A National Journal of Indian Association of Preventive and Social Medicine

HEALTHLINE

pISSN 2229-337X / eISSN 2320-1525

VOLUME : 16 ISSUE : 4 OCTOBER - DECEMBER 2025

For more details visit : www.healthlinejournal.org

HEALTHLINE JOURNAL

A National Journal of

Indian Association of Preventive and Social Medicine managed by IAPSM-GC

Volume : 16 Issue : 4 (October-December 2025)

Editorial Board

Correspondence

Editor in Chief, Healthline Journal, Community Medicine Department, GCS Medical College, Hospital and Research Center, Opp. DRM Office, Nr. Chamunda Bridge, Naroda Road, Ahmedabad-380025, Gujarat. Telephone: 07966048000 Ext. No. 8351, Email: editorhealthline@gmail.com.

Disclaimer

Healthline journal is indexed with

Index Copernicus, DOAJ, OPENJGATE, CABI, Index Medicus-SEAR

HEALTHLINE JOURNAL

A National Journal of
Indian Association of Preventive and Social Medicine managed by IAPSM-GC
Volume : 16 Issue : 4 (October-December 2025)

INDEX

HEALTHLINE JOURNAL

A National Journal of

Indian Association of Preventive and Social Medicine managed by IAPSM-GC

Volume : 16 Issue : 4 (October-December 2025)

INDEX

Brewing Epidemic of Research Publications in Medical Colleges: Critical Commentary

Manjunatha S Nagaraja

Professor, Department of Community Medicine, Mysore Medical College and Research Institute, Mysuru, India

Correspondence: Dr. Manjunatha S Nagaraja, Email: drmanju.mmcri@gmail.com

Today's medical educator/health professional educator is undergoing an identity crisis as competing priorities are thrust on him/her. Being an astute clinician, teacher (with multiple sub-roles involving pedagogical and technological skills), researcher and administrator, the educator is expected to deliver on all fronts, which is easier said than done. The most important determinant of recognition and reward today is scholarship of discovery and not always scholarship of teaching, integration or application, which seems surreal at the least. The accreditation and ranking of an institute hinge on the number and quality of research output. There are targets set for procuring research grants and patents. This looks progressive and necessary, but there are concerns that need the attention of all stakeholders.

The National Medical Commission has defined research publication criteria from time to time for the promotion of medical college faculty, which are relevant and optimum. But there is an epidemic of research publications fueled by college managements, professional bodies and self-imposition by faculty as a matter of pride and the fallout may not be good. If we analyse the good, bad and the ugly side of publications, we find the publication landscape looking like an ocean of mediocrity with islands of excellence. Plagiarism, unethical authorship, salami publications and all other forms of misconduct are commonplace. Unfortunately, India ranks very high in research misconduct globally, and the premier medical colleges are not immune to it.[1]

Altman, in his paper 'The scandal of poor medical research', catalogues the incomplete spectrum of serious errors which may be willful or due to ignorance. Either way, science is defeated, and huge grant money is going down the drain.[2]

The common metrics used to measure academic excellence, like number of publications, citation numbers and impact factors, have not undergone changes for decades. These metrics have become targets and follow Goodhart's law, according to which "when a measure becomes a target, it ceases to be a good measure". Fire and Guestrin analysed more than 120 million papers and demonstrated that the validity of citation-based measures had been compromised and their usefulness is decreasing. More number of authors, small papers, self-citations, long list of references inflate metrics. These inflated metrics make it harder to compare researchers across fields or even departments, diminishing their usefulness.[3]

The publishing epidemic may lead to publishing addiction (PA). Publication addiction is a behavioural disorder with specific characteristics. Repeated rituals like checking citations repeatedly or the H index on Google Scholar. The trap is not easy to escape.[4] The McNamara fallacy is also applicable here, which refers to the tendency to focus on numbers, metrics, and quantifiable data while disregarding the meaningful qualitative aspects, which reinforces the fact that less may be more.[5]

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Nagaraja MS. Brewing Epidemic of Research Publications in Medical Colleges: Critical Commentary. Healthline. 2025;16(4): 251-252
	DOI : 10.51957/Healthline_811_2025	

Received : 30-12-2025 **Accepted** : 31-12-2025 **Published :** 31-12-2025

Publications being the sine qua non of merit for a medical teacher is causing a tsunami of publications that are of the run-of-the-mill type. The teacher is paying the price in terms of burnout and peer pressure. Intra-departmental conflicts due to the publication war are reported in informal circles. The surprising part is that we pay a publication fee to journals for disseminating our work, which is a product of our blood and sweat. A farmer or any other producer of a commodity would never imagine doing it! Publication as the only accountable incentive for teachers may take them away from academic and clinical duties. Scholarship of teaching attributes, including continuous deep reflection, committed engagement in action, shared communication, and a critical enquiry-based approach, may start receding from the ecosystem. We can consider developing a comprehensive framework to promote and assess the professional growth of faculty, which focuses on developing a community of practice rather than competition and the rat race. Such a framework can include scholarship of teaching, clinical excellence, 360-degree feedback, mentoring, role modelling, number of publications and citations in indexed journals, grants received for research projects, role in organising committees of CMEs and conferences, involvement in institutional committees, community educational activities and extracurricular activities. An Academic Index (AI) based on objective scoring can also be considered.

The maverick musing is not about predicting doom, but to make the faculty reflect. If we need to prevent the nemesis, we need to deliberate on this key issue at various levels. Integrating a research component in the regular faculty development programs, like Basic Course in Medical Education (BCME) may help. Primary prevention is possible with a competency-based faculty development (CBFD) programme with articulated competencies covering all types of scholarship. We need to create pathways for faculty, which may be a pure clinician pathway, clinician scientist pathway or clinician educator pathway, each having equal recognition and not glorifying clinician scientist. Though the medical education system follows complex adaptive systems the Occam's Razor should guide us in this matter. Secondary prevention may be possible with the national medical commission scrutinising the publications made by the faculty. Tertiary prevention may be considering only citation index and not the number of publications, which is already on the cards. Quaternary prevention is to set criteria/conditions for publications once a particular number is credited to the account of a faculty. It may seem outlandish but may help prevent publication addiction and publication mania. Having used high-sounding lexicon, I feel sanguine, and the prevailing mood among the medical fraternity is propitious.

Om Tat Sat

Declaration

Funding: Nil

Conflict of Interest: Nil

References:

1. Jayaraman KS. Growing scientific misconduct causes concern. Nat India [Internet]. 2011 Aug 18 [cited 2025 Dec 19]; Available from: http://www.natureasia.com/en/nindia/article/10.1038/nindia.2011.120
2. Altman DG. The scandal of poor medical research. BMJ. 1994 Jan 29;308(6924):283-4. doi: 10.1136/bmj.308.6924.283
3. Fire M, Guestrin C. Over-optimization of academic publishing metrics: observing Goodhart's Law in action. Giga science. 2019 Jun 1,8(6):giz053. doi: 10.1093/gigascience/giz053
4. Ioannidis JPA (2022) Correction: Why Most Published Research Findings Are False. PLOS Medicine 19(8): e1004085. doi:10.1371/journal.pmed.1004085
5. McNamara fallacy [Internet]. Wikipedia. 2023[cited 2025 Dec 27] Available from: https://en.wikipedia.org/wiki/McNamara_fallacy

Facilitators and Barriers of Service Utilization in the Ayushman Arogya Mandirs of Tripura: A Qualitative Study

Paulami Nag[1], Rituparna Das[2], Subrata Baidya[3]

[1]Postgraduate student, [2]Associate Professor, [3]Professor and Head, Department of Community Medicine, Agartala Government Medical College, Agartala, Tripura, India

Correspondence: Dr. Paulami Nag, Email: npaulami18@gmail.com

Abstract:

Introduction: In order to deliver comprehensive primary health care, the existing Sub Health Centres were converted into Health and Wellness Centre (HWC) now known as Ayushman Arogya Mandirs under the twin pillars of Ayushman Bharat Scheme. However, Universal Health Coverage (UHC) remains an elusive aim due to various shortcomings in the quality and availability of services. **Objective:** To identify the facilitators and barriers of utilization of the services of Health and Wellness Centres of Tripura. **Methods:** This was a Qualitative study, using In-depth Interview method where 35 key informants' in-depth interviews were conducted in different health and wellness centre areas from the districts of Tripura and data were analysed using the Thematic network analysis framework. **Results:** Unavailability of services (like medicines and functioning equipment), lack of accessibility, lack of satisfaction, lack of awareness and poor health seeking behaviour were identified as major barriers of utilization of the services. On the other hand, positive working attitudes of the staff, availability of MCH services, friendly environment and good communication of staffs were found as facilitators in the utilization of services. **Conclusion:** The study highlighted that poor accessibility of health centres, unavailability of medicines, equipment etc., were acting as barriers whereas availability of the MCH services and staff behaviour were facilitating the service utilization.

Keywords: Ayushman Arogya Mandir, Comprehensive Primary Health Care, Health and Wellness Centre, Service Utilization

Introduction:

With the announcement of Ayushman Bharat with its twin pillars Health and Wellness Centre (HWC) and Pradhan Mantri Jan Arogya Yojana (PMJAY), Government of India marked a paradigm shift in prioritising policies and programs from Reproductive and Child Health Services (RCH) towards achieving UHC.[1] HWCs were envisaged to deliver Comprehensive Primary Health Care (CPHC) through expanded range of services going beyond RCH and including Non-Communicable Diseases (NCD), palliative and rehabilitative care, basic oral care, ENT care, mental health care and first level care for emergencies and trauma, provision of free medicines and diagnostics with focus being kept on health promotion and disease prevention.[1,2]

In February 2018, the Government of India announced that 1,50,000 HWCs would be created to

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Nag P, Das R, Baidya S. Facilitators and Barriers of service utilization in the Ayushman Arogya Mandirs of Tripura: A Qualitative study. Healthline. 2025;16(4): 253-260
	DOI : 10.51957/Healthline_738_2025	

Received : 26-05-2025 **Accepted** : 14-11-2025 **Published :** 31-12-2025

deliver CPHC with the aim to provide a seamless continuum of care that ensures principles of equity, quality, universality and no financial hardship.[1,3]

The primary health care system of India has evolved since Independence.[4] In spite of the successive commitments of National and State governments, the UHC remains an elusive aim due to the shortcomings related to workforce, infrastructure, quality and availability of services.[5] As, the implementation process of Ayushman Bharat scheme through Ayushman Arogya Mandir, is in its initial phase, a qualitative assessment of the beneficiaries in the community is needed to identify which aspects of the program needs more attention as well as which strategies will be more useful for successful implementation of the program. Hence this qualitative study was conducted to assess the facilitators and barriers of utilization of services in the community catered by Health and Wellness Centres of Tripura. It can also help to understand the challenges faced by the beneficiaries which can be used to optimise the service utilization.

Methods:

This community based qualitative study was conducted from June 2021 to December 2022 in the three out of 8 districts of Tripura where existing sub centres were upgraded to Health and wellness centres during the study period using In-Depth Interview method.

The study was conducted among key informants of 10% of the HWCs functioning in each district. As of 31st December 2020; 323 Sub health centres of three out of eight districts of Tripura were upgraded to HWCs known as Ayusman Arogya Mandirs, under Ayushman Bharat scheme. Considering the feasibility and time, 10% of the HWCs functioning in each of the 3 districts were randomly selected from the list of Ayushman Arogya Mandirs for the district. Hence, Total 33 HWC areas were selected in the present study. In Depth Interviews were conducted with total 35 key informants of the area with minimum 1 Key informant from each HWC area. The Key informants were identified either as political leaders, religious leaders or representatives of local organisations as informed by ASHA workers of the area, and selected purposively they shared their first-hand experience regarding facilitators and barriers to service utilization. Participants were interviewed by the researcher who was a female Post graduate resident of the Dept. of Community Medicine, at the time of interview and trained in conducting In-depth interview. They were interviewed using a pre- tested interview guide developed by the researchers that used open-ended, thematic prompts rather than direct questions, after taking written informed consent from the participants.

Interview was conducted at the community by visiting the house of the informants; was video recorded and was conducted over a period of 30 to 45 mins. After initial rapport building the purpose of the interview was explained and interview was in local language (Bengali) and then translated into English by one linguistic and subject expert and then back translated into local language by another subject and linguistic expert and matched and final version was kept for the study. Qualitative data of In-Depth Interview was analysed by Thematic network analysis framework. Transcribed data were read again and again and coding was done by 2 researchers- one PG resident and one faculty from the department. All the codes were listed and codes with common characteristics were categorized followed by identification of sub themes and global themes. The present study was conducted as part of the study titled "Assessment of Health and Wellness Centres of Tripura: A mixed method observational study" and was approved by the Institutional Ethics Committee. (Ref. No.F.4(5-244)/AGMC/Academic/IEC Certificate/2021/7186 Dated 2nd June 2021).

Results:

The present study included qualitative analysis of In-Depth Interviews of 35 key informants. The sociodemographic profile of the participants showed majority of the participants were male (n=32, 91.4%), were from the age group 61-70 yrs (n=10, 28.5%), Hindu by religion (n=32, 91.4%), with primary education (n=14, 40%). Study results also showed that 40% (n=14) participants belonged to lower middle class and 60% (n=21) participants belonged to nuclear family (Table 1).

Table 1: Socio-Demographic characteristics of the study participants (N=35)

Characteristics	n (%)
Age group (in year)	
31-40	4 (11.4%)
41-50	5 (14.3%)
51-60	8 (22.9%)
61-70	10 (28.6%)
71-80	5 (14.3%)
>80	3 (8.6%)
Gender	
Male	32 (91.4%)
Female	3 (8.6%)
Religion	
Hindu	32 (91.4%)
Muslim	1 (2.9%)
Christian	2 (5.7%)
Caste	
SC	16 (45.7%)
ST	4 (11.4%)
OBC	7 (20.0%)
General	8 (22.9%)
Education	
Illiterate	11 (31.4%)
Primary educated	14 (40.0%)
Secondary educated	6 (17.1%)
Graduate and above	4 (11.4%)
Socio-economic status	
Upper	1 (2.9%)
Upper lower	2 (5.7%)
Middle	9 (25.7%)
Lower middle	14 (40.0%)
Lower	9 (25.7%)
Family type	
Nuclear	21 (60.0%)
Joint	14 (40.0%)

Perspective on Barriers of service utilization-

A. Health system related barriers (Global Theme1)

1. Unavailability of Services (Subtheme1)

Regarding Health system related barriers total 23 participants (65.71%) from 21 centres(63.63%) revealed Unavailability of services like medicine supply, functional equipment as very crucial for delivering uninterrupted services. Beneficiaries get disappointed and uninterested in HCW services when they face such issues while visiting the centre.

A literate male aged 62 years reported that *" I went there to collect my medicines that day.....I need to take medicines for my BP every day....but medicines were not available only.... told me to collect after 2 days...I had to buy that day....who will go again to collect?"*

Another literate male informant aged 45 years reported that *" when I went there for checking my BP, the machine was not working."*

2. Lack of Accessibility (Subtheme 2)

Lack of accessibility due to poor transportation facility and inconvenient timings of HWCs was found out as another important health system related barrier from the interview of the informants(n=19, 54.28%) . Accessibility is a big issue in hilly and hard to reach areas and areas with poor transportation facility.*"Our area is very hilly....no auto-rickshaw service.....arranging transport is difficult here.*" …(a 75 years old illiterate female)

Again, timings of the HWCs overlapping with the working hours of the community members makes it difficult for them to attend HWC without compromising their works and loss of wages.*" Morning time we all are busy working .....by the time we return from work its already late afternoon.....centre is closed by then."*..(a 48 years old Primary educated male).

B. Community related barrier (Global Theme 2)

1. Lack of satisfaction (Subtheme 1)

Regarding community related barriers, lack of satisfaction due to poor previous experience and unmet needs was identified as one of the important barriers by the informants (n=12,34.28%). Bad experience during previous visit demotivates people from utilizing the services next time. Perceived need for doctors and broad range of medicines were identified as important factors in relation to patients satisfaction. *"I dont go there*

anymore.....Last time when my uncle became unconscious.....we rushed to the centre.....it was of no use!.....could not tell what happened to him.....told us to go to Higher Centre....again we had to come back home.....arrange for vehicle....only waste of time."(a 32 years old male Informant with Secondary education reported).

