing problems associated with learning disorders may include suicidal tendencies¹¹⁻¹³, depression¹²⁻¹³, Stress¹⁴, anxiety¹⁴, Emotional ties¹⁵, low self-esteem¹⁶, low self-worthiness¹⁷. Low self-control¹⁸, Low Self-regulation¹⁹⁻²⁰ and social withdrawal²¹. Maag and Reid²² observed that students with Specific Learning Disorders (SLD) have significantly higher levels of depression than do students without them. Besides this it is also observed that children with specific learning Disorders are observed to be at greater risk psychological disorders than to their counterparts-skilled learners²³. From a cross sectional research conducted by Esmaili, et. al.²⁴ on a sample of 107 students diagnosed with specific learning Disorders affirmed other psychiatric problems such as attention deficit hyperactivity disorder, depression, generalized anxiety and oppositional defiant disorder which were co morbid with Specific Learning Disorders.

Externalizing problems are those problems which are explicitly visible in the maladaptive behaviour. Externalizing problems which can be the associated with learning Disorders can include both physical and verbal aggression²⁵, disobedience²⁶, cheating²⁷, stealing and theft behaviour²⁸, destruction of property²⁹, disruptive behaviour³⁰, defiant³¹, tantrums³² and even juvenile delinquency³³. In this context, it can be said that because of learning disorders children may develop these externalizing problem behaviours or vice versa. In a comparison study by Willcutt, and Pennington³⁴ in regard to the internalizing and externalizing problem behaviour of children with Learning Disorders, it is found that internalizing problem are relatively higher in children with Specific Learning Disorders (SLD) where externalizing problems are more with Non SLD children. Further, it can be said that gender also plays a vital role in relation to the problem behaviour in children specific to Specific Learning disorders. Analyses of gender differences by Willcutt and Pennington³⁴ affirmed that there is a significant association between Specific Learning Disorders and internalizing problem behaviour and is largely restricted to girls, whereas there is a strong association between Specific Learning Disorders and externalizing problem behaviour and also is stronger for boys. Researchers³⁵ conducted on normal population also affirmed that internalizing problem behaviours are more with girls and externalizing problem behaviours relatively high in boys.

In participation of everyday life activities of the children with and without specific learning Disorders was compared and it was observed that participation of children with specific learning Disorders were significantly decreased in learning domain in comparison to non SLD children. In addition, Pade, Rosenberg, Tzarzur, and Bart³⁶ viewed that the parents of SLD children also confirmed that specific learning Disorders had lowered the child's enjoyment and recreation as

well as the parental satisfaction of specific learning Disorders children was relatively lower than parental satisfaction of parents of those children who were skilled learners. Although some of the studies conducted on problem behaviour in relation to Children with specific learning Disorders and Skilled learners, still its number are very less especially in developing countries where it's one of the major neglected area of concern by the teachers, school professional and psychologist. Therefore, the present research was planned to see the difference of problem behaviour between children with Specific Learning Disorders (SLD) and Skilled Learners.

Objective

The main objective of the present study is to see the difference of problem behaviour between children with Specific Learning Disorders and Skilled Learners.

Hypotheses

There will be significant difference problem behaviour between children with Specific Learning Disorders and Skilled Learners. A total of (N=120) school going children with problem behaviours were participated in the present study. Out of the total participants, n1=60 were from the population of children with Specific Learning Disorders (SLD) and n2=60 were from population of children with Skilled Learners. Both male and female participant's were selected randomly from the pool of children with Specific Learning Disorders and Skilled learners. All the participants were from different schools, NGOs, and Tuition canters from Delhi NCR. Already diagnosed children Specific Learning Disorders and Skilled learners included in the present study. The diagnostic criteria for children with Specific Learning Disorders were followed Bocian³⁷. The age range of the participants was from 9 to 13 years of old with the median age of 11. The sampling techniques for the present study was followed a purposive random sampling procedure where 60 children with Specific Learning Disorders and 60 Skilled learners were selected from a pool of 150 each.