2. Lack of Awareness (Subtheme 2)

Most important community related barrier found in this study was lack of awareness. Many of the informants(n=17, 48.57%) were unaware regarding the services and government health schemes available and there were many misinformation among the community members regarding the services which prevent them from seeking care. False belief and wrong perception of the community members also prevent them from utilizing the services. *"Allopathic medicines are very harmful for the body.....they makes body very week....worsen the condition."*.....(59 years old illiterate male)

3. Poor health seeking behaviour (Subtheme 3)

Another community related barrier found in this study was poor health seeking behaviour from the interview of the informants (n=13,37.14%). Community members Poor health seeking behaviour due to indifferent attitude towards health and blind faith in quacks act as a barrier in utilization of the services of HWCs. They prefer local faith healers over the available health care services. One of the illiterate female informant told *"I have full faith in Babaji....he can cure any disease....we always go to him."*

Perspective on Facilitators of service utilization

A. Health system related facilitators (Global Theme1)

1. Positive working attitude of the health staffs (Subtheme1)

Regarding Health system related facilitators positive working attitude of the health staffs was identified by the respondents (n=24, 68.57%) as one of the important facilitators. Welcoming behaviour of the staffs and negligible waiting time makes the community members utilize the services more. *"All the staffs are very friendly..... Didimoni (Madam) always welcomes us with smile.....listens to our problems."*.... (32 year old Primary educated female)

2. Availability of the MCH services (Subtheme 2)

Another important health system related facilitator found in this study was availability of MCH services from the respondents (n=35, 100%) . Availability of free Antenatal care and Immunization services is very crucial for mobilizing the lower socio-economic groups in seeking medical care. Provision of free medicines and diagnostic facilities motivates the community *members* for utilizing the services from the HWCs.*"we dont have enough money for treatment.....but here we can get free consultation..... My wife went there for checkups during pregnancy....I also take my son there for vaccination."* **.....(**35 years old Primary educated male)

B. Community related facilitators (Global Theme1)

1. Friendly environment (Subtheme1)

Regarding community related facilitators, friendly environment is one of the facilitators found in this study from the interview of the respondents (n=17, 48.57%). ASHAs, MPW and CHOs have gained the trust in the community through their sincere work. Due to this trust and familiarity with the staffs, people feel confident and comfortable to approach them for medical care. One Primary educated male informant aged 56years, told *"I know the staffs here.....Sir is from my village.....ASHA also visits our home often."*

Table 2: Thematic network analysis framework (from codes to global themes) identifying Barriers of service utilization

Codes	Categories	Sub Themes	Global Themes
- Medicine was not available at the time of visit - Instructed to collect medicine later	Shortage of medicines	Unavailability of services	Health system related barriers
- Blood Sugar testing machine was out of order - BP machine was not working	Unavailability of functional equipment		
- Far from home - Takes long time to reach the centre	Distance	Lack of Accessibility	
- Road is very hilly - No vehicles available	Difficult transportation		
- Can not visit centre during daytime due to works - Daily work gets affected if the centre is visited	Inconvenient health centre timings		
- Again had to visit Doctor - previous visits were not helpful - Condition worsened	Poor Previous experience	Lack of Satisfaction	Community related barriers
- Need a doctor at the centre - Need Ambulance facility for referral - Good antibiotics not available for children - Doctor prescribed medicines not available at the centre	Unmet expectation		
- Unaware of the services available - Unaware of availability of free medicines - Unaware of the available free diagnostics - Unaware of the Government schemes	Inadequate knowledge	Lack of awareness	
- Considered it as facilities for only pregnant mother - Heard medicines were bad	Misinformation		
- Allopathic medicines are very harmful - Medicines makes body worse	False belief		
- Don't like to take medicines - Didn't consider the need of health checkups	Negligence	Poor health seeking behaviour	
- Babaji can cure the disease - Only trust on local healer	Faith in quacks		

Table 3: Thematic network analysis framework (from codes to global themes) identifying Facilitators of service utilization.

Codes	Categories	Sub themes	Global Themes
- Staffs are ready to listen - Staffs always greet with smile	Welcoming behaviour of the staffs	Positive working attitude of the health staffs	Health system related facilitators
- No need to stand in a queue - Staffs attend immediately	Negligible waiting time		
- Can register pregnancy & undergo Antenatal checkups - Can take Td vaccines - Can take the benefits of maternity schemes - Get the children vaccinated	Availability of free services	Availability of MCH services	
- Get free Iron and Folic acid tablets - Get free Calcium tablets	Availability of free medicines		
- Can do Blood investigations free - Can do urine pregnancy tests - Can get their Blood pressure checked	Availability of free diagnostics		
- All the staffs are known - Staffs are from locality	Familiarity with the staffs	Friendly environment	Community related facilitators
- Staffs regularly visit the community - Always try to help	Trust gained		
- Suggests locally available nutritious food - Gives suitable and affordable suggestions	Practical advice	Good communication	
- Help in choosing appropriate contraceptive - Hold yoga sessions in the centre - Encourage in taking healthy foods	Involvement of community members		

2. Good communication (Subtheme 2)

Good communication of the staffs was identified by the informants(n=12, 34.28%) as another community related facilitators. Staffs of the HWCs provide practical advises to the care seekers due to the familiarity with their family background. Involvement of the family members in the decision-making process makes the services more acceptable to them. 35 years old primary educated male informant reported…*" Madam told us that we should use contraceptive methods....we already have two children. …she explained the risk and benefits.....helped us to choose one."*

Discussion:

For assessing facilitators and barriers of service utilization 35 in depth interviews were taken from the community members. This study has explored a wide range of facilitators and barriers of service utilization from both the community and health facility side. A discussion has been made according to the concepts across themes or sub-themes.

The present study highlighted availability or unavailability of services serving as both facilitators and barriers to utilization respectively. While availability of MCH services has been a facilitator in utilization among a selected section of community with pregnant mothers and children utilising the services, on the other hand unavailability of services due to interruption in the supply chain of medicines and lack of the functional equipment, etc. were found to be a significant barrier of service utilization to the general people with hypertension, diabetes, etc . Qualitative studies conducted by Vijayan SM et al[6] in Kerala and Higi AH et al[7] in Ethiopia also found shortage of continuous drug supply as a barrier in service utilization. Similar findings were seen in the study conducted by Hussain Dar K et al.[8]

The present study found that lack of accessibility of the HWCs in terms of distance and difficult transportation is an important barrier in case of service utilization. Studies conducted in Ethiopia by Tareke et al[9] and in Kerala[6] also identified accessibility as a key factor in service utilization. Inconvenient timings of the HWCs was another factor decreasing the accessibility which was also seen in the qualitative study conducted in Kerala.[6]

Lack of satisfaction was identified as another barrier in this study which was related to the factors like bad experience during previous visit, perceived need of doctors, wider variety of medicines and 24×7 ambulance services in the HWCs.

In this study one of most important barrier of utilization identified was lack of awareness. People have inadequate knowledge of the free services specially the newly added services, free medicines and free diagnostics available at the HWCs. A qualitative study conducted on facilitators and barriers of newborn and maternal health services utilization showed similar results.[7] The present study showed that there are also misinformation among the community members regarding the availability of services and the quality of medicines available there. They have the wrong perception that there are only traditional services like ANC and immunization services available in the HWCs.

Another important barrier identified in this study was poor health seeking behaviour. Because of negligence and indifferent attitude towards health and blind belief on quacks they don t find it necessary to seek medical care.

This present study found that the positive working attitude of the staff acts as a facilitator in service utilization. Welcoming behaviour of the staff and negligible waiting time motivates people in utilizing the services. Health care workers behaviour was also found as a facilitator in service utilization in the study conducted in Ethiopia by Hussain Dar K. et al.[8] Similar findings were seen in the studies conducted by Gebremichael et al,[10] Fikre et al[11] and Weldearegay et al.[12] Availability of MCH services was found to be an important factor in service utilization. Availability of free antenatal services like pregnancy registration and checkups, provision of Td vaccine and immunization of children, availability of free diagnostics and medicines etc along with free Government schemes act as motivator for service utilization. Qualitative study conducted by Vijayan SM[6] in Kerala also showed that traditional services like antenatal care and immunization were well utilized.

In the present study, friendly environment of the HWC was found as a facilitator for service utilization. Familiarity of the staffs along with the trust gained through their sincere work provides confidence to the community members in seeking health care services from the centre.

In this present study good communication is identified as a prime factor for service utilization. Study conducted by Duffy et al[13] and Tongue et al[14] also showed that patients expect better communication from health care provider. Practical advice and involvement of the care seekers in decision making process makes the services more acceptable to them and increases the service utilization in the community.

The study was a baseline qualitative assessment of health and wellness centres where new services were added under Ayushman Bharat Scheme. The study highlighted though new facilities and services were added, the centres were not equipped with medicines and functional equipment to provide regular services.

Limitations:

This study included only In-depth Interview of the Key Informants, which highlighted perspective of a particular section of the community, however, focussed Group Discussion of the general population would have given more insight to the utilization of services at community level.

Conclusion:

The study highlighted the major barriers and facilitators of service utilization of Health and Wellness Centres of the difficult terrains of North East India. Unavailability of services like medicines and equipment, lack of accessibility, lack of satisfaction, lack of awareness and poor health seeking behaviour were identified as major barriers of utilization of the services. On the other hand, positive working attitudes of the staff, availability of MCH services, friendly environment and good communication were found as facilitators in the utilization of services.

Recommendation:

Findings of this study has provided insight regarding facilitators and Barriers of service utilization which would be helpful for policy makers to take appropriate decisions for further optimizing the utilization of services; especially at the dawn of the evolution of sub centres to Health and Wellness centres- committed to provide a wide range of services. The study recommends a strong monitoring and supervision of the supply chain management system to avoid deficit of logistics at HWC level. The study revealed that there is a gap in the community regarding health seeking behaviour & the awareness of services available beside MCH services. Hence, extensive IEC programs are needed to minimise this knowledge gap.

Declaration:

Funding: Nil

Conflict of Interest: Nil

References:

1. Government of India. Ayushman Bharat Comprehensive Primary Health Care through Health and Wellness Centres – Operational Guidelines. New Delhi: Ministry of Health and Family Welfare, Government of India; 2018. Available from: https://www.nhm.gov.in/New_Updates_2018/NHM_Components/Health_System_Stregthening/Comprehensive_primary_health_care/letter/Operational_Guidelines_For_CPHC.pdf. [Accessed 2020 Sep 12].
2. Ayushman Bharat HWC Portal. Health and Wellness Centre. Available from: https://ab-hwc.nhp.gov.in. [Accessed 2020 Sep 20].
3. Ved RR, Gupta G, Singh S. India's health and wellness centres: Realizing universal health coverage through comprehensive primary health care. WHO South-East Asia Journal of Public Health. 2019;8(1):18.
4. Lahariya C. Health and Wellness Centers to strengthen primary health care in India: Concept, progress and ways forward. Indian Journal of Pediatrics. 2020 Jul 8. doi:10.1007/s12098-020-03359-z.
5. Angell BJ, Prinja S, Gupta A, Jha V, Jan S. The Ayushman Bharat Pradhan Mantri Jan Arogya Yojana and the path to universal health coverage in India: Overcoming the challenges of stewardship and governance. PLoS Medicine. 2019 Mar 7;16(3):2.
6. Vijayan SM, Puliyakkadi S, Chalil S. Facilitators and barriers of service utilization: Perspectives of stakeholders in a family health center of central Kerala – A qualitative study. Indian Journal of Public Health. 2021 Apr 1;65(2):136.
7. Higi AH, Debelew GT, Dadi LS. Perception and experience of health extension workers on facilitators and barriers to maternal and newborn health service utilization in Ethiopia: A qualitative study. International Journal of Environmental Research and Public Health. 2021 Oct 5;18(19):10467.
8. Hussain Dar K. Medicine and Nursing. Vol. 16. An International Peer-reviewed Journal; 2015. Available from: http://www.iiste.org. [Accessed 2021 Mar 14].
9. Tareke KG, Lemu YK, Feyissa GT. Exploration of facilitators of and barriers to the community-based service utilization for newborn possible serious bacterial infection management in Debre Libanos District, Ethiopia: Descriptive qualitative study. BMC Pediatrics. 2020 Dec;20(1):1–4.
10. Gebremichael MW, Worku A, Medhanyie AA, Edin K, Berhane Y. Women suffer more from disrespectful and abusive care than from the labour pain itself: A qualitative study from women's perspective. BMC Pregnancy and Childbirth. 2018;18:1–6.
11. Fikre R, Eshetu K, Berhanu M, Alemayehu A. What determines client satisfaction on labor and delivery service in Ethiopia? Systematic review and meta-analysis. PLoS ONE. 2021;16:e0249995.
12. Weldearegay HG, Kahsay AB, Medhanyie AA, Godefay H, Petrucka P. Quality of and barriers to routine childbirth care signal functions in primary level facilities of Tigray, Northern Ethiopia: Mixed method study. PLoS ONE. 2020;15:e0234318.
13. Duffy FD, Gordon GH, Whelan G, Cole-Kelly K, Frankel R, Buffone N, et al. Assessing competence in communication and interpersonal skills: The Kalamazoo II report. Academic Medicine. 2004;79:495–507.
14. Tongue JR, Epps HR, Forese LL. Communication skills for patient-centered care: Research-based, easily learned techniques for medical interviews that benefit orthopaedic surgeons and their patients. Journal of Bone and Joint Surgery (American Volume). 2005;87:652–8.

A Mixed-method Study on Coping Mechanism among Caregivers of Thalassemia patients Attending A Tertiary Care Hospital in West Bengal, India

Shaswati Biswas[1], Madhumita Bhattacharyya[2], Monalisha Sahu[3], Rivu Basu[4], Bobby Paul[5]

[1]Postgraduate Doctor, [4]Assistant Professor, [5]Professor and Head, Department of Preventive and Social Medicine, All India Institute of Hygiene and Public Health, Kolkata, India
[1]Professor, Department of Maternal and Child Health, All India Institute of Hygiene and Public Health, Kolkata, India
[3]Associate Professor and Head, Department of Occupational Health, All India Institute of Hygiene and Public Health, Kolkata, India

Correspondence: Dr. Shaswati Biswas, Email: biswashaswati95@gmail.com

Abstract:

Introduction: Thalassemia is a severe chronic anaemia. Caregivers face many stresses to provide the best possible medical care for their children. They develop a variety of coping mechanism. **Objectives:** To determine coping mechanism among caregivers of thalassemia patients and its associated factors; To explore challenges faced by caregivers of thalassemia patients. **Methods:** Institutional based observational study with convergent parallel mixed method study design was conducted in tertiary care hospital at OPD of Haematology Department in Kolkata, India. Total of 130 caregivers were selected through systematic random sampling for the quantitative strand who were interviewed using pre-tested questionnaire and the Coping Health Inventory for Parents-45 (CHIP). Additionally, seven in-depth interviews were conducted for the qualitative strand. Data were analysed using MS Excel 2019, SPSS v25, and QDA Miner Lite v3.0.2 with coding and thematic analysis after data saturation. **Results:** Among the caregivers 55 (42.3%) and 75 (57.7%) were mothers and fathers respectively with median age of 34 years. The median total score of the CHIP was 75, where 49% caregivers had adequate and 51% had inadequate coping skills. There was significant association between inadequate coping with poor social support (p=0.045) and frequent blood transfusion interval (p=0.020). The qualitative strand of this mixed-methods study identified five major themes—health problems, self-negligence, financial issues, familial issues and spiritual beliefs. **Conclusion:** Nearly half of the caregivers exhibited inadequate coping due to poor social support and shorter intervals between blood transfusions. Comprehensive support systems are crucial to improve their coping and overall quality of life.

Keywords: Coping Mechanism, Caregivers, Convergent-Parallel, Mixed Method study, Thalassemia,

Introduction:

Thalassemia is one of the common autosomal recessive inherited blood disorders, characterized by genetic defect in production of alpha or beta globin chains. Thalassemia major is the homozygous form of deficiency of beta globin chain synthesis which results in a severe transfusion dependent anaemia that becomes apparent in first six months of age. This is one of the major public health problem in Mediterranean, the Middle East, Indian subcontinent and the Southeast Asia.[1] In India, prevalence of â-Thalassemia 3-4%.