Methodology

- **Child Behaviour Rating Scale (Cassel, 1962):** The Child Behaviour Rating Scale (CBRS) measures the child's level of behavior and personality adjustment. This instrument was developed by Cassel (1962) is an objective assessment of children from preschool through third grade. It consists of 78 brief statements to be rated by someone familiar with the child (such as parent and/or teacher) on a scale of six values ranging from "Yes 11 to "No." The provides a profile of the child's adjustment in five different areas (self, home, social, school, and physical) along with a single score to indicate total adjustment. The CBRS has a construct validity index of 0.481 with the Vineland Social Maturity Scales. A split-half reliability coefficient of 0.873 was obtained when comparing odd-even items for 800 typical children and 0.589 for 200 maladjusted children.
- **Problem Behaviour Checklist (Veeraraghavan and Dogra, 2000):** Problem behavior checklist was developed by Veeraraghavan and Dogra, (2000) is a 3 point rating scale ranging from Most often (3) to Never (1). The checklist consists of 58 items. The checklist indicates three levels of problem behavior i.e. Low problem behavior ranging from the raw score of 58-96, followed by

moderate problem behavior ranging from the raw score 97-135 and high problem behavior ranging from the raw score 136-174. The standardization of the checklist is based on test –retest reliability (0.85) and split half reliability (0.81). The validity of the checklist is based on face validity and content validity.

Research Design: An experimentation single case design was followed for the present study where each and every participant's data was collected individually.

Settings: The study was conducted in school settings of the participants. In some cases, the parent's information related to the Child Behaviour Rating Scale (CBRS) and Problem Behaviour Check List (PBCL) following a parent meeting at the school with the permissions of the school authorities. The entire data related to the present study was collected during leisure time of participants.

Ethical Issues: Consent from parents of participants and also from the participants, participated in the present study was taken before conduction of study. Beside that the permission from respective school authorities was taken. The entire participants were assured that their data will be kept confidential.

Procedure: Prior consent was taken from the parents and the school authority for the study. Then the researcher visited the school 3 to 4 times to make a friendly relationship with all the participants. Then after a good rapport between the participants and the researcher, the researcher had debriefed about the purpose of the study to the participants. All the participants had informed that participation in the present study is voluntary the information related to the study will be kept confidential. The instructions for collection of information related to Problem Behavior Checklist and Child Behavior Rating Scale were provided according to the respective manuals. Besides that, the participant was requested to be honest for the information they will be asked for. After the instruction, participants were provided one after other materials for the collection of information. In between one test to other a fifteen minutes rest interval was given to the participants during the data collection. Besides that, all the participants were informed that, if during the time of administration, they feel any fatigue or burden, they can ask to the researcher for rest. The entire data for the present study was collected during the leisure time of the participants whether it is in school or in the natural home setting.

Scoring and Data Analysis: The scoring of each and every material was followed as per the respective manual. After the scoring the researcher did the data analysis using both descriptive and inferential statistics. The descriptive data analysis was followed using Mean and Standard deviation. The data is presented in both tabular and figural representation. The inferential statistics was followed Pearson's product movement correlation and Pearson's Product Movement Correlation to find out the relationship between problem behavior and Vineland Social Maturity Scale of the participants. For the comparison of data between participants from Government and private school settings and between male and female the researcher had used SOne way Analysis of Variance respectively. The entire data was analyzed using SPSS 22.0.