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Biswas S, Bhattacharyya M, Sahu M, Basu R, Paul B. A Mixed-method Study on Coping Mechanism among Caregivers of Thalassemia patients Attending A Tertiary Care Hospital in West Bengal, India. Healthline. 2025;16 (4): 261-268
	DOI : 10.51957/Healthline_726_2025	

Received : 14-06-2025 **Accepted** : 14-11-2025 **Published :** 31-12-2025

Every year, 10000-15000 babies are born with Thalassemia. India alone contributes to approximately 25% of the global â-thalassemia burden.[2] In West Bengal, every 10th person is a thalassemia carrier and more commonly found among Muslim, scheduled caste, and scheduled tribe populations.[3,4]

Caregiver is an individual who provide care and support to someone who is unable to fully care for themselves due to distress, illness, age, disability or other challenges.[5] In the case of chronic diseases like thalassemia, they face many challenges in providing quality care to their children. By definition, caregiver burden refers to a high level of stress or strain one experiences while caring for another person (usually a family member) with some illness. For example, a person caring for someone with a chronic disease like thalassemia may experience stressors such as financial strain, physical strain, their mental health, relationship with the care receiver, and social support. Cost of treatment of the disease and its complications impose a significant burden on the clients of thalassemia. It also imposes a significant burden on their caregivers too and the society at a large. Coping strategies are a set of cognitive and behavioural efforts that are applied so as to interpret and correct a stressful situation and leads to the alleviation of suffering from it.[5]

Today, with the use of new drugs and timely treatment, life expectancy of these patients has increased but with repeated blood transfusion, long-term use of drugs the general health, mental health and quality of life of these patients and their families have been deteriorated. The greatest stress is on parents as thalassemia cause a high level of psychological pressure on them. Depression and stress are also common among them.[6] Poor adaptability to stress usually induce psychosocial problems and marginalization along with negative attitude toward the child's illness. Parenting of children with chronic disease requires coping with stressors, such as administering medication, helping child to manage their pain, frequent hospital visits, and helping the child to cope with negative feelings. Therefore they develop a variety of coping strategies in response to the stress.[7]

Parental coping strategies like maintaining social support, self-esteem, and psychosocial stability are associated with improvements in child physical as well as mental health[8]. There are many studies related to quality of life among caregivers of thalassaemic patients, but studies related to coping styles of parents of thalassaemic children are limited in West Bengal. So this study will help to find their coping styles and to identify the factors associated with it. Objective of the study is to determine the coping mechanism and the associated factors among caregivers of thalassemia patients and also to explore the difficulties faced by them.

Methods:

An institutional based cross sectional study with convergent parallel mixed method study design was conducted in a tertiary hospital in the Haematology OPD in Kolkata, West Bengal, India from March 2024 to August 2024.

Operational definition: Primary caregiver is the person who takes principal responsibility for providing regular care and support to someone who cannot fully care for themselves due to age, illness, disability, or other conditions.

Sampling and data collection: Primary caregivers of diagnosed thalassemia patients with at least one blood transfusion in the last one year attending the tertiary care hospital were included in the study; whereas those other than primary caregivers, study participants who did not give informed written consent and who were critically ill, were excluded.

Using Cochran's formula; $N=Z^2pq/d^2$, sample size was calculated for the quantitative strand, where N= Sample size, Z= 1.96, p=57% (prevalence; considering, a previous study done in Bangalore where coping mechanism was found to be effective in 57% of the study participants)[7], q= 43% and d=9% (absolute error), taking 10% non-response rate, total sample size calculated was 130.

The study participants were selected by systematic random sampling technique from OPD of Haematology department of Institution of Haematology and Transfusion Medicine, Kolkata. Almost 50-60

thalassemia patients come every Monday in the OPD, and data collection was done for two months, so total patients came around 400, so we calculated sampling interval of 3 (total patients/sample size). Then using a random number generator we selected a random starting point and choose every 3rd patient until target was reached, each day 16-17 patients were selected this way. The data collection tools included a demographic questionnaire and the Coping Health Inventory for Parents (CHIP).[15] Interviewer administered questionnaire was used for face-to-face interviewing the study participants, where dependent variables was Coping mechanism among the caregivers of thalassemia effected children and independent variables included socio-demographic characteristics, socio-economic factors, Oslo social support scale-3[16] and clinico-therapeutic factors (age at diagnosis, blood transfusion frequency and spleen status).

Collected data were compiled using MS Excel 2019 and tabulated accordingly. Software like IBM Statistical Package for the Social Sciences (SPSS) statistics (version 25) was used for analysis for quantitative data. Descriptive statistics, univariate and multivariable logistic regression were performed. Coping Health Inventory for Parents (CHIP) is interpreted in terms of median value.

For qualitative strand, an agreement on data saturation was reached with the participation of 7 individuals. After 5 interviews, data saturation was reached with no further theme was obtained. However, two more interviews were conducted to confirm the absence of new theme. These study participants were selected using purposive sampling technique and interviewed using In-Depth Interview (IDI) guide to explore the challenges faced by them. Qualitative Data Analysis (QDA) Miner Lite (version 3.0.2) software was used for analysis for qualitative data, where codes, categories and theme were generated.

Results from both the strands were compared and interpreted in the discussion section. This study was approved by the Institutional Ethics Committee.

Result:

Quantitative results

Socio-demographic characteristics

Among 130 study participants, nearly 39.2% belonged to age group of 30-40 years (median age: 34 years, IQR (25,75), 75 (57.7%) were fathers and 55 (42.3%) were mothers. Majority followed Hindu religion (96, 73.8%) followed by Muslim (33, 25.4%), resided in urban area (116, 89.2%), lived in nuclear family (96, 73.8%) and had more than equal to 4 family members (128, 98.5%). Most of them were currently married (117, 90%). More than one-fourths of the study participants had completed primary level of education (38, 29.2%), fathers were engaged in semi-skilled work (15, 27.3%) and mothers were homemakers (43, 57.3). More than half of the participants belong to middle class (42, 32.3%) and lower middle class (37, 28.5%) as per B.G. Prasad's Scale updated for the year 2024[17] and three-fourth had loss of their daily wages due to treatment. About 51.3% had history of substance abuse. Three-fourth of the participants had total one or two child; 90% (117) had at least one thalassemia major diagnosed child and nearly three-fifth of them had their first-born child thalassemia major effected; 59.2% (77) had female child and 40.8% (53) had male child. More than three-fifth (84, 64.5%) of them had their child diagnosed before their first birthday and require blood transfusion at less than 30 days interval (86, 66.2%). Only 3.8% of them had children with splenectomy done while all of their children received anti-chelating. Less than one-tenth (6.2%) had child suffering from TTIs, of which 75% and 25% were HBsAg- and anti-HIV-positive, respectively (Table 2).

Social support

One-tenth (12, 9.2%) of the study participants had poor social support, rest had moderate to poor social support according to Oslo social support scale-3 (Table 1).

Table 1. Sociodemographic details of the study participants (N=130)

Variables	Number (%)
Relation with the affected child	
Mother	55 (42.3)
Father	75 (57.7)
Age (in completed years)	
≤20	1 (0.8)
21-30	44 (33.8)
31-40	51 (39.2)
41-50	25 (19.2)
≥51	9 (6.9)
Marital status	
Currently married	117 (90)
Widow/separated	13 (10)
Religion	
Hindu	96 (73.8)
Muslim	33 (25.4)
Christian	1 (0.8)
Area of residence	
Rural	14 (10.8)
Urban	116 (89.2)
Type of family	
Nuclear	96 (73.8)
Joint	34 (26.2)
Number of family members	
≤4	2 (1.5)
>4	128 (98.5)
Highest level of education	
Illiterate	19 (14.6)
No formal education, but literate	15 (11.5)
Primary	38 (29.2)
Middle school	14 (10.7)
Secondary	16 (12.4)
Senior secondary	17 (13.1)
Graduate	11 (8.5)
Occupation	
Housewife	43 (33.1)
Farmer	8 (6.2)
Office staff	3 (2.3)
Self employed	15 (11.5)
Semi professional	2 (1.5)
Semi-skilled	19 (14.6)
Skilled labour	7 (5.4)
Unskilled labour	33 (25.4)
Per capita income	
I (Upper class)	3 (2.3)
II (Upper middle class)	34 (26.2)
III (Middle class)	42 (32.3)
IV (Lower middle class)	37 (28.5)
V (Lower class)	14 (10.8)
Loss of wages	
Yes	99 (76.2)
No	31 (23.8)
Substance abuse	
Absent	61 (46.9)
Present in any form	69 (53.1)
Social support	
Strong support	90 (69.2)
Moderate support	28 (21.5)
Poor support	12 (9.2)

Table 2. Characteristics of the Thalassemia children (N=130)

Variables	Number (%)
Total number of children of the caregivers	
≤2	100 (76.9)
>2	30 (23.1)
Number of thalassemia affected child	
1	117 (90.0)
>1	13 (10.0)
Gender of the affected child	
Female	77 (59.2)
Male	53 (40.8)
Age at thalassemia diagnosis	
≤1 year	84 (64.5)
>1 year	46 (35.5)
Blood transfusion interval	
≤30 days	86 (66.2)
>30 days	44 (33.8)
Splenectomy of child	
Yes	5 (3.8)
No	125 (96.2)
Transfusion transmitted diseaseHBsAg	5 (3.8)
Anti-HIV positive	3 (2.4)
None	122 (93.8)

Table 3. Distribution of CHIP item subscale according to median and IOR

	Subscales of CHIP	Median	IQR
1.	Maintaining family integration, cooperation, and an optimistic definition of the situation	29	25-32
2.	Maintaining social support, self-esteem and psychological stability	30	26-33
3.	Understanding the medical situation through communication with other parents and consultation with medical staff	12	Oct-14
	Total coping of CHIP	**75**	**67-84**

Table 4. Common Coping Behaviours Expressed by the Parents (N=130)

Subscale	Most helpful		Not helpful	
	Items	Number (%)	Items	Number (%)
Maintaining family integration, cooperation, and an optimistic definition of the situation	Being sure prescribed medical treatments for child (ren) are carried out at home on a daily basis	84 (64.6)	Eating	101 (77.7)
Maintaining social support, self-esteem and psychological stability	Believing in God	85 (65.4)	Sleeping	118 (90.8)
Understanding the medical situation through communication with other parents and consultation with medical staff	Taking good care of all the medical equipment at home	84 (64.6)	Allowing myself to get angry	123 (94.6)

Coping Health Inventory for Parents

As demonstrated (Table 3), the median total score of the CHIP was 75, where 49% caregivers had adequate and 51% had inadequate coping skills. There are 3 subscale "Maintaining family integration, cooperation, and an optimistic definition of the situation", "Maintaining social support, self-esteem and psychological stability" and "Understanding the medical situation through communication with other parents and consultation with medical staff" with median value of 29, 30 and 12 respectively.

Table 4 indicates the most helpful coping behaviours by caregivers for each subscale. For the subscale "Family integration, cooperation, and optimism," the items of "Being sure prescribed medical treatments for child (ren) are carried out at home on a daily basis" extremely helpful for 64.6% of the caregivers. For "Social support, self-esteem, and mental stability," 65.4% found "Believing in god" extremely helpful. In addition, considering the "Medical communication and consultation" subscale, 64.6% found chose "Taking good care of all the medical equipment at home".

As Table 4 shows, the least performed behaviours in the subscale "Family integration, cooperation, and optimism" was "Eating" (77.7%). Concerning the "Social support, self-esteem, and mental stability" subscale, the least expressed statements included "Sleeping" (90.8%). In addition, the least common coping behaviours in the subscale "Medical communication and consultation" were found to be "I let myself get angry" (94.6%).

Table 5 shows, univariate and multivariable logistic regression. There is significant association between coping and relation with child, age, marital status, type of family, number of family members, social support,

Table 5. Association between independent variables and inadequate coping mechanism by univariate and multivariate logistic regression (N=130)

Variables	UOR (95%)	p-value	AOR (95%)	p-value
Relation with children				
Father (ref)				
Mother	0.314 (0.2-0.7)	0.002	1.551 (0.4-5.5)	0.499
Age category				
≤34 years (ref)				
>34 years	2.917 (1.4-5.9)	0.003	0.294 (0.6-4.2)	0.294
Marital status				
Currently married (ref)				
Separated	0.275 (0.7-1.1)	0.059	0.304 (0.6-1.6)	0.167
Type of family				
Joint (ref)				
Nuclear	0.424 (0.2-1.0)	0.038	0.4450 (0.1-1.4)	0.165
Number of family members				
≤5 (ref)				
>5	4.415 (1.7-11.3)	0.002	1.867 (0.5-6.8)	0.343
Substance abuse				
Absent (ref)				
Present	2.109 (1.1-4.3)	0.037	1.567 (0.5-5.2)	0.466
Oslo social support				
Poor (ref)				
Good	4.941 (2.2-11.4)	0	3.047 (1.0-9.1)	0.045
Age at thalassemia diagnosis				
≤1 year (ref)				
>1 years	2.882 (1.4-6.0)	0.005	1.190 (0.4-3.4)	0.747
Blood transfusion frequency				
≤30 days (ref)				
>30 days	0.230 (0.1-0.6)	0.001	3.8 (1.2-11.7)	0.02

substance abuse, age at thalassemia diagnosis and frequency of blood transfusion interval ($p<0.05$). In the final multivariable logistic regression model (Table 5), child requiring blood transfusion at >30 days interval had 3.8 odds of adequate coping [AOR: 3.809 (1.2–11.9)] and caregiver with good social support adequately coped than those with poor support [AOR: 3.047 (1.0–9.1)]. Independent variables were explaining 37.1% variability.

Qualitative results

Study participants were interviewed (n=7) to explore the challenges faced by them. There were 3 father and 4 mother participants. Median age was 38 years belonging to lower middle and middle class as per Updated B.G. Prasad scale for 2024. The broad theme, i.e., difficulties faced by the caregivers of thalassemia diagnosed patients, was classified into 5 categories: a) health problems, b) self-negligence, c) familial conflicts, d) financial issues and e) lack of access to healthcare resources (Table 6).

Table 6. Thematic analysis of In-Depth Interviews of study participants showing the challenges faced by them (N=7)

Themes	Categories	Quotable quotes
Health problems	Physical distress	"our health deteriorated. Sometimes I felt tired" (participant 1, 50 years, Female)"The day I come becomes very stressful" (participant 3, 41 years, Female)
		"previously I used to feel very tired" (participants 6, 27 years, Female)
	Psychological distress	"his father is very worried about him" (participant 7, 45 years , Female)
		"When I first came to know, I was devastated" (participant 5, 38 years, Male)
		"I was so mentally broken just thinking about the cost of treatment" (participant 4, 38 years, Male)
		If I don't get blood, I worry more" (participant 2, 34 years, Male)
Self -negligence	Ignorant about selfcare	"no time to think about ourselves" (participant 6)
	Restless life	" I have to visit every fifteen days" (participant 3)
		"if we don't get blood, we have to rush" (participant 2)
Financial issues	Travel expenses	"We come from far away; travel costs a lot" (participant 7)
		"Day by day the cost of transportation is increasing so much that a lot of money is being spent" (participant 1)
	Medicine expenses	"medicines are not always available, many a times medicines have to be bought from outside" (participant 2)
		"a lot of money goes into medicines" (participant 4)
	Loss of wage	"I can't go to work on the day I come" (participant 7)
		"if I don't go to work, I don't get pay for that day" (participant4)
		"I work as labour, if I don't work, the owner won't pay" (participant 6)
		"what will we eat, if I don't go to work" (participant 2)
	Patient care	"sick child at home so there are expenses" (participant 2)
		"he has many food restrictions, so have to take proper care" (participant 3)
Familial issues	Unstable family	"his father is drunk all time" (participant 6)
		"He would come back drunk and beat me" (participant 3)
		"He left me and got married elsewhere after she was diagnosed with thalassemia" (participant 3)
	Conflict within family relatives	"There are many relatives who avoid us a bit" (participant 2)
		"No relatives can be found when needed" (participant 2)
		"When we will die, I don't know who will take care of him" (participant 7)
		"His brothers do not take proper care of him" (participant 2)
Spiritual beliefs	Spirituality	"we have left everthing in the name of Allah. Allah will do everything" (particicpant 2)
		"Allah has given it, so we have to bear with this, can't leave the kid alone" (participant 3)
		" I left everything to God" (participant 5)
Shortage of patient care equipment	Shortage of blood supply	"during unavailability of blood, it becomes very difficult" (participant 1)
		"they don't even write so that we can bring blood with a donor" (participant 6)
		"sometimes we face problem due to lack of donor" (participant 4)
		"it is always possible for us to find a donor with matched blood group" (participant 5)
		" until and unless they write refer from here, it is hard to get blood transfusion from other hospitals" (participant 3)
	Shortage of medicine supply	"medicines are not available all the time" (participant 1)
	Shortage of drug and blood	"medicines are not always available" (participant 5)
		"it was hard to find blood sometimes" (participant 7)

Discussion:

In the present study, 42.3% of the study participants are father and rest 57.7% are mothers with median age of 34 years. Majority (73.8%) of them live in nuclear family. 29.2% of them have primary level of education with 4.5 median years of schooling. Most of them (89.2%) reside in urban area and 90% are currently married. 27.3% of the fathers are engaged in semi-skilled work and 57.3% of the mothers are homemakers. 32.3% of the study participants belong to middle class followed by lower middle class 28.5% as per Updated B.G Prasad scale 2024 with mean per capita income of Rs 3749.9. 76.9% of the study participants are having less than or equal to 2 children with 90% having only one thalassemia affected child and 59.2% of them are having affected girl child. About 64.5% of them had their child diagnosed before their first birthday and 66.2% require blood transfusion at less than 30 days interval. These socio-demographic characteristics are in line with existing literature[7]. Majority (69.2%) are having poor social support.