Findings and Discussion

The mean score of Self adjustment obtained from Child Behaviour Rating Scale (CBRS) in Skilled Readers is 89.50 ± 9.33 . The Mean score of Self adjustment obtained from Child Behaviour Rating Scale (CBRS) in Children with SLD is 71.30 ± 8.08 . The Comparison of Self Adjustment between Skilled Learners and Children with SLD indicates a significant difference (df, 118, $t=11.52$, $P=0.000^{**}$). In other words, it can be said that the self-adjustment of children with specific Learning disorders are poorer than to the skilled learners. The study of Awasthi³⁸ also affirmed that self-adjustment is one of the important problems with children with specific learning disorders. The mean score of Home adjustment obtained from Child Behaviour Rating Scale (CBRS) in Skilled Readers is 75.67 ± 7.11 . The Mean score of Home adjustment obtained from Child Behaviour Rating Scale (CBRS) in Children with SLD is 63.97 ± 6.71 . The Comparison of Home Adjustment between Skilled Learners and Children with SLD indicates a significant difference (df, 118, $t=9.35$, $P=0.000^{**}$). From the study of Awasthi³⁸ it is also observed that home adjustment is also another problem with children with specific learning disorders. The reason might be that because of the poor academic performances, children with specific learning disorders gets less family attention and affection rather than more harassment in the family system. Because of this reason he/she try to avoid the family environment and, in many cases, don't adjust himself/herself with the family system.

The mean score of Social adjustment obtained from Child Behaviour Rating Scale (CBRS) in Skilled Readers is 69.50 ± 10.53 . The Mean score of Social adjustment obtained from Child Behaviour Rating Scale (CBRS) in Children with SLD is 63.37 ± 4.66 . The Comparison of Social Adjustment between Skilled Learners and Children with SLD indicates a significant difference (df, 118, $t=4.16$, $P=0.000^{**}$). Because of the poor performances, the children with specific learning disorders also lacks social interaction and, in many cases, avoid social situation just to avoid the social harassment because of his/her poor performances³⁻⁴. In this context, from the study of Neeraja, and Anuradha³⁹ it is evidenced that social adjustment is one of the major issues in children with specific learning disorders.

The mean score of School adjustment obtained from Child Behaviour Rating Scale (CBRS) in Skilled Readers is 50.23 ± 5.97 . The Mean score of School adjustment obtained from Child Behaviour Rating Scale (CBRS) in Children with SLD is 44.67 ± 4.77 . The Comparison of School Adjustment between Skilled Learners and Children with SLD indicates a significant difference (df, 118, $t=5.69$, $P=0.000^{**}$). The results of the present study in regard to the school adjustment stated that the children with specific learning disorders suffer more problems in school adjustment than to their counterparts. The reason could be the bullying behaviour of the teachers and peers in the school setting⁴⁰. The same issues of school adjustment is also observed from the study of Awasthi³⁸ and also from the study of Neeraja and Anuradha³⁹. Further, the study also confirmed that physical adjustment is quite poor in children specific learning disorders than to the skilled learners. The results of the present study the mean score of Physical adjustment obtained from Child Behaviour Rating Scale (CBRS) in Skilled Readers is 30.90 ± 4.08 . The Mean score of Physical adjustment obtained from Child Behaviour Rating Scale (CBRS) in Children with SLD is 27.27 ± 3.75 . The Comparison of Physical Adjustment between Skilled Learners and Children with SLD indicates a significant difference (df, 118, $t=5.12$, $P=0.000^{**}$) is also aligned with the study of Awasthi³⁸ and also from the study of Neeraja and Anuradha³⁹.

The mean score of PBCL obtained from Child Behaviour Rating Scale (CBRS) in Skilled Readers is 149.20 ± 17.58 . The Mean score of PBCL obtained from Child Behaviour Rating Scale (CBRS) in Children with SLD is 157.33 ± 14.06 . The Comparison of PBCL between Skilled Learners and Children with SLD indicates a significant difference ($df, 118, t=2.82, P=0.000^{**}$). Finally, problem behaviour check list score also affirmed that problem behaviour is quite more with children with specific learning disorders than to their skilled readers' counterparts. In this context, Diakakis, et. al¹ viewed that problem behaviour is more with children with Specific Learning Disorders than to the skilled readers in the same classroom settings. From the earlier study of Mahakud⁴⁰ it was also observed that classroom problem behaviour is quite more with children with learning disorders than to the skilled learners.