CHIP-45 have 3 subscale "family integration, cooperation", "maintaining social support, self-esteem and psychological stability" and "understanding medical situation" whose median scores are 29, 30 and 12 respectively. Overall 65% of the study participants found "Believing in God" is an extremely helpful way for coping up, which is in accordance with previous studies[10]. About 64.6% of the parents ensured children received appropriate care at home on a daily basis and 63.8% valued trusting medical professionals. Also trusting spouse were seen as extremely helpful coping strategies among 51.5%. This shows importance of importance of social support and family integrity for good coping.

The present study showed several challenges faced by the caregivers like health problem, psychological issues, self-negligence, financial and family issues, shortage of blood supply, bed and drugs, similar to a study.[12-14] It suggests the need for a bi-directional exploration of interactions among individual, familial and community.

Conclusion:

Caregivers of thalassemia children face significant psychosocial, financial, and health-related challenges that affect their coping abilities. Good social support and frequent transfusion needs were independent predictors of better coping, explaining about 37% of variability. Interventions should focus on strengthening social support systems and reducing treatment-related burdens to enhance caregiver resilience.

Acknowledgement: We would like to extend our acknowledgment and gratitude to the Director and Professor of the Institution of Haematology and Transfusion Medicine, Kolkata and Principal sir of Medical College, Kolkata to grant permission to conduct the study.

Declaration

Funding: Nil

Conflict of Interest: Nil

References:

1. Biswas B, Naskar NN, Basu K, Dasgupta A, Basu R, Paul B. An Epidemiological Study of the Quality of Life of Children With Beta-Thalassemia Major (β-TM) and Its Correlates in Kolkata, West Bengal, India. Cureus. 15 (3):e36888.
2. Ministry of Health and Family Welfare. (2016). Prevention and control of hemoglobinopathies in India: Thalassemias, sickle cell disease, and other variant hemoglobins – Guidelines on hemoglobinopathies 2016. Government of India
3. Hossain MS, Raheem E, Sultana TA, Ferdous S, Nahar N, Islam S, et al. Thalassemias in South Asia: clinical lessons learnt from Bangladesh. Orphanet J Rare Dis. 2017 May 18;12 (1):93.
4. Colah R, Italia K, Gorakshakar A: Burden of thalassemia in India: the road map for control . Pediatr Hematol Oncol J. 2017, 2:79-84. 10.1016/j.phoj.2017.10.002
5. Gothwal VK, Bharani S, Reddy SP. Measuring Coping in Parents of Children with Disabilities: A Rasch Model Approach. PLoS ONE. 2015 Mar 2;10 (3):e0118189.
6. Sahu S, Agrawal A, Shrivastava J, Tonk S. Psychiatric disorders and caregiver burden in children with transfusion dependent β-thalassaemia and their caregivers. World J Clin Pediatr. 2023 Jun 9;12 (3):125–32.
7. Saldanha SJ. Stress and coping among parents of children having thalassemia. Int J Sci Res. 2013;4 (7).
8. Salehi S, Morovati S. Coping behaviors in families with children suffering from thalassemia major and evaluating the implementation effect of nursing intervention on these behaviors Int J Med Res Health Sci. 2016;5:58–63
9. Snezana C, Vucic V, Mihaljevic O, Djordjevic J, Colovic S, Radovanovic S, et al. Social support score in patients with malignant diseases—with sociodemographic and medical characteristics. Front Psychol. 2023 Jun 1;14:1160020.
10. Kermansaravi F, Najafi F, Rigi S. Coping Behaviors in Parents of Children with Thalassemia major. Med - Surg Nurs J [Internet]. 2018 [cited 2024 Jan 28];7 (1). Available from: https://brieflands.com/articles/msnj-81173#abstract
11. Yazdi K. Psychosocial, social and financial problems with coping strategies among families with thalassemic patients. J Gorgan Univ Med Sci. 2007;9 (2):71–5.
12. Nabavian M, Cheraghif_ F, Shamsaei F, Tapak L, Tamadoni A. A Qualitative Study Exploring the Experiences of Mothers Caring for Their Children with Thalassemia in Iran. Ethiop J Health Sci [Internet]. 2021 Nov 1 [cited 2024 Jan 25];31 (6). Available from: https://www.ajol.info/index.php/ejhs/article/view/219382
13. Padhy, P. & Kumar, N. Understanding resilience in chronically Ill children: Parental perspectives on strengths, difficulties and fostering resilience in children with thalassemia major IJHW. 2017 Oct 26;8(7):588-593
14. McCubbin, H.I., McCubbin, M.A., Patterson, J.M., Cauble, A.E., Wilson, L.R. & Warwick, W. (1983). CHIP-Coping Health Inventory for Parents: An Assessment of Parental Coping Patterns in the Care of the Chronically Ill Child. Journal of Marriage and the Family, 45 (2), 359-370. doi: 10.2307/351514.
15. Oslo Social Support Scale (OSSS-3) – EMERGE [Internet]. [cited 2024 Dec 20]. Available from: https://emerge.ucsd.edu/r_1mq2f0ksb7qyidj/
16. National Family Health Survey (NFHS-5), 2019-21, India Report. Ministry of health and Family Welfare, Government of India. 2022.
17. Javalkar SR, H. S, B. Davalagi S, G. S. V. Socio economic status assessment in India: history and updates for 2024. Int J Community Med Public Health. 2024 Feb. 29;11(3):1369-77. doi:10.18203/2394-6040.ijcmph20240648.

Tuberculosis Preventive Therapy Adherence and factors associated with it among Household Contacts of Tuberculosis Patients in Western Uttar Pradesh: A Prospective study

Sanghmitra Singh[1], Geetu Singh[2], Himalaya Singh[3], Gajendra Vikram Singh[4]

[1]Postgraduate Student, [2]Associate Professor, [3]Assistant Professor cum Epidemiologist, Community Medicine Department, Sarojini Naidu Medical College, Agra, India
[4]Professor, Respiratory Medicine Department, Sarojini Naidu Medical College, Agra, India

Correspondence: Dr. Sanghmitra Singh, Email: sanghmitrasingh1111@gmail.com

Abstract:

Introduction: Tuberculosis (TB) remains a significant global health challenge, with India bearing the highest burden. Tuberculosis Preventive Therapy (TPT) is a critical strategy to prevent latent TB infection (LTBI) from progressing to active disease, particularly among household contacts (HHCs) of pulmonary TB patients. **Objective:** This study evaluates the completion rate and factors influencing TPT adherence in Agra district, India. **Methods:** A community based prospective follow up study was conducted from January 2024 to December 2024 in two randomly selected Tuberculosis Units (TU) (Lohamandi and Bichpuri) in Agra district. A total of 360 Household contacts (HHC) were enrolled in the study. Data was collected via a pilot-tested, semi-structured questionnaire based on the Programmatic Management of Tuberculosis Preventive Treatment (PMTPT) guidelines. Participants were followed for six months to assess TPT completion, adverse effects and factors influencing compliance of TPT. **Results:** The TPT completion rate was 55.3%, with 40.9% lost to follow-up and 3.8% discontinuing due to adverse effects. Factors significantly associated with completion included higher education, occupation, socio-economic status, regular follow-up, and awareness of TPT importance (all $p<0.001$). Common barriers to adherence were lack of perceived need (41.9%) and forgetfulness (38.7%). Reported side effects were minimal, including lethargy (2.8%) and skin rashes (1.1%). **Conclusion:** Study highlights that TPT adherence in Agra district is slightly over half hindered by low awareness and poor follow-up. Strengthening education, routine monitoring, and addressing socio-economic barriers are essential to enhancing TPT outcomes and achieving India's TB elimination target by 2025.

Keywords: Adherence, Household contact, Latent TB infection, NTEP, Tuberculosis Preventive Therapy.

Introduction:

A significant part of the world population estimated to be around one-third is affected by latent tuberculosis infection (LTBI), with the majority of cases concentrated in 22 high-TB-burden countries. LTBI is a state where individuals exhibit a persistent immune response to Mycobacterium tuberculosis without any clinical symptoms of active tuberculosis (TB). In nations with limited healthcare resources and a high incidence of TB, the timely detection and management of active TB cases is a primary concern. However, since LTBI plays a vital role in contributing to future TB cases, identifying and

Quick Response Code	Access this article online
	Website : www.healthlinejournal.org
	DOI : 10.51957/Healthline_787_2025

How to cite this article :
Singh S, Singh G, Singh H, Singh GV. Tuberculosis Preventive Therapy Adherence and factors associated with it among Household Contacts of Tuberculosis Patients in Western Uttar Pradesh: A Prospective study. Healthline. 2025;16(4): 269-276

Received : 25-08-2025 **Accepted** : 08-12-2025 **Published :** 31-12-2025

treating it among high-risk populations is equally important. Effective LTBI control should involve a focused screening strategy and individualized treatment regimens, alongside enhanced airborne infection control in high-burden regions.[1]

Due to the lack of a universally accepted diagnostic method for tuberculosis infection (TBI), its true global burden is uncertain, though about 25% of the population is estimated to be infected with M. tuberculosis. Most individuals are asymptomatic but remain at risk of developing active diseases, influenced largely by immune status. Preventing new infections and progression to active TB is essential.[2] WHO recommends Tuberculosis Preventive Treatment (TPT) for high-risk groups like people living with HIV, household contacts of confirmed pulmonary TB patients, and other clinically vulnerable groups.[3] TPT shows 60–90% efficacy, with isoniazid reducing disease risk and community programs lowering incidence by up to 17%.[4]

The United Nations aimed to provide TPT to 30 million people between 2018 & 2022, but only 12.5 million (52%) received it by 2021. According to the World TB Report 2023, coverage among household contacts above 5 years of age was just 2 million (10% of the 20 million target). The 2023 United Nations High-Level Meeting (UNHLM) now targets 90% TPT coverage (45 million) by 2027.[5]

In India, the National Strategic Plan (2017–2025) for TB elimination has emphasized "Prevent" as a major pillar, targeting reductions in TB incidence among vulnerable and high-risk groups.[6] Despite this, India faces several challenges in TPT implementation. These include a general underestimation of LTBI risk among household contacts, confusion between latent infection and active disease, stigma and fear of discrimination, and concerns about TPT-related side effects. Many of these issues stem from limited public knowledge about TB prevention. As a result, healthcare workers bear a considerable burden in repeatedly educating and counseling household contacts regarding the benefits and safety of TPT.[7] The objective of this study was to evaluate the treatment completion of Tuberculosis Preventive Therapy (TPT) among household contacts of pulmonary TB patients and identify the key factors influencing adherence to TPT within the community setting.

Methods:

Study design and setting: A community based prospective follow up study was conducted from January 2024 to December 2024 in Agra district, Uttar Pradesh, India. There are 26 Tuberculosis units (TU) in Agra district. Out of which 6 TB units are urban, and 20 TB units are rural. For the purpose of this study, Simple random sampling was used and two Tuberculosis units (TU) – Lohamandi (urban) and Bichpuri (rural) were selected using the lottery method. This selection gave us the opportunity to ensure representation of both urban and rural populations, while keeping the study feasible in terms of time, manpower, and resources. Since the functioning of TUs is standardized under the National Tuberculosis Elimination Programme (NTEP), data from these two representative units were considered adequate to reflect district-level patterns.

Sample size: The sample size was calculated based on a TPT completion rate of 66.5% from a previous study by Samudyatha UC et al.[7] (2023) using the formula: $N=4pq/d^2$ where (p=66.5%) (q=33.5%), and (d=5% which is error). This yielded a sample size of approximately 360 Household contacts equally divided between the two Tuberculosis units. (180 per TU).

Study population: Household contacts (HHC) who met the inclusion criteria were selected consecutively in the selected TB units from January 2024 to June 2024. A total sample size of 360 was calculated and was equally allocated to both TU with 180 HHC selected from urban TU and 180 from the rural TU. One or multiple HHC per index case were selected, based on eligibility as per the inclusion criteria. HHC was screened and active TB was ruled out in all the study participants by chest X-ray. Inclusion criteria were people residing in study area from

last 6 months and people who were above 18 years of age. People who were HIV positive and HHC with patients of MDR-TB or were excluded from the study. Chest X-ray was done to rule out active TB in Household contacts before starting TPT.

The participants were contacted on the day of initiation of TPT through telephone and a verbal informed consent was taken explaining all the details about the study. The baseline data was collected. Each participant was followed up twice a month and were monitored for their TPT compliance till 6 months as the TPT regimen includes 6 month of Isoniazid. Household contacts (HHC) are defined as individuals who lived in the same enclosed living space as the index tuberculosis (TB) case, either for at least one or more overnight stay or for repeated or prolonged daytime interactions, during the three months preceding the initiation of the TB patient's treatment. As per the guidelines outlined in the Programmatic Management of Tuberculosis Preventive Treatment (PMTPT), [16] treatment completion is defined as the intake of at least 80% of the prescribed doses—equivalent to 144 out of 180 doses—within 133% of the intended treatment duration, which equates to a maximum of 239 days for the 6-month isoniazid (6H) regimen. The effectiveness of TPT is considered optimal when a minimum of 80% of the doses are administered within this allowable timeframe.

Study procedure/data collection: Data was collected by using the semi structured questionnaire based on Programmatic Management of Tuberculosis Preventive Treatment in India (PMTPT) guidelines. Househod contacts (HHCs) were interviewed for collection of socio demographic and treatment details as well as its side effects if any by semi structured questionairre. Study participant's voluntary consent was taken and participants were informed adequately. Participant identification details were taken, and a serial number was given to each participant questionnaire form. Data analysis was done using MS Excel and free Jamovi software.

Table 1: Socio demographic and Environmental Characteristics of Household Contacts (N=360)

Variable	n (%)
Age Group (years)	
18–39	220 (61.1)
40–59	129 (35.8)
≥60	11 (3.1)
Gender	
Male	212 (58.9)
Female	148 (41.1)
Educational Status	
Illiterate / Primary	20 (5.6)
Middle / High School	130 (36.1)
Intermediate / Graduate	210 (58.3)
Occupation	
Unemployed	183(50.5)
Unskilled/ Semi-skilled	34(9.7)
Skilled/Clerical/Shop/Farmer	92(25.5)
Semi-professional/ Professional	51(14.3)
Socio-Economic Status	
Lower / Lower Middle	170 (47.2)
Middle	74 (20.5)
Upper Middle / Upper	116 (32.2)
Overcrowding	
Present	232 (64.4)
Absent	128 (35.6)
Awareness of Risks of Skipping TPT	
Yes	219 (61.0)
No	141 (39.0)

Ethical considerations: Approval of study was taken from institutional ethical committee (SNMC/IEC/2024/202).

Table 1 shows Socio demographic and Environmental characteristics of Household Contacts. A total of 360 participants were analysed. The majority were young adults aged 18–39 years. (61.1%). Males constituted a larger share (58.9%) compared to females (41.1%). Educational status revealed that most participants were relatively educated, with 58.3% having completed intermediate or graduate-level

Table 2: Treatment Related Factors and Outcomes among Household Contracts (N=360)

Variable	n (%)
Knowledge about TPT	
Yes	190 (52.7)
No	170 (47.3)
Reasons for Skipping TPT	
No need felt / No symptoms	151 (41.9)
Forgetfulness	139 (38.7)
Adverse Effects	14 (3.8)
Did Not Skip	56 (15.6)
Adverse Effects	
Present	14 (3.9)
None	346 (96.1)
Tablet Consumption	
≥144 tablets	199 (55.3)
<144 tablets	161 (44.7)
Follow-Up Frequency	
Monthly / Bimonthly	240 (66.7)
None	120 (33.3)
Treatment Outcomes	
Completed	199 (55.3)
Lost to Follow-Up	147 (40.9)
Discontinued (Adverse Effects)	14 (3.8)

education. Socio-economically, the study population was predominantly from the lower or lower middle class (47.2%).

Environmental factors indicated that overcrowding was present in 64.4% of households, potentially contributing to higher TB transmission risk. Awareness about the health risks associated with skipping TPT was reported by 61.0% of the respondents, suggesting a moderately informed population.

Table 2 shows that 53% of participants have knowledge about TPT while 47% were unaware about TPT. total 41.9% of participants skipped TPT due to a perceived lack of need or absence of symptoms, and 38.7% cited forgetfulness as the reason. Adverse drug effects were rarely reported as a reason for discontinuation (3.8%), and only 15.6% of participants reported not skipping TPT at all. Regarding adverse effects, a vast majority (96.1%) experienced no side effects, which indicates good overall tolerability of the therapy. Tablet consumption data showed that 55.3% of participants consumed ≥144 tablets, aligning with the recommended regimen, while 44.7% took fewer than the required number. In terms of treatment outcomes, just over half (55.3%) successfully completed the TPT course, while a significant proportion (66.7%) had follow-up, and 3.8% discontinued treatment due to adverse effects.