Conclusion

From the results of the present study and even some of the previous studies affirmed that problem behaviour is one of the major issues with children with learning disorders. In this regard, it can be said that the problem behaviour may be the cause of the poor learning performance and unfortunately in developing and under developed countries teachers, parents, school authorities and other social agents are not serious about the facts that due to the poor performance problem behaviour may be one of the consequences among the children with Specific learning disorders and in future it may result dropout, antisocial, unsocial and other form of criminal behaviour. So proper management at various level of the problem behaviour in school, home and other social setting may reduce this chance of occurrences and may help the children with learning disorders to be skilled learners and can also improve the day to day life of the children with learning disorders.

Table-1
Comparison of Problem Behaviour followed by CBRS and PBCL of Skilled Learners and Children with SLD

Variables	Categories	Mean	Std. Deviation	Std. Error Mean	t-Value	P-Value
CBRS-Self Adjustment	Skilled Learner	89.50	9.33	1.70	11.52	0.000**
	Children with SLD	71.30	8.08	1.48		
CBRS Home Adjustment	Skilled Learner	75.67	7.11	1.30	9.35	0.000**
	Children with SLD	63.97	6.71	1.23		
CBRS Social Adjustment	Skilled Learner	69.50	10.53	1.92	4.16	0.000**
	Children with SLD	63.37	4.66	0.85		
CBRS School Adjustment	Skilled Learner	50.23	5.97	1.09	5.69	0.000**
	Children with SLD	44.67	4.77	0.87		
CBRS Physical Adjustment	Skilled Learner	30.90	4.08	0.75	5.12	0.000**
	Children with SLD	27.27	3.75	0.69		
PBCL	Skilled Learner	149.20	17.58	3.21	2.82	0.000**
	Children with SLD	157.33	14.06	2.57		

Note: High score depicts low Behavioural issues and Better Adjustment in Child behavior rating Scale (CBRS) whereas high score depicts high problem behavior in Problem behaviour Check List (PBCL)

References

1. Diakakis P, Gardelis J, Ventouri K, Nikolaou K, Koltsida G, Tsitoura S, Constantopoulos A. (Jan, 2008). Behavioral problems in children with learning difficulties according to their parents and teachers. *Pediatrics*; 121 (Supplement_2): S100-101.
2. Bonifacci P, Storti M, Tobia V, & Suardi A. (Sep, 2016). Specific learning disorders: A look inside children's and parents' psychological well-being and relationships. *Journal of learning Disorders*;49(5):532-545.
3. Nair MK, Paul MK, & Padmamohan J. (Aug, 2003). Scholastic performance of adolescents. *The Indian Journal of Pediatrics*; 70:629-631.
4. Biçakçı MY, Er S, & Aral N. (Apr, 2016). An overview of child neglect and abuse: Types, causes, impact and prevention. *Studies on Ethno-medicine*;10(2):221-228.
5. Williams F. (Sep, 2002). Women with learning difficulties are women too. In *Women, oppression and social work*; (pp. 163-182). Routledge.
6. Weinreich L, Haberstroh S, Schulte-Körne G, & Moll K. (Fab, 2023). The relationship between bullying, learning disorders and psychiatric comorbidity. *BMC psychiatry*; 21;23(1):116.
7. Gresham FM, & Kern L. (2004). Internalizing behavior problems in children and adolescents. *Handbook of research in emotional and behavioral disorders*; 14:262-281.
8. Grigorenko EL, Compton DL, Fuchs LS, Wagner RK, Willcutt EG, & Fletcher JM. (Jan, 2020). Understanding, educating, and supporting children with specific learning Disorders: 50 years of science and practice. *American Psychologist*;75(1):37.
9. Goldstein S. (1997). *Managing attention and learning disorders in late adolescence and adulthood: A guide for practitioners*. John Wiley & Sons.
10. Arslan İB, Lucassen N, Van Lier PA, De Haan AD, & Prinzie P. (Fab, 2021). Early childhood internalizing problems, externalizing problems and their co-occurrence and (mal) adaptive functioning in emerging adulthood: a 16-year follow-up study. *Social psychiatry and psychiatric epidemiology*; 56:193-206.
11. Miniksar DY, & Büşra ÖZ. (2021). Personality traits and suicide probability in children and adolescents with specific learning disorder. *Cukurova Medical Journal*;46(3):1245-1256.
12. Nagraj D, & Omar HA. (Oct, 2017). Disability and suicide: A review. *International Journal of Child Health & Human Development*;10(4).
13. Shah FH, Kim SJ, Zakir L, Ehsan A, Riaz S, Sulaiman M, & Salman S. (Jan, 2022). Depression, Suicidal Tendencies, Hopelessness, and Stress among Patients with Learning Disorders. In *Learning Disorders-Neurobiology, Assessment, Clinical Features and Treatments*; IntechOpen.
14. Bender WN, Rosenkrans CB, & Crane MK. (May, 1999). Stress, depression, and suicide among students with learning Disorders: Assessing the risk. *Learning Disability Quarterly*;22(2):143-156.
15. D'Amico A, & Guastaferro T. (2017). Emotional and meta-emotional intelligence as predictors of adjustment problems in students with Specific Learning Disorders.
16. Pandy RI. (2012). Learning Disorders and self-esteem. *All Capstone Projects*. 133. Retrieved from <https://opus.govst.edu/capstones/133> dated 20-12-2023.
17. AP SK. (2012). Sense of Worthiness among the Children with Specific Learning Disability. *International Journal of Pharmaceuticals and Health Care Research*; 3(1), 12-19.
18. Harris KR, & Graham S. (Fab, 1985). Improving learning disabled students' composition skills: Self-control strategy training. *Learning Disability Quarterly*;8(1):27-36.

19. Graham L, & Berman J. (Jan, 2012). Self-regulation and learning Disorders. *Special Education Perspectives*;21(2):41-52.
20. Khasawneh MA. (2021). Self-Regulation among students with learning Disorders in English language and its relationship to some variables.
21. Stanford LD, & Hynd GW. (Apr, 1994). Congruence of behavioral symptomatology in children with ADD/H, ADD/WO, and learning Disorders. *Journal of learning Disorders*;27(4):243-253.
22. Maag JW, & Reid R. (Jan, 2006). Depression among students with learning Disorders: Assessing the risk. *Journal of learning Disorders*;39(1):3-10.
23. Sahoo MK, Biswas H, & Padhy SK. (Jan, 2015). Psychological co-morbidity in children with specific learning disorders. *Journal of family medicine and primary care*;4(1):21.
24. Esmaili SK, Shafaroodi N, Mehraban AH, Parand A, Qorbani M, Yazdani F, & Mahmoudpour A. (Aug, 2016). Prevalence of psychiatric symptoms and mental health services in students with specific learning Disorders in Tehran, Iran. *International Journal of Mental Health and Addiction*; 14:438-448.
25. Tyrer F, McGrother CW, Thorp CF, Donaldson M, Bhaumik S, Watson JM, & Hollin C. (April, 2006). Physical aggression towards others in adults with learning Disorders: prevalence and associated factors. *Journal of intellectual disability research*;50(4):295-304.
26. Roach KJ. (1997). The Prevalence of Adoption Among Children Diagnosed with Learning Disorders and Attention Deficit Hyperactivity Disorder.
27. Perdeu M. (2016). To Cheat or Not to Cheat: Impacts of Learning Disability Status and Impulsivity on Cheating.
28. Shandra CL, & Hogan DP. (Dec, 2012). Delinquency among adolescents with Disorders. *Child indicators research*; 5: 771-788.
29. Smith S, Branford D, Collacott RA, Cooper SA, & McGrother C. (Aug, 1996). Prevalence and cluster typology of maladaptive behaviours in a geographically defined population of adults with learning Disorders. *The British Journal of Psychiatry*;169(2):219-227.
30. Margalit M. (Jan, 1995). Social skills learning for students with learning Disorders and students with behaviour disorders. *Educational Psychology*;15(4):445-456.
31. Absoud M, Wake H, Ziriati M, & Hassiotis A. (May, 2019). Managing challenging behaviour in children with possible learning disability. *BMJ*;365.
32. Lowe K, Allen D, Jones E, Brophy S, Moore K, & James W. (Aug, 2007). Challenging behaviours: Prevalence and topographies. *Journal of Intellectual Disability Research*;51(8):625-636.
33. Zinkus PW, & Gottlieb MI. (Oct, 1978). Learning Disorders and juvenile delinquency: Failure to recognize the impact of academic underachievement on family and peer relationships and on the developing self-concept of the individual may result ultimately as disturbed adolescent behaviors and juvenile delinquency. *Clinical Pediatrics*;17(10):775-780.
34. Willcutt EG, & Pennington BF. (Nov, 2000). Psychiatric comorbidity in children and adolescents with reading disability. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*;41(8):1039-1048.
35. Keenan K, & Shaw D. (Jan, 1997). Developmental and social influences on young girls' early problem behavior. *Psychological bulletin*;121(1):95.