Table 3a demonstrates the association between socio-demographic variables and TPT completion among household contacts in Agra District. Age and gender were not significantly associated with completion, though younger participants (30–39 years) showed relatively higher adherence. Head of family status was significant, with non-head members completing TPT more often than heads of households (χ^2-4.27, p = 0.039). Occupation showed a strong association. (χ^2 - 51.4, p < 0.001); completion was lowest among unskilled workers, while semi-professionals and professionals achieved the highest completion rates. Education was also significantly associated (χ^2 - 42.1, p < 0.001); completion increased steadily with higher education, reaching almost 90% among graduates. Similarly, socio-economic status strongly influenced adherence (χ^2 - 67.2, p < 0.001), with upper and upper-middle groups showing the highest completion, and lower/low-middle groups the lowest. Marital status was also a significant factor (χ^2 - 8.66, p = 0.013); unmarried individuals had higher completion compared to married or widowed/divorced participants.

Table 3b shows that follow-up frequency and awareness were strongly associated with TPT completion. Participants with monthly (81.6%) or bimonthly follow-up (83.0%) had significantly higher completion rates compared to those without follow-up (0.8%) (χ^2 - 215, p < 0.001). Similarly, those aware of the risks of skipping TPT showed markedly better adherence (88.1%) than those not aware (4.2%) (χ^2 - 244, p < 0.001).

Table 3a: Association of Socio demographic Variables with TPT Completion in Agra District (N=360)

Variable	Completed n (%)	Not Completed n (%)	p value
Age (years)			
18–29	91 (58.8)	64 (41.2)	0.128
30–39	46 (70.7)	19 (29.3)	
40–49	37 (45.6)	44 (54.4)	
50–59	22 (45.8)	26 (54.2)	
≥60	3 (27.2)	8 (72.8)	
Gender			
Male	119 (56.1)	93 (43.9)	0.696
Female	80 (54.0)	68 (46.0)	
Residence			
Urban	107 (59.4)	73 (40.6)	0.112
Rural	92 (51.1)	88 (48.9)	
Head of Family			
Head	32 (44.4)	40 (55.6)	0.039
Not Head	167 (57.9)	121 (42.1)	
Occupation			
Unemployed	104 (56.8)	79 (43.2)	<0.001
Unskilled/ Semi-skilled	9(26.5)	25 (73.5)	
Skilled/ Clerical/Shop/Farmer	51 (55.4)	41 (44.6)	
Semi-professional/ Professional	35 (68.6)	16 (31.4)	
Education			
Illiterate	4 (26.6)	11 (73.4)	<0.001
Primary	1 (20.0)	4 (80.0)	
Middle School	27 (39.7)	41 (60.3)	
High School	33 (53.2)	29 (46.8)	
Intermediate	82 (53.9)	70 (46.1)	
Graduation	52 (89.6)	6 (10.4)	
Socio-Economic Status			
Upper/Upper Middle	99 (85.3)	17 (14.6)	<0.001
Middle	48 (64.8)	26 (35.2)	
Lower/Lower Middle	52 (30.5)	118 (69.4)	
Marital Status			
Married	120 (50.2)	119 (49.8)	0.013
Unmarried	78 (66.1)	40 (33.9)	
Widowed/Divorced	1 (33.3)	2 (66.7)	

**Chi-square test (x^2) was used to assess the association between treatment completion and socio-demographic variables. A p-value <0.05 was considered statistically significant.*

Table 3b: Association of Follow-Up and Awareness with TPT Completion in Agra District (N = 360)

Variables	Completed n (%)	Not Completed, n (%)	p value*
Follow-Up			
Monthly	80 (81.6)	18 (18.4)	<0.001
Bimonthly	118 (83.0)	24 (16.9)	
None	1 (0.8)	119 (99.2)	
Awareness of Risks of Skipping TPT			
Aware	193 (88.1)	26 (11.9)	<0.001
Not Aware	6 (4.2)	135 (95.8)	

**Chi-square test (U^2) was used to assess the association between treatment completion and socio-demographic variables.*

Discussion:

Tuberculosis (TB) continues to pose a major public health threat worldwide, especially in high-burden nations such as India. In 2023, India contributed to approximately 27% of the global TB burden, with an estimated 2.8 million newly diagnosed cases.[5] The present study conducted in Agra district, Uttar Pradesh, aimed to assess the efficacy of Tuberculosis Preventive Therapy (TPT) among household contacts (HHCs) of drug-sensitive pulmonary TB patients. The study found a TPT completion rate of 55.3%, with 40.9% lost to follow-up and 3.8% discontinuing due to adverse effects. These findings align with existing literature but also highlight critical gaps in TPT implementation that need to be addressed to achieve India's National Tuberculosis Elimination Programme (NTEP) goal of TB elimination by 2025.[8]

The completion rate of 55.3% in this study is comparable to findings from other Indian studies, such as Mukherjee et al., who reported a 51.8% completion rate in West Bengal[9] but lower than Kumar et al. (2025),[10] who observed a 66.5% completion rate in rural Delhi. The variation in completion rates may be attributed to differences in population awareness, healthcare infrastructure, and follow-up mechanisms. For instance, the present study identified a significant association between regular follow-up (monthly or bimonthly) and treatment completion ($\chi^2 = 216$, $p < 0.001$), underscoring the importance of structured monitoring, as also noted by Shah et al. (2024).[11] However, 34% of participants in this study received no follow-up, which likely contributed to the high loss to follow-up rate (40.9%). This gap in the care cascade is consistent with global challenges reported by Alsudrf et al.[2] who highlighted substantial dropout rates in latent TB management.

Socioeconomic and educational factors significantly influenced TPT adherence in this study. Participants from higher socioeconomic classes (upper and upper-middle) and those with graduate-level education exhibited completion rates of 85.3% and 89.6%, respectively ($x^2 = 67.2$, $p < 0.001$; $x^2 = 42.1$, $p < 0.001$). These findings corroborate Kumar et al.[10] who noted that higher education correlates with better TPT compliance due to increased awareness and health literacy. Conversely, lower socioeconomic status and illiteracy were associated with poorer adherence, potentially due to financial constraints and limited access to healthcare facilities, as also reported by Sharma et al.[12] Additionally, occupational status influenced adherence, with professionals showing 68.6% completion rates, likely due to better access to resources and awareness ($x^2 = 51.4$, $p < 0.001$). Awareness of TPT's importance was a critical determinant of adherence. Participants aware of the risks of skipping TPT had an 88.1% completion rate compared to only 4.2% among those unaware ($x^2 = 244$, $p < 0.001$). This aligns with Borse et al. (2024), who found that knowledge about TPT significantly enhances adherence. However, 53% of participants in this study had knowledge about TPT indicating a need for improved patient education and counseling.[13] Stigma and misconceptions, as noted by Samudyatha et al.[7] further complicate TPT uptake, particularly among females, who comprised only 41.1% of participants, possibly due to social barriers.

The study also highlighted environmental risk factors, with 64.4% of participants living in overcrowded conditions and 43.3% in high TB transmission settings. These conditions, as supported by Banu et al. increase TB transmission risk and underscore the need for targeted interventions in vulnerable communities.[14] Adverse effects, though minimal (3.9% reported lethargy or skin rashes), led to discontinuation in 3.8% of cases, a lower rate than reported by Sharma et al. (2022) (27.5%) but consistent with Yuen et al. (2021) (7%)[11,15] This suggests that while TPT is generally well-tolerated, even minor side effects can impact adherence if not addressed promptly.

The absence of treatment failure (i.e., no participants developed active TB during TPT) is encouraging and aligns with the high efficacy of TPT when adhered to, as per PMTPT guidelines.[16] However, the high loss to follow-up rate indicates systemic

challenges, including inadequate follow-up, drug supply issues, and patient-related factors like forgetfulness (38.7%) and perceived lack of necessity (41.9%). These barriers are consistent with findings by Alvi et al.[17] (2024), who identified drug availability and workforce burden as key implementation challenges.

This study represents, to our knowledge, one of the first community-based assessment involving household contacts of pulmonary TB patients since the nationwide rollout of the TPT program to all HHCs in India. However, as it was a cross-sectional study conducted at only two TB units, the findings may not be widely generalizable beyond the study population.

This study provides valuable insights into TPT efficacy in Agra district, highlighting the critical role of follow-up, awareness, and socioeconomic factors in achieving high completion rates. To enhance TPT effectiveness, interventions should focus on strengthening follow-up mechanisms, improving patient education, and addressing social determinants like poverty and overcrowding. Community-based approaches, and digital adherence tools, could bridge gaps in the care cascade. These findings contribute to the evidence base for scaling up TPT under NTEP, supporting India's goal of TB elimination by 2025.

Conclusion:

The community based prospective study conducted among 360 household contacts (HHC) of drug-sensitive pulmonary tuberculosis (TB) patients in Agra district highlights significant challenges in the implementation of Tuberculosis Preventive Therapy (TPT). Treatment adherence was suboptimal, with 42% intentionally skipping TPT due to the absence of symptoms, 4% discontinuing due to side effects, and approximately 41% lost to follow-up. Notably, only 55.3% of participants completed the treatment regimen.

Key factors associated with treatment completion included occupation, educational status, and socioeconomic status. Regular follow-up and awareness about the consequences of skipping TPT emerged as critical determinants of adherence. These findings underscore the need for multifaceted interventions at individual, family, community, healthcare facility, and administrative levels. Strategies such as leveraging digital adherence technologies like 99DOTS and MERM, enhancing community awareness, reducing stigma, and strengthening healthcare infrastructure are essential to improve TPT uptake and adherence. Implementing these recommendations can significantly contribute to the National Tuberculosis Elimination Programme's goal of ending TB in India.

Declaration

Funding: Nil

Conflict of Interest: Nil

References:

1. Sharma SK, Mohanan S, Sharma A. Relevance of latent TB infection in areas of high TB prevalence. Chest. 2012 Sep 1;142(3):761-73. https://doi.org/10.1378/chest.12-0142
2. Alsdurf H, Hill PC, Matteelli A, Getahun H, Menzies D. The cascade of care in diagnosis and treatment of latent tuberculosis infection: a systematic review and meta-analysis. The Lancet Infectious Diseases. 2016 Nov 1;16(11):1269-78. DOI: 10.1016/S1473-3099(16)30216-X
3. World Health Organization. Guidelines on the management of latent tuberculosis infection. World Health Organization; 2015 Jan 15.
4. Comstock GW, Baum C, Snider Jr DE. Isoniazid prophylaxis among Alaskan Eskimos: a final report of the bethel isoniazid studies. American Review of Respiratory Disease. 1979 May;119(5):827-30.
5. World Health Organization. Global tuberculosis report 2024. Geneva: World Health Organization; 2024.
6. Khanna A, Saha R, Ahmad N. National TB elimination programme-What has changed. Indian Journal of Medical Microbiology.2023 Mar 1;42:103-7. https://doi.org/10.1016/j.ijmmb.2022.10.008
7. Samudyatha UC, Soundappan K, Ramaswamy G, Mehta K, Kumar C, Jagadeesh M, Prasanna Kamath BT, Singla N, Thekkur P. Outcomes and challenges in the programmatic implementation of tuberculosis preventive therapy among household contacts of pulmonary TB patients: a mixed-methods study from a rural district of Karnataka, India. Tropical Medicine and Infectious Disease. 2023 Nov 30;8(12):512. https://doi.org/10.3390/tropicalmed8120512
8. Rajoria C, Maula MT, Vyas S, Ray A, Nischal N. Paving a Way for "TB Mukt Bharat": A Snapshot of India's TB Elimination Program. Indographics. 2024 Dec;3(02):027-32. DOI: 10.1055/s-0044-1787985

9. Mukherjee O, Das DK, Adhikary M, Ghosh R. Tuberculosis preventive treatment among the household contacts of tuberculosis patients–Coverage and correlates in a block of Murshidabad district, West Bengal: A cross-sectional study. Indian Journal of Tuberculosis. 2024 Jun 6. https://doi.org/10.1016/j.ijtb.2024.06.002

10. Kumar S, Yadav G, Lukhmana S. Community-based assessment of Tuberculosis Preventive Therapy among household contacts living with index pulmonary TB patient in rural Delhi. Indian Journal of Tuberculosis. 2025 Feb 3. https://doi.org/10.1016/j.ijtb.2025.02.004

11. Shah H, Patel J, Rai S, Sen A. Advancing Tuberculosis Elimination in India: A Qualitative Review of Current Strategies and Areas for Improvement in TB Preventive Treatment. IJID regions. 2024 Dec 21:100556. https://doi.org/10.1016/j.ijregi.2024.100556

12. Sharma N, Basu S, Khanna A, Sharma P, Chandra S. The intention to receive tuberculosis preventive therapy in adult household contacts of pulmonary TB patients in Delhi, India. The Journal of Infection in Developing Countries. 2022 Feb 28;16(02):298-304.

13. Borse R, Randive B, Mattoo S, Malik P, Solanki H, Gupta A, Chaisson RE, Mave V, Suryavanshi N. Three months of weekly rifapentine plus isoniazid for TB prevention among people with HIV. IJTLD open. 2024 Sep 1;1(9):404-9. https://doi.org/10.5588/ijtldopen.23.0609

14. Banu S, Rahman MT, Uddin MK, Khatun R, Ahmed T, Rahman MM, Husain MA, van Leth F. Epidemiology of tuberculosis in an urban slum of Dhaka City, Bangladesh. PloS one. 2013 Oct 21;8(10):e77721. https://doi.org/10.1371/journal.pone.0077721

15. Yuen CM, Millones AK, Galea JT, Puma D, Jimenez J, Lecca L, Becerra MC, Keshavjee S. Toward patient-centered tuberculosis preventive treatment: preferences for regimens and formulations in Lima, Peru. BMC Public Health. 2021 Jan 11;21(1):121. https://doi.org/10.1186/s12889-020-10098-5

16. Central TB Division, Ministry of Health and Family Welfare, Government of India. Guidelines for programmatic management of tuberculosis preventive treatment in India [Internet]. New Delhi: Ministry of Health and Family Welfare; 2023 [cited 2025 Mar 21]. Available from: https://tbcindia.mohfw.gov.in/wp-content/uploads/2023/05/Guidelines-for-Programmatic-Management-of-Tuberculosis-Preventive-Treatment-in-India.pdf

17. Alvi Y, Philip S, Anand T, Chinnakali P, Islam F, Singla N, Thekkur P, Khanna A, Vashishat BK. Situation analysis of early implementation of programmatic management of tuberculosis preventive treatment among household contacts of pulmonary TB patients in Delhi, India. Tropical Medicine and Infectious Disease. 2024 Jan 17;9(1):24. https://doi.org/10.3390/tropicalmed9010024

A Cross-Sectional Study on Consumption of Iron and Folic Acid Supplements and its Determinants among Women During Pregnancy in Rural Punjab, India

Sanyogita Gupta[1], Priyanka Devgun[2], Harpreet Kaur[3], Harjot Birgi[4], Vishal Gupta[5]

[1]Assistant Professor, [2]Professor and Head, [3]Professor, [4]Associate Professor, Department of Community Medicine, SGRIMS&R, Amritsar, Punjab, India
[5]Consultant Anaesthetist, Amandeep Hospital, Amritsar, Punjab, India

Correspondence: Dr. Sanyogita Gupta, Email: sanyogita7325@gmail.com

Abstract:

Introduction: Anaemia in pregnancy remains a public health problem and is an important indirect cause of maternal mortality. Iron deficiency is regarded as the most common cause of anaemia during pregnancy. World Health Organization recommends daily oral iron and folic acid (IFA) supplementation as part of antenatal care. Despite this recommendation, the use of IFA supplements is still very low in several developing countries. **Objectives:** To determine the prevalence of consumption of IFA supplements and to identify its determinants among women while pregnant. **Methods:** It was a population based cross sectional study done in rural field practice area of community medicine. Total of 370 mothers of two months to two years old children were selected by PPS sampling. Data so collected was analysed by SPSS using descriptive inferential and chi square test. **Results:** Prevalence of IFA consumption for 180 days or more was 56.7%. Factors like caste, socioeconomic status of family, education of respondent as well as husband, parity and knowledge about antenatal care, anaemia and IFA consumption were significantly associated with consumption of IFA supplements. Side effects, forgetfulness and lack of knowledge about duration of intake were main reasons for discontinuation. **Conclusion:** There is a need to generate awareness regarding importance and correct duration of IFA consumption during pregnancy and constant mobilisation and support by health workers is required to increase the compliance

Keywords: Determinants, IFA supplementation, Maternal Anaemia, Punjab

Introduction:

Anaemia is a common public health problem and is defined by WHO as a Hb concentration of less than 11gm/dl for pregnant women.[1] Globally prevalence of anaemia as estimated by WHO in 2019 was 36.5%.[2] According to NFHS 5 in India at least 52.2% pregnant women of age group 15-49 years were found to be anaemic, whereas in Punjab this figure approached 51.7% and situation was further grave in rural as compared to urban area.[3,4]

Anaemia is one of the important indirect causes of maternal mortality accounting for 20% of maternal deaths.[5,6] Anaemia is also an aggravating factor in haemorrhage, sepsis and toxaemia and also increases susceptibility to communicable diseases such as tuberculosis and malaria. Anaemic women face the further risk of falling into a cycle of multiple pregnancies in their efforts to have children that survive, since nutritional deficiencies during pregnancy notably reduce the chances of infant survival. Increased workload,

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Gupta S, Devgun P, Kaur H, Birgi H, Gupta V. A Cross-Sectional Study on Consumption of Iron and Folic Acid Supplements and its Determinants among Women During Pregnancy in Rural Punjab, India. Healthline. 2025;16 (4): 277-283
	DOI : 10.51957/Healthline_760_2025	

Received : 19-06-2025 **Accepted** : 30-09-2025 **Published :** 31-12-2025

decreased consumption and increase expenditure of energy, all lead to anaemia in women and the condition further worsens during pregnancy due to haemodilution.[7-10]

Many nutritional and non nutritional aspects are responsible for anaemia during pregnancy. Most common cause of nutritional anaemia is iron deficiency which can be very easily tackled by consuming iron folic acid tablets which are provided free of cost to pregnant women for 180 days under Intensified national iron plus initiative.[11-15] However consumption is far below recommended as evident from the fact that only 44.1% and 26.0% women when pregnant consumed Iron and folic acid tablets for 100 days or more and for 180 days or more respectively in India and this figure in Punjab was 55.4% and 40.5% respectively.[3,4] Several studies have shown various factors responsible for low consumption of supplements across India varying from low demand by pregnant women to low supply of IFA tablets at health centres.[16-18] Very few studies have been done in study area especially after the implementation of Intensified national iron plus initiative (INIPI) /Anaemia Mukt Bharat (AMB) which was launched in 2018 under POSHAN Abhiyaan to bring down anaemia prevalence from 50% to 32% by 2022 among pregnant women.[15] therefore the study aimed to determine prevalence and determinants of IFA consumption among women when pregnant residing in rural area of Punjab

Methods:

A cross-sectional study was carried out in rural field practice area (including 11 villages with total population of 31842) attached to one of the medical colleges of Amritsar in the month of May-June 2025 after obtaining ethical clearance from institutional ethical committee.

Study population: Mothers of two months to two-year-old children were interviewed by house to house visit after taking informed consent. Participants not willing to give consent were excluded from study.

Sample size: The sample was calculated by considering the proportion of women taking IFA for 180 days during pregnancy as 40.5% in Punjab with absolute error of margin as 5% and it was estimated to be 370 by using the formula $N= Z^2pq/e^2$, where N is sample size, Z is 1.96 at 95% confidence limit, P is presumed proportion, q is (1-p) and e is absolute error of margin (0.05).

Sampling Technique: The study subjects were selected by probability proportional to size (PPS) sampling technique from 11 villages to reach the requisite sample of 370.

Data collection: Study participants were personally interviewed by the researchers after taking informed consent. Purpose of study was explained to them and confidentiality was assured. Interview was done in local language and information so obtained was recorded on a predesigned, pretested, semi structured questionnaire.

Statistical analysis: All the information so collected were compiled in Microsoft excel and analysed statistically with the help of SPSS version 23. Simple percentages and Chi-square test was used to evaluate different variables and valid conclusions were drawn.

Knowledge of participants was assessed by asking 8 questions each regarding basic antenatal care (TT, IFA, antenatal checkups, supplementary diet, BP and weight monitoring and avoidance of self medication), and knowledge about anaemia and IFA consumption (symptoms and effect of anaemia on pregnant women and foetus, benefits of IFA consumption, number of IFA tablets taken during pregnancy, way of consuming IFA, side effects of IFA intake and how to reduce its side effects). Participants giving more than four correct answers in each section were labelled to have good knowledge. Modified Kuppuswamy scale was used for assessing socioeconomic status of family.

Results:

Among 370 study participants 342, (87%) belonged to the age group of 18-29 years as shown in Table1. Mean age at marriage among study participants was 21.02 ± 2.57 years while the mean age at first pregnancy was 22.32 ± 2.63 years. 352 (95.1%) participants were Sikh by religion and 236 (63.8%) belonged to scheduled caste. 252 (71.4%) lived in joint family. According to Modified Kuppuswamy scale 216 (58.4%) belonged to upper lower socioeconomic class. 54 (14.6%) participants were illiterates and 250 (67.6%) were

educated till high or above. More than two third study participants 298 (80.5%) registered in first trimester, 182 (49.2%) had parity one and 194 (52.4%) were anaemic while pregnant.

Table 1: Socio demographic profile of study participants (N=370)

Characteristic	Frequency, n (%)
Age (Years)	
18-24	180 (48.6%)
25-29	142 (38.4%)
>30	48 (13%)
Religion	
Sikh	352 (95.1%)
Hindu	18 (4.9%)
Caste	
General	102 (27.6%)
OBC	32 (8.6%)
SC/ST	236 (63.8%)
Type of Family	
Joint	264 (71.4%)
Nuclear	106 (28.6%)
Socioeconomic status	
Upper middle	87 (23.5%)
Lower middle	59 (15.9%)
Upper lower	216 (58.4%)
Lower lower	8 (2.2%)
Education	
Illiterate	54 (14.6%)
Below High	66 (17.8%)
High and above	250 (67.6%)
Parity	
1	182 (49.2%)
2	134 (36.2%)
≥3	54 (14.6%)
Trimester of registration	
First	298 (80.5%)
Second	72 (19.5%)
No.of antenatal visits	
≤2	78 (21.1%)
≥3	292 (78.9%)
Whether anaemic during pregnancy	
Anaemic	194 (52.4%)
Non anaemic	146 (39.5%)
Status not known	30 (8.1%)

As shown in Table 2, 297 (80.2%) and 240 (64.8%) study participants had correct knowledge about benefits of taking IFA tablets and symptoms of anaemia respectively. 174 (47%) study participants could respond correctly when inquired on ways of consuming IFA tablets and 149 (40.3%) had correct knowledge about number/ duration of IFA tablets to be taken during pregnancy. Only 88 (23.7%) and 52 (14.1%) study participants could tell correctly when asked about effects of anaemia on pregnant woman and foetus respectively. Correct understanding on side effects of IFA tablets and on ways to reduce it was present in 127 (34%) and 46 (12.4%) participants respectively.

Total 143 (38.6%) study participants had good knowledge about anaemia and IFA supplement consumption. As shown in Figure 1, 210 (56.7%) consumed iron and folic acid for 180 days or more and 160 (43.3%) for less than 180 days. Out of 160 participants 98 (26.4%) consumed even for less than 100 days.

Table 2: Knowledge of study participants on anaemia and iron folic acid consumption (N=370)

Knowledge about anaemia and IFA consumption	Response	
	Correct	Incorrect
Symptoms of anaemia	240 (64.8%)	130 (35.2%)
Effects of anaemia on pregnant woman	88 (23.7%)	282 (76.3%)
Effects of anaemia on foetus/foetal outcome	52 (14.1%)	318 (85.9%)
Benefits of taking IFA Tablets	297 (80.2%)	73 (19.8%)
No./duration of IFA Tablets to be taken during pregnancy	149(40.3)%	221(59.7%)
Way of consuming IFA tablets	174 (47%)	196 (53%)
Common Side effects of IFA tablets	127 (34.3%)	243 (65.7%)
How to reduce side effects of IFA tablets	46 (12.4%)	324 (87.6%)

Table 3: Socio demographic determinants of IFA consumption during pregnancy (N=370)

Factors	>180 days n=210 (56.7%)	<180 days n=160 (43.3%)	Total n=370	Chi Square, p value
Caste				
General	86 (84.3%)	16 (15.7%)	102 (27.6%)	50.35, <0.001
OBC	20 (62.5%)	12 (37.5%)	32 (8.6%)	
SC/ST	104 (44.1%)	132 (55.9%)	236 (63.8%)	
Type of Family				
Joint	156 (59.1%)	108 (40.9%)	264 (71.4%)	2.17, 0.14
Nuclear	54 (50.9%)	52 (49.1%)	106 (28.6%)	
Education Status of Participant				
Illiterate	22 (40.7%)	32 (59.3%)	54 (14.6%)	14.83, <0.001
Below high school	29 (43.9%)	37 (56.1%)	66 (17.8%)	
High school and Above	159 (63.6%)	91 (36.4%)	250 (67.6%)	
Education status of Husband				
Illiterate	13 (39.4%)	20 (60.6%)	33 (8.9%)	14.63, <0.001
Below High school	25 (40.3%)	37 (59.7%)	62 (16.8%)	
High school and Above	172 (62.5%)	103 (37.5%)	275 (74.3%)	
Socio-economic status				
Upper middle	71 (81.6%)	16 (18.4%)	87 (23.5%)	37.56, <0.001
Lower middle	39 (66.1%)	20 (33.9%)	59 (15.9%)	
Upper lower and lower	100 (44.6%)	124 (55.4%)	224 (58.4%)	

Table 4: Obstetric care related determinants of IFA consumption during pregnancy (N=370)

Factors	>180 days, n=210(58.5%)	<180 days, n=160 (41.5%)	Total, n=370	Chi Square, p value
Parity				
Parity 1	121 (66.5%)	61 (33.5)	182 (49.2%)	14.5, <0.001
Parity 2	66 (49.3%)	68 (50.7%)	134 (36.2%)	
Parity 3	23 (42.5%)	31 (57.4%)	54 (14.6%)	
Knowledge of Antenatal care				
Good	187 (60.9%)	120 (39.1%)	307 (83.0%)	24.2, <0.001
Poor	13 (20.6%)	40 (63.4%)	63 (17.0%)	
Knowledge of anaemia and IFA Consumption				
Good	89 (62.2%)	54 (37.8%)	143 (38.6%)	15.22, <0.001
Poor	94 (41.5%)	133 (58.5%)	227 (61.4%	
Source of IFA Tablet				
Private	49 (75.4%)	16 (24.6%)	65 (17.6%)	11.5, <0.01
Government	118 (51.8%)	110 (48.2%)	228 (61.6%)	
Both	43 (55.8%)	34 (44.2%)	77 (20.8%)	
Place of Antenatal care				
Private	77 (71.3%)	31 (28.7%)	108 (29.2%)	15.32, <0.001
Government	108 (53.2%)	95 (46.8%)	203 (54.9%)	
Both	25 (42.4%)	34 (57.6%)	59 (15.9%)	
Trimester of registration				
First	175 (58.7%)	123 (41.3%)	298 (80.5%)	2.4, 0.120
Second	35 (48.6%)	37 (51.4%)	72 (19.5%)	
No. of Antenatal visits				
≤2	22 (31.9%)	56 (68.1%)	78 (21.1%)	32.8, <0.001
≥3	188 (64.8%)	104 (35.2%)	292 (78.9%)	
Whether Anaemic during pregnancy				
Yes	131 (67.5%)	63 (32.5%)	194 (52.4%)	22.63, <0.001
No	61 (41.8%)	85 (58.2%)	146 (39.5%)	
Don't know	18 (60%)	12 (40%)	30 (8.1%)	

Figure 1: Consumption of IFA supplements by study participants (N=370)

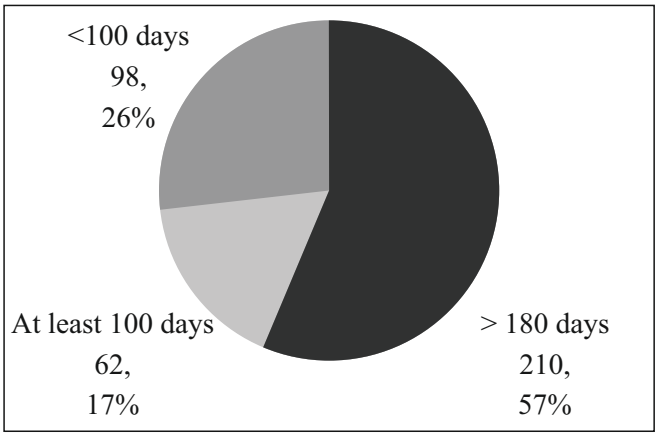


Figure 2: Distribution of study participants according to the reasons* given for consuming Iron Folic Acid Tablets for less than 180 days (N= 160)

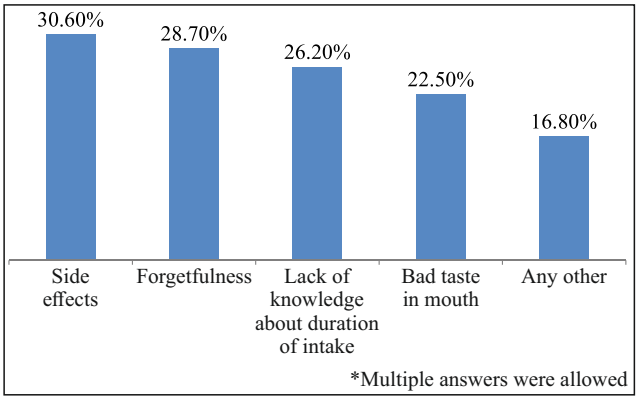


Figure 2 shows that among 160 mothers who took Iron folic tablets for less than 180 days, most common reason cited were side effects like nausea, vomiting, diarrhoea and pain in abdomen etc. in 49 (30.6 %) followed by forgetfulness in 46 (28.7%), lack of knowledge about exact duration of intake in 42 (26.2%), bad taste in 36 (22.5%) and 27 (16.8%) gave other reasons like tablets not available at centre, no need to take etc.

Table 3 shows higher consumption of IFA tablets in participants belonging to General caste, upper middle socioeconomic status and having higher education and difference was found to be highly significant ($p<0.01$). Type of family was not significantly associated with consumption of IFA supplements.($p=0.14$).

Table 4 shows parity, knowledge of antenatal care, anaemia and IFA consumption, place of antenatal care, source of IFA supplements, number of antenatal visits and anaemia during pregnancy were significantly associated with consumption of IFA supplements. However trimester of registration had no significant association. ($p=0.12$)

Discussion:

Current study showed majority of study participants were Sikhs, lived in joint family, belonged to upper lower socioeconomic status and were educated till high or above. Majority registered in first trimester and almost half were anaemic during pregnancy.

Majority of study participants had correct knowledge about benefits of taking IFA tablets and symptoms of anaemia whereas less than half could tell correct ways of consuming IFA tablets and number or duration of IFA tablets to be taken during pregnancy. Nivedita K et al[16] revealed that 39.8% were aware of term anaemia. Debbarma et al[17] reported knowledge about no. of tablets to be taken during pregnancy in 74.4%. which was higher than our study. Study showed knowledge about effects of anaemia on pregnant woman and foetus was quite less. Even correct understanding on ways to reduce its side effects was present only in few study participants. Similar to our study Suputri et al.[18] in Ethopia reported side effects of IFA tablets and its management was known to 50% and 21.7% participants respectively.

Consumption of IFA supplements in our study population was found to be more (56.7%) . according to NFHS 5 survey in Punjab only 55.4% and 40.5% mothers consumed iron and folic acid tablets for 100 and 180 days respectively.[4] Vashisht et al[19] in Haryana found consumption of IFA for more than 100 days only in 38.2%. Saimaa et al[20] in Puducherry found 64.4% adherence to IFA during pregnancy. Similar to our study Singh et al[21], Mishra et al[22], Debbarma et al[17] found main reasons for low consumption of supplements as side effects, bad taste, forgetfulness and inadequate supply whereas Saimaa et al reported unawareness (26.9%) and inadequate counselling (23.1%) as one of

the main reason for non-adherence apart from forgetfulness (62.8%) and side effects.[20]

In this study, the probability of consuming Iron and folic acid was higher among those who belonged to General category, higher socioeconomic status and were having higher education. Similar association with education was shown by study conducted in Haryana.[19] Saimaa et al[20] reported higher adherence to IFA among women with graduation and post graduation and with higher income. Education of husband also impacts in a great way on utilization of maternal health services as in our study 172 (62.5%) study participants with husband having higher education consumed IFA for more than 180 days compared to 13(39.4%) with illiterate husbands. A study conducted by Godara et al[23] found better compliance in women belonging to higher socioeconomic status similar to our findings. On the contrary Deori et al[24] showed better compliance in women belonging to low socioeconomic status.