36. Pade M, Rosenberg L, Tzarzur R, & Bart O. (Sep, 2020). Participation in everyday activities of children with and without specific learning disorder. *Physical & occupational therapy in pediatrics*;40(5):506-517.
37. Bocian KM, Beebe ME, MacMillan DL, & Gresham FM. (Jan, 1999). Competing paradigms in learning Disorders classification by schools and the variations in the meaning of discrepant achievement. *Learning Disorders Research & Practice*;14(1):1-4.
38. Awasthi RK. (2018). Adjustment Problems Faced by Children With Learning Disorders Reference To Inclusive Education. *Globus Journal of Progressive Education*;8(2):21-23.
39. Neeraja P, & Anuradha K. (2014). Adjustment problems faced by children with learning Disorders impact of special education. *Indian Journal of Scientific Research*;5(1): 77-81.
40. Mahakud GC. (Mar, 2013). Classroom problem behaviour and working memory of reading disabled and skilled readers. *Indian Journal of Health and Wellbeing*;4(2):239.

GUIDELINES FOR AUTHORS

Manuscripts/papers will be critically blind-reviewed by experts in the relevant fields. Neither the author's identity will be revealed to the experts nor will the experts' identity be informed to the authors. Authors are given the benefit of comments, whenever necessary. Acceptance of the paper for publication is purely based on the originality of the work, substance, and clarity of presentation. Published papers represent the opinion of the authors and do not reflect the views or the policy of the Institute. Text materials/papers published in the book can be reproduced with due acknowledgment.

How to submit the manuscript: It is mandatory for the author/s to submit the soft-copy of the manuscript through only an E-attachment to The Editor- National Institute of Health and Family Welfare, Munirka, New Delhi-110067 at- editor@nihfw.org. As a part of 'green initiative,' we don't receive hard copies from the authors. The manuscript must be in **MS Word only, Arial Narrow**, Font size- 13, Colour- black, in single column and single spacing with wide margins. The paper must accompany a declaration that it is an original creation of the author/s; and has not been published / submitted for publication anywhere else. In the absence of such a Declaration by the any author/s, it would be assumed that the paper is an original creation of the concerned author/s; and has not been published / submitted for publication anywhere else. **The concerned author/s will be responsible for any kind of plagiarism or copy right violation in the published papers.** Any communication from the Editor, to the author/s; will be done only through E-mail. The paper should be precisely written following **APA style/format**. The flow of the paper to be followed is: Title- Abstract-Key words-Introduction-Methodology-Findings-Discussion-Conclusion and Recommendations-References. The title of the paper should be short and clear. The author should keep a copy of the manuscript. The institute reserves the right to make necessary editorial changes. The paper must not exceed 5000 words, with an abstract of not exceeding 200 words preceding the title and followed by a maximum of 7 key-words. The combined number of Tables, Graphs, Figures, Illustrations and Charts must not go beyond 10. Tables with borders, Graphs, Figures, Illustrations, Legends and Charts must not appear at the end of the paper but these should be given at appropriate places amidst the text content. The Tables, Figures and, Illustrations must be within the printing area of the book i.e. A4 size.