Current study showed more consumption of IFA in primipara similar to study conducted by Deori et al[24]. Participants having knowledge about care required during pregnancy and anaemia were more likely to consume IFA for 180 days or more. This is in line with the findings of study done in Indonesia who found positive correlation between knowledge and consumption of IFA.[18] whereas study conducted in Kathmandu by Mishra et al[22] showed no significant association. Participants getting care from private institution or purchasing IFA from pharmacy shop showed significantly higher consumption however early registration had no significant association with consumption of IFA for 180 days or more as 175 (58.7%) and 35 (48.6%) consumed IFA for 180 days or more getting registered in 1st and 2nd trimester respectively whereas study conducted by Asres et al[25] in Ethopia found that women who started taking antenatal care in first trimester were 1.2 times more likely to comply with IFA consumption. Participants having three or more antenatal visits were more likely to consume IFA for 180 days or more. Similar results were shown by study done in Ballabhgarh, Haryana where increased compliance to IFA in mothers having more than 4 antenatal visits was observed.[19] Study shows that participants with anaemia during pregnancy 131 (67.5%) were more likely to consume IFA for more than 180 days as compared to nonanemic 61 (41.8%) . On the contrary Deori et al[24], Saimaa et al[20] found higher adherence to IFA in women with no anaemia. Higher consumption could be due to the reason that women with anaemia were repeatedly counselled to take IFA by health care providers.

Limitations:

It was an observational interview-based study so recall bias might be there. Further self reported IFA intake was considered so there are possibility participants who did not take supplements were reported. Despite the limitation this study provides better evidence and understanding of population as study is community based and findings can be generalised for general population.

Conclusion:

Consumption of IFA tablets during pregnancy for 180 days or more was found only in 56.7% participants. Moreover less than half were aware about correct number of IFA tablets to be taken during pregnancy and less than one third could tell ill effects of anaemia on pregnant women and foetus and knowledge about ways to reduce side effects was very poor. Side effects followed by forgetfulness and lack of knowledge about exact duration of IFA supplements to be taken were main reasons given for low consumption. So there is dire need to educate women about exact number of IFA tablets to be taken during pregnancy and risk associated with non utilization. Health care providers should also explain the associated side effects of IFA supplements and its management strategies so as to increase its acceptance. Strategies of behaviour change communication as mentioned in Anaemia Mukt Bharat can be utilized involving community leaders, health workers and health care providers.

Declaration

Funding: Nil

Conflict of Interest: Nil

References:

1. World Health Organization. Hemoglobin concentrations for the diagnosis of anemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva: World Health Organization; 2011. p.1-6.
2. World Health Organisation(WHO). WHO Global Database on Anaemia, Nutrition Landscappe Information System. Geneva, Switzerland: World Health Organisation (WHO).
3. Ministry of Health and Family Welfare. National Family Health Survey-4, India Fact Sheet [Internet], International Institute of Population Sciences. Government of India. 2021-22:4 [Cited 2025 Apr 15]. Available at: https://www.data.gov.in/catalog/national-family-health-survey-5-nfhs-5-india-districts-factsheet-data
4. Ministry of Health and Family Welfare. National Family Health Survey-4 State fact sheet Punjab. Mumbai: International institute for population sciences, Mumbai; 2021-22:4. [Cited 2025 Apr 15]. Available at: https://im4change.in/docs/NFHS-5%20Punjab.pdf
5. Ministry of Home affairs. Sample Registration System, Maternal Mortality in India: 1 pdf 997-2003, Trends causes and risk factors. New Delhi: Govt. of India; 2003:17
6. World Health Organization. Attending to 136 million births every year. In: Make every mother and child count WHO Report 2005. Geneva: WHO Publications; 2005: 61-77
7. Centre for Reproductive Rights. Maternal Mortality in India – Using International and Constitutional Law to Promote Accountability and Change. New York: 2008: Centre for Reproductive Rights; 13-14 [Cited 2024 August 5]. Available from:https://reproductiverights.org/sites/default/files/documents/MM_report_FINAL.pdf
8. World Health Organization. Great expectations: making pregnancy safer. In: Make every mother and child count WHO Report 2005. Geneva: WHO Publications; 2005: 41-58
9. Lal S, Adarsh, Pankaj. Population Stabilization: High fertility – Mortality. In: Text Book of Community Medicine. 3rd ed. New Delhi: CBS Publishers; 2011: 87-9
10. Suryanarayana R, Chandrappa M, Santhuram AN, Prathima S, Sheela SR. Prospective study on prevalence of anemia of pregnant women and its outcome: A community based study. J Family Med Prim Care 2017 Oct;6(4):739-43
11. Abbaspour N, Hurrell R, Kelishadi R. Review on iron and its importance for human health. J Res Med Sci. 2014;19(2):164–74.
12. WHO. Daily iron and folic acid supplementation in pregnant women. Geneva, World Health Organization, 2012. [Cited 2024 Dec 27]. Available at: https://www.who.int/publications/i/item/9789241501996
13. Park K. Community nutrition programmes. In: Park's Text book of Preventive and Social Medicine. 25th ed. Jabalpur: M/s Banarsidas Bhanot Publishers; 2019: 717.
14. Gautam CS, Saha L, Sekhri K, Saha PK. Iron deficiency in pregnancy and rationality of iron supplements prescribed during pregnancy. Medscape J Med 2008 Dec;10(12):283.
15. Ministry of Health and Family Welfare. Guidelines for Control of Anaemia- Intensified National Iron Plus Initiative. New Delhi, MoFHW [Cited 2024 September 15] Availableat: http://nhm.gov.in/images/pdf/programmes/wifs/guidelines/GuidelinesforControlofIronDeficiencyAnaemia.pdf
16. Nivedita K et al. knowledge attitude and practices of pregnant women regarding anaemia, iron rich diet and iron supplements and its impact on their haemoglobin levels. Int J Reprod Contracept Obstet Gynaecol 2016 Feb;5(2:425-31
17. Debbarma B, Konjengbam S, Elangbam V, Christina S, Akoijam BS. Prevalence of nonadherence to iron and folic acid supplementation among pregnant women in Bishanpur district of Manipur. J Med Soc 2022;36:43-7
18. Saputri GZ, Candradewi SF, Hidayati A, Winarti D. The Correlation Between Pregnant Women Knowledge Level, Perception, and Compliance with Ferrous Fumarate Tablet Consumption in a Primary Health Care Institution. Advances in health sciences research. 2021;33:402-7
19. Vashisht BM, Bhadwaj H, Chauhan M, Anvesha, Jaiprakash, Sociodemographic determinants of iron and folic acid consumption(IFA) by females during their antenatal period delivering in a tertiary care hospital of Haryana. Public Health Rev Int J Public Health Res. 2020 April;7(2):19-25.
20. Saimaa P, Prakash M, Pandiamunian J, Sabita P, Sivagami K, Basu M. A Mixed-Method Study on Iron-Folic Acid Adherence and its Determinants among Pregnant Women in Puducherry, India. Healthline.2024;15(3): 190-200
21. Singh G, Lal M, Singh S. Utilization of iron folic acid tablets among pregnant women in rural Punjab: an interventional study. Int J Community Med Public Health. 2020 April;7(4):1307-12.
22. Mishra RK, Tiwari K. Knowledge and compliance of Iron and folic acid supplementation among pregnant and postnatal women in a hospital of Kathmandu. Journal of advanced academic research. 2020 June;7(1):63-9.
23. Godara S, Hooda R, Nanda S, Mann S. To study compliance of antenatal women in relation to iron supplementation in routine ante-natal clinic at a Tertiary health care centre. J Drug Deliv Ther 2013 May;3(3):71-5.
24. Deori TJ, Ramaswamy G, Jaiswal A, Loganathan V, Kumar R, Mahey R, et al. Compliance with iron folic acid (IFA) tablets and associated factors among pregnant women attending ante-natal care clinic at Sub District Hospital, Ballabgarh. J Family Med Prim Care 2021 May;10(5):2006-11
25. Asres AW, Hunegnaw WA, Ferede AG, Azene TW. Compliance levels and factors associated with iron folic acid consumption among pregnant women in Dangila, Northern Ethopia: A cross sectional study. SAGE Open Medicine. 2022 July;10:1-8.

Quality of Life among Patients with Neuropathic Pain Attending Outpatient Department of a Tertiary Care Hospital, Kolkata, India

Sayantani Bhunia[1], Kuntala Ray[2], Anindita Maiti[3], Anindita Mondal[1], Moumita Mandal[3], Mausumi Basu[4]

[1]Postgraduate Student, [2]Professor & Head, [3]Assistant Professor, Community Medicine Department, Institute of Post Graduate Medical Education and Research, Kolkata, India
[4]Professor & Head, Community Medicine Department, ICARE Institute of Sciences & Research, Haldia West BergaL, India
Correspondence: Dr. Mausumi Basu, Email: basu.mausumi544@gmail.com

Abstract:

Introduction: Neuropathic pain is a complex, painful condition, difficult to diagnose and treat with a negative impact on patients' health and quality of life. **Objectives:** To evaluate the correlation between neuropathic pain and quality of life along with identifying the limiting aspects in the daily life of the patients suffering from it; and also, to find out association of socio-demographic factors with quality of life. **Methods:** A cross-sectional study was conducted for 3 months among 404 patients with neuropathic pain attending the outpatient department of Neuro-medicine and Physical medicine of a tertiary care teaching Hospital, Kolkata using WHO QOL-BREF Scale. Data were tabulated in MS-Excel spreadsheet, statistical analysis was done in SPSS version 26. **Results:** Among the study participants 264 (65.4%) were female, about 252 (62.2%) were Muslim and 372 (92.2%) were married. More than half of the study participants had poor quality of life 238 (59%) with burning 343 (93%), tingling 365 (90%) sensation. A total of 290 (72%) of the study participants were suffering from severe pain. It was found that the limiting aspect was the psychological domain. Significant association ($p<0.05$) was seen with age, gender, religion and education with QOL. **Conclusion:** Majority of the study participants had poor quality of life (59%) with the greatest impact on psychological domain after the onset of pain and presented a positive attitude for treatment towards it.

Keywords: Neuropathic pain, Psychological domain, Quality of life

Introduction:

Pain affects different aspects of human being and its interpretation varies from one culture and socio-economic condition to one another. It is a multifactorial phenomenon that involves everything from tissue damage to environmental aspects.[1] According to IASP (Indian Association for the study of pain), pain is a sensory and emotional experience associated with real or potential lesion of tissue.[2] Neuropathic pain is a complex, painful condition, difficult to diagnose, and treat with a negative impact on patient's health and quality of life.[3] Neuropathic pain occurs due to direct consequence of a disease or injury that affects the somatosensory system. The pathophysiological states that determined the onset of neuropathic pain mostly involved are metabolic disorder, viral infection, chemotherapy-induced, autoimmune disorder, spinal cord injury and inflammatory disorder. In patients

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Bhunia S, Ray K, Maiti A, Mondal A, Mandal M, Basu M. Quality of Life among Patients with Neuropathic Pain Attending Outpatient Department of a Tertiary Care Hospital, Kolkata, India. Healthline. 2025;16 (4): 284-290
	DOI : 10.51957/Healthline_765_2025	

Received : 17-07-2025 **Accepted** : 11-11-2025 **Published :** 31-12-2025

suffering from neuropathic pain, the perceived pain is usually spontaneous, manifesting itself without needing a stimulus.[4] It is characterized by abnormal hypersensitivity to stimuli (hyperalgesia) and nociceptive responses to non-noxious stimuli (allodynia).[5] This condition is the result of a series of different pathological mechanisms and it is usually described based on the anatomic localization or aetiology. Damaged nerve fibres send the wrong signals to pain centres in body, resulting in neuropathic pain (central sensitization) This pathological condition substantially affects the quality of life of patients, compromising their psychological state. Hence with this background a study was carried out to evaluate the correlation between neuropathic pain and quality of life along with identifying the limiting aspects in the daily life of the patients suffering from it; and also, to find out association of socio-demographic factors with quality of life.

Methods:

A descriptive type of observational study with a cross-sectional design, was conducted among patients attending outpatient department of neuro-medicine and department of physical medicine rehabilitation (PMR) of tertiary care hospital, Kolkata, West Bengal. The study was done for a time period of 3 months. (April 2024 to June 2024). All the patients having pain with burning, numbness, tingling sensation attending in outpatient department were included as study participants. Assuming the prevalence as 47.3 % of poor quality of life[1]. p= 0.47; Confidence interval (C.I) = 95%; Level of Absolute precision = 5%; standard normal deviate (Z)= 1.96, the Cochran's formula for cross-sectional studies was applied which is: $n= Z^2pq/d^2$. After applying the formula, the minimum sample size (n) was calculated to be 382. Five patients from each department i.e. PMR and neuro-medicine department were selected for the pretesting of the schedule and were included in the study, so after the end of data collection total sample size was found to be 404. Dependent variable was Quality of life and neuropathic pain and independent variable socio-demographic characteristics.

A pre-designed, pre-tested, structured study was employed to collect data from the participants, where it was first translated to local language and then back translated. It comprised of the following variables: i) socio-demographic characteristics of the study participants; ii) DN4 (Douleur Neuropathique 4) questionnaire; iii) WHO QOL BREF[7] scale for assessing the quality of life of patients with neuropathic pain[8]; iv) a visual pain scale to find the intensity of pain[9] and v) Michigan Body Map to identify the sites of pain[10]. A sample frame of the study participants was first made by making a list of the patients attending the out-patient department of neuro-medicine and physical medicine rehabilitation in between 10 am to 12 noon. 25 was the desired sample size achieved each day. Approx 150 patients attended the out-patient department in last 3 months. Then sample interval was calculated 150/25= 6. First patient was selected randomly from the sampling frame and then every 6th patient was selected and desired sample size was achieved.

While analysing the WHOQOL-BREF scale the patient's responses were assigned according to their corresponding predefined scores ranging from 1 to 5, signifying worst possible to best possible health status for all questions except question no. 3, 4 and 26, where the point values had to be reserved. A domain score was calculated for each of the four domains by taking the average for each domain and multiplying it by 4. The domains scores were converted into a scale from 0 to 100 (where 100 is the highest QoL and 0 is the lowest QoL) by the formula: transformed score = (domain score – 4) X (100/16). There is no defined cut-off point for QoL according to this scale. The overall domains of WHOQOL-BREF were taken together for the analysis of the perceived QoL. Individual above the mean were classified having good QoL and less than mean was having poor QoL. The Visual Pain Scale (often called the Visual Analogue Scale (VAS) or Faces Pain Scale) was

used to help patients describe the intensity of their pain visually-especially when words are not enough or hard to explain. Left end = no pain (0) and right end= Worst pain imaginable (10). The Michigan Body Map (MBM) is a clinical tool used to help patients identify and document the location of chronic pain on their body. It's often used in pain clinics and research to assess the distribution of widespread pain-especially in conditions like fibromyalgia, neuropathy, or chronic musculoskeletal pain. It is a diagram of the human body (front and back); divided into 19 standard regions. Patients mark the part where they feel chronic pain in the past 3 months. The DN4 Questionnaire is a screening tool used to identify neuropathic pain. The DN4 helps distinguish neuropathic pain (nerve-related) from nociceptive pain (due to tissue damage). Total 10 items, 7 interviews based like burning, painful cold, electric shock, tingling, pins and needles, numbness and itching and 3 clinical based like hypoesthesia to touch and prick and pain increase by brushing). Each yes=1 point. Total score ranges from 0-10; Score e" 4 suggests the pain likely to be neuropathic in origin. Score< 4 unlikely to be neuropathic pain

Ethics: Anonymity and confidentiality of study participants were maintained throughout the study. Informed verbal consent was taken from each study participant. Proposal of study was submitted, and clearance was obtained from the Institutional Ethics Committee IPGME&R/IEC/2024/0436)

Statistical analysis: Data were tabulated in Microsoft Office Excel 2021 (Microsoft Corp, Redmond, WA, USA) and analysed using Statistical Package for the Social Science (SPSS) version 26.0. Categorical data were represented as proportion and with the help of suitable diagram. Continuous data were represented as mean/median and other suitable measure. Descriptive statistics were represented by Mean ± SD, frequency and percentage. $p<0.05$ was considered statistically significant.

Results:

Out of 404 studied participants, 264 (65.4)% were female and age was >50 yrs 130 (52.9%). Most of the study participants were Muslim by religion 251 (62.2%) and half of the participants (51.4%) were illiterate. Majority of the studied participants (92.2%) were married and according to the modified BG Prasad's Scale 2025, 30.5 % of the patients with neuropathic pain belong to lower middle class which was highest and 9% belonged to upper class which was lowest.(Table 1)

Table 1: Distribution of study participants with neuropathic pain according to socio-demographic characteristics (N=404)

Variables	Frequency	Percentage
Age in completed years		
<35	93	23.0
36-50	181	44.8
>50	130	32.2
Gender		
Female	264	65.4
Male	140	34.6
Religion		
Hindu	153	37.8
Islam	251	62.2
Education		
Illiterate	208	51.5
Primary	73	18.4
Middle school	62	15.3
Secondary	6	1.4
Higer-secondary and above	55	13.5
Marital status		
Single	18	4.4
Married	372	92.2
Widowed and divorced	14	3.4
Socio-economic status		
Upper class	39	9.6
Upper middle class	88	21.7
Middle class	98	24.2
Lower middle class	114	28.2
Lower class	65	16.3

Table 2: Descriptive statistics of quality-of-life scores of participants with neuropathic pain. (N=404)

Domain	Mean ±Standard deviation
Overall domain	37.13 ±21.65
Physical health	27.33 ±18.6
Psychological health	25.46±20.1
Social relations	58.42±32.6
Environment	37.30±15.3

Patients with neuropathic pain was confirmed by DN4 Questionnaire. When considering the aspects involved in the questionnaire, the most prevalent sensory descriptors were tingling (93.3%), numbness (90.3%) and burning (88.1). Regarding the physical related to sensitivity hypoesthesia to touch was the predominant one (79.4%) and 137 (34%) of the study participants had good quality of life.

Table 2 showing mean values of all the four domains of WHO QoL BREF Scale, with over all mean score of 37.13 ±21.65 and lowest being the psychological domain which is 25.46±20.1.(Table 2)

Michigan body map was used to locate the various sites of the pain, showed more than half of the study participants (54.5%) suffered from lower back pain. (Figure 1) A scatter plot showing a negative correlation between intensity of pain and overall quality of life among the study participants. It showed Spearman correlation coefficient: -478 with a p value 0.005. (Figure 2) Association between quality of life and socio-demographic characteristics were found to be in age, gender, religion and education (Table 3) Binary logistic regression showed significant association between age, residence and marital status (p=0.002) with quality of life. (Table 4)

Figure 1: A body map showing the location of pain in multiple sites (N=404)

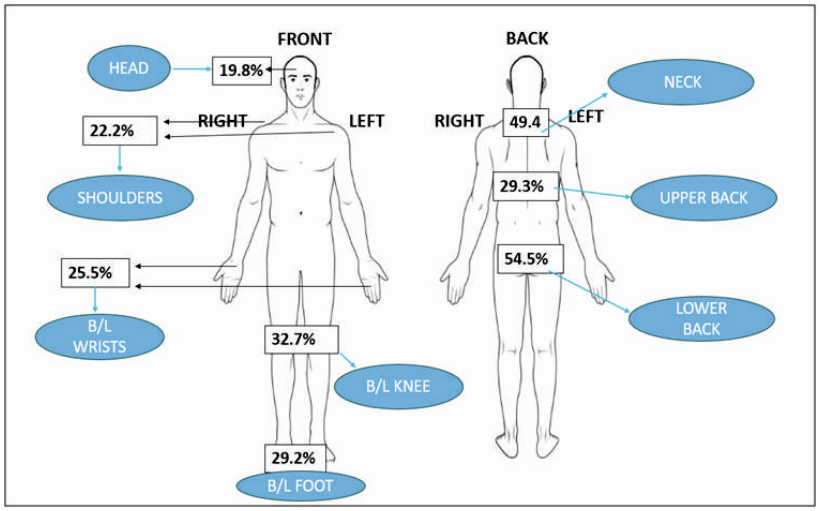


Figure 2: A scatter plot showing the correlation between intensity of pain and overall quality of life. (N=404)

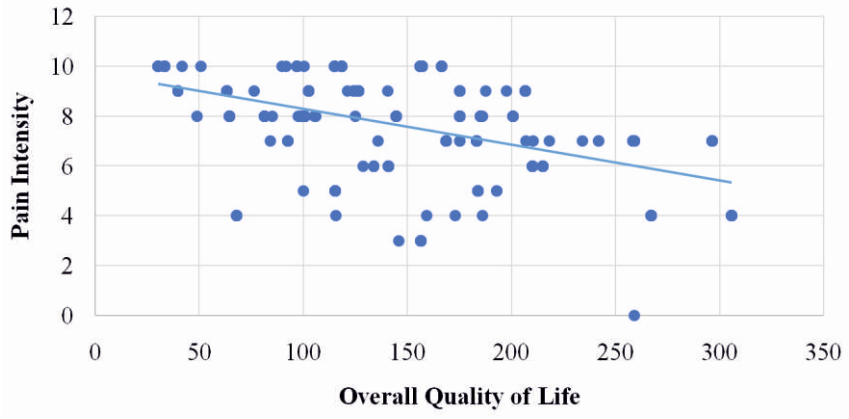


Table 3: Association of quality of life with socio-demographic characteristics. (N=404)

Socio-demographic characteristics	Quality of life			
	Good n (%)	Poor n (%)	Total n (%)	Chi-Square Value, p-value
Age of the participants (in Completed Years)				
<35	48 (51.6)	45 (48.4)	93 (100)	10.75, 0.001
>36-50	80 (44.1)	101 (55.9)	181 (100)	
>50	45 (34.6)	85 (65.4)	130 (100)	
Gender				
Male	30 (21.4)	110 (78.6)	140 (100)	15.98, 0.001
Female	109 (41.3)	155 (58.7)	264 (100)	
Religion				
Hindu	39 (25.5)	114 (74.5)	153 (100)	8.87, 0.003
Muslim	100 (36.8)	151 (60.2)	251 (100)	
Level of Education				
Illiterate	58 (29.7)	150 (72.1)	208 (100.0)	60.33, 0.001
Primary	43 (58.9)	30 (49.1)	73 (100.0)	
Middle	35 (56.5)	27 (43.5)	62 (100.0)	
Secondary	4 (56.9)	2 (43.1)	6 (100.0)	
Higher Secondary and above	20 (65.5)	35 (34.5)	55 (100.0)	
Marital Status				
Married	136 (36.6)	236 (63.4)	372 (100.0)	11.47, 0.009
Single	1 (5.5)	17 (94.5)	18 (100.0)	
Widowed/Divorced	3 (23.1)	11 (76.9)	14 (100.0)	
Socio-Economic class (Modified B G Prasad Scale)				
Upper class (I)	15 (38.5)	24 (61.5)	39 (100.0)	18.07, 0.001
Upper middle class (II)	19 (21.6)	69 (78.4)	88 (100))	
Middle class (III)	44 (44.9)	54 (55.1)	98 (100.0)	
Lower middle class (IV)	31 (27.2)	83 (72.8)	114 (100.0)	
Lower class (V)	30 (46.2)	36 (53.8)	65 (100.0)	

Table 4: Multivariable binary logistic regression showing association between quality of life and socio-demographic characteristics. (N=404)

Socio-demographic characteristics	Quality of life					
	Good n (%)	Poor n (%)	OR (95% CI)	p-value	AOR (95% CI)	p-value
Age of the participants (in Completed Years)						
<35	48 (51.6)	45 (48.4)	0.45	0.002	0.953	0.001
>36-50	80 (44.1)	101 (55.9)	(0.43-0.55)		(0.932-0.974)	
>50	45 (34.6)	85 (65.4)				
Gender						
Male	30 (21.4)	110 (78.6)	0.56	0.001	0.566	0.038
Female	109 (41.3)	155 (58.7)	(0.41-0.76)		(0.331-0.970)	
Religion						
Hindu	39 (25.5)	114 (74.5)	0.89	0.004	0.600	0.05
Muslim	100 (36.8)	151 (60.2)	(0.78-1.87)		(0.359-1.00)	
Marital Status						
Married	136 (36.6)	236 (63.4)	1.23	0.001	1.034	0.002
Single	0 (0.0)	18 (100)	(1.13-1.45)		(3.559-13.431)	
Widowed/Divorced	3 (23.1)	11 (76.9)				

Model fitness information: Cox and Snell R- Square=0.38, Nagelkerke R-Square=0.56, Omnibus Test of Model coefficients was significant (p<0.001) and Hosmer-Lemeshow Goodness of Fit Test was not significant(p=0.040), suggesting a good fit of the model

Discussion:

In this study the mean age was 45 years, 64.5% were female. The minimum age was 18 years and maximum age was 70 years. According to Flavia CA et al.[1] 57.3% were women, mean age was 50.6. The minimum age observed was 21 years, and the maximum age was 74 years which was similar with this study.

All patients had NP confirmed by DN4. When considering the aspects involved in this questionnaire, the pain intensity was 5.1±1.2, and the most prevalent sensory descriptors were tingling (52%) and burning (28%). Regarding the physical signs related to sensitivity, hypoesthesia to the touch was the predominant one (62%). In this study pain intensity was 5.5±1.5 with burning (93%), tingling (90%) and numbness (88%).

This study showed a decrease of psychological domain whereas the compared study showed decrease in physical domain. In present study it is seen that majority of the study participants were having low psychological domain. According to Anna Sherly et al[12], 42.4% showed pain in lower back while in this study it showed 54.4% lower pain which was highest for both the studies. The most affected locations of the body were knees, lumbar region and head. In 60.2% of interviewees, neuropathic pain, of high intensity (VAS = 7.09 ± 3.0) predominated, with duration of 8.53 ± 8.8 years and mean QoL was reduced in 47.13%.

By DN4 questionnaire it showed neuropathic pain of 65.2% while in the compared study it showed a neuropathic pain of 62.4%. The intensity of pain was 5.1±1.2 where in the compared study it was 7.09 ± 3.0. According to Jensen MP et al[13] psychological domain of quality of life is greatly hampered whereas in this present study it is the same. A study by Troth et al[14], it is seen that chronic pain was present in 35%, where 17.9% presented with neuropathic pain and had poor quality of life and female were mostly affected in this study, where as in present study 59% presented with poor quality of life and neuropathic pain and majority were female.

In a study by Garifi et al.[15] The prevalence was higher in women and individuals older than 60. Chronic pain with Nociplastic pain was significantly more prevalent in women, elderly, illiterate respondents, and respondents from lower social class. It was more frequently located in the lower limbs, and its intensity and duration were higher in comparison with chronic pain without neuropathic characteristics; it is also seen in present study that lower class and middle class suffers more with neuropathic pain. Bouhasira et al.[16] conducted a study, where there was a higher prevalence of chronic pain with neuropathic characteristics was associated with middle age (50-64 years), manual professions and those living in rural areas. It was more frequently located in the lower limbs and its intensity and duration were higher in comparison with chronic pain without neuropathic characteristics; where in present study it was also seen the same that lower back pain is more.

Like other studies present study also had some limitations. Being a cross-sectional study, it captures data at a single point in time, limiting the ability to assess changes in quality of life over time or establish cause-effect relationships. The assessment of quality of life and pain intensity was based on self-reported questionnaires, which can be influenced by recall bias, emotional state, or misunderstanding of question. Detailed psychological evaluation should be made. Without follow-up it is not possible to understand how pain progression or treatment over time affects the QOL.

Conclusion:

Majority of the study participants had poor quality of life with the greatest impact on psychological domain after the onset of pain and presented a positive attitude for treatment towards it. Assessing quality of life (QoL) should be part of routine care for patients with neuropathic pain. Early detection of reduced QoL enables personalized treatment and better outcomes. Policymakers and administrators must invest in training and resources to strengthen comprehensive pain management programs.

Declaration

Funding: Nil

Conflict of Interest: Nil

References:

1. Shirley A, Abrahao Fontes Baptista, Mendes L, Kamilla Soares Silva, Cristine, Manoela F, et al. Impact of Neuropathic Pain at the Population Level. Journal of Clinical Medicine Research [Internet]. 2023 [cited 2024 Aug 7];6(2):111–9.
2. Moher D. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. Annals of Internal Medicine. 2019 Aug 18;151(4):264.
3. Almeida FC, Castilho A, Cesarino CB, Ribeiro R de CHM, Martins MRI. Correlation between neuropathic pain and quality of life. Brazilian Journal Of Pain. 2018;1(4).
4. Ziegler D. Thioctic Acid for Patients with Symptomatic Diabetic Polyneuropathy. Treatments in Endocrinology. 2004;3(3):173–89.
5. Burgess J, Frank B, Marshall A, Khalil RS, Ponirakis G, Petropoulos IN, et al. Early Detection of Diabetic Peripheral Neuropathy: A Focus on Small Nerve Fibres. Diagnostics. 2021 Jan 24;11(2):165
6. Baron R, Maier C, Attal N, Binder A, Bouhassira D, Cruccu G, et al. Peripheral neuropathic pain. PAIN. 2017 Feb;158(2):261–72.
7. World Health Organization. WHOQOL - Measuring Quality of Life [Internet]. World Health Organization. 2012. Available from: https://www.who.int/tools/whoqol
8. Trust R. Website [Internet]. ePROVIDE - Mapi Research Trust. 2025 [cited 2025 Oct 24].
9. Visual Analogue Scale. (2024, August 5). Physiopedia. from https://www.physio-pedia.com/index.php? title=Visual_Analogue_Scale&oldid=356879.
10. Michigan Body Map (MBM) | Pain Research | Michigan Medicine [Internet]. Pain Research. 2016. Available from: https://medicine.umich.edu/dept/pain-research/clinical-research/michigan-body-map-mbm
11. World Health Organization. WHOQOL - Measuring Quality of Life| The World Health Organization [Internet]. www.who.int. 2012. Available from: https://www.who.int/tools/whoqol
12. Ansari D, Tingstedt B, Andersson B, Holmquist F, Sturesson C, Williamsson C, et al. Pancreatic cancer: yesterday, today and tomorrow. Future Oncology. 2016 Aug;12(16):1929–46.
13. Jensen MP, Chodroff MJ, Dworkin RH. The impact of neuropathic pain on health-related quality of life: Review and implications. Neurology. 2007 Apr 9;68(15):1178–82.1.
14. Toth C, Lander J, Wiebe S. The Prevalence and Impact of Chronic Pain with Neuropathic Pain Symptoms in the General Population. Pain Medicine. 2009 Jul;10(5):918–29.1.
15. Harifi G, Amine M, Ait Ouazar M, Boujemaoui A, Ouilki I, Rekkab I, et al. Prevalence of Chronic Pain with Neuropathic Characteristics in the Moroccan General Population: A National Survey. Pain Medicine. 2013 Feb;14(2):287–92.
16. Bouhassira D, Lanteri-Minet M, Attal N, Laurent B, Touboul C. Prevalence of chronic pain with neuro-pathic characteristics in the general population. Pain. 2008;136(3):380-387

Adult Vaccination among Diabetic Patients: An Assessment of Awareness, Coverage and Acceptance in a Tertiary Care Hospital in Kolkata, India

Somnath Naskar[1], Aparajita Mondal[2], Ratul Kumar Bysack[3], Mausumi Basu[4]

[1]Associate Professor, [2]Seior Resident, Community Medicine Department,
Institute of Post Graduate Medical Education and Research, Kolkata, India
[3]General Duty Medical Officer, Swasthya Bhawan, Kolkata, India
[4]Professor & Head, Community Medicine, ICARE Institute of Sciences & Research, Haldia West BergaL, India

Correspondence: Dr. Mausumi Basu, Email: basu.mausumi544@gmail.com

Abstract:

Introduction: Adult vaccination is widely recognized as a highly cost-effective public health measure, despite its benefits many diabetics may not grasp their importance or have misconceptions, affecting their acceptance. The purpose of the study was to assess the awareness and to estimate the coverage and find out the level of acceptance of adult vaccination. **Methods:** An observational study with cross-sectional design was conducted in Diabetes OPD of tertiary care hospital in Kolkata among 423 diabetics patients using consecutive sampling methods attending Diabetic OPD for a duration 6 months (September 2023-February 2024). A pre-designed, pre-tested, structured schedule comprising of socio demographic clinical profile, awareness, coverage and acceptance of vaccine was used for face-to-face interview. Data were analysed by Microsoft Excel 2019 and SPSS v25.0. **Results:** Out of 423 participants more than half (57%) were male, and mean age of them were 50.7 years (±11.2). Ninety one percent (91%) of study participants had type II Diabetes Mellitus, and more than two thirds (67.4 %) suffered from co-morbidities. Thirteen percent (13%) had adequate awareness about adult vaccination and very few (7%) had administered Hepatitis B vaccine. Seventy one percent (71%) of the study participants were ready to get Influenza vaccine after being aware. Fear of adverse effects and out of pocket expenditure were the major reason from non-acceptance of vaccines. **Conclusion:** Eighty-seven percent (87%) of the participants had inadequate awareness about adult vaccines and only seven percent (7%) of them had taken Hepatitis B vaccination.

Keywords: Awareness, Coverage, Diabetes Mellitus, Vaccination

Introduction:

Adult vaccination is widely recognized as a highly cost-effective public health measure