Labeling of the figures shall be reentered by the Editor to conform to a uniform style, wherever necessary. Each table should be referred to as e.g. Table 4 using Arabic number. Tables with borders must be appropriately cited in the text. Legends should be typed on the same sheet of table.

References:All the references should be cited in superscript in a numerical consecutive order in the text. The reference list should also be arranged in the same order at the end of the paper. References not reflected in the text, must not be included in the list of references and vice-versa. Care should be taken to quote the page number where the article begins in a periodical, or the source from where the statement has been quoted.

Papers submitted without adhering to the given format, will not be considered for publication. Decision of the Editorial Board with regard to the suitability of the papers for publication is final. Authors are requested not to enquire about the status of their papers.

THE NATIONAL INSTITUTE OF HEALTH AND FAMILY WELFARE

The National Institute of Health and Family Welfare (NIHFW) an autonomous organization, under the Ministry of health and Family Welfare, Government of India, acts as an 'apex technical institute' as well as 'think tank' for the promotion of Health and Family Welfare programmes in the country. The NIHFW is known for its Education, Training, Research, and Specialized advisory services.

Educational activities: The educational activities of the Institute contribute to Human resource development for better management of health and family welfare programmes in the country. The on campus courses are: Three-year Post-graduate Degree in Community Health Administration, a two-year Post-Graduate Diploma in health Administration, and a one year Post-Graduate Diploma in learning mode of one year duration each. These are: Health and Family Welfare management, Hospital management, health Promotion, health Communication, Public Health Nutrition and Applied Epidemiology. These courses are need based and multidisciplinary in nature. The Institute has also developed certificate courses through e-learning mode for enhancing the skills and competencies of in-service middle level health professionals in the areas of 'Professional Development in Public health and Health Sector Reforms' for Medical Officers, and "Programme Management for Public Health care for the Programme Managers working in national health Mission or in the health sector.

Training and Workshops: The training courses and workshops (intramural and extramural), numbering around 45-50 are organized by the Institute every year with an aim to familiarize the participants with the goals and the objectives of health and family welfare programmes; updating their knowledge and understanding of operational difficulties in implementation and suggesting remedial measures to overcome such constraints.

Research and Evaluation: The Institute gives priority attention to research in various aspects of health and family welfare. The Institute has an Academic Committee and a high level Programme Advisory Committee for ensuring the quality in academic endeavours. The Institute also conducts evaluation studies of National Health Programmes and various other related activities initiated by the Government of India.

Specialized Services: Specialized services of the Institute include Clinical services, National Cold Chain and Vaccine Resource management Centre (NCCVMRC), Centre for Health Informatics, Skill Lab, National Documentation Centre and publications. The ministry of health and Family Welfare (MoHFW) has entrusted the Institute to act as a "National Nodal Agency" to organize, coordinate and monitor the training programmes of Reproductive and Child health (RCH) in the country. The main objective of the Clinic is to render Mother and Child Health services. The clinical work in relation to infertility, reproductive disorders, especially endocrinology and sexual dysfunctions deserve special mention. NIHFW in partnership with UNICEF through the National Cold Chain Management Information System, is responsible for the overall maintenance, implantation and monitoring of NCCMIS across the country including providing support to the end users. The reference, referral, press clipping and bibliographic services of the National Documentation Centre; and the publication, art and projection services of the Department of Communication compliment the activities of the Institute.

Advisory and Consultancy Services: The Director and faculty members of the Institute provide advisory and consultancy services to various national, international and voluntary organizations in various capacities.

PRINTED AND PUBLISHED BY THE DIRECTOR,
The National Institute of Health and Family Welfare, Munirka, New Delhi-110067
Website: www.nihfw.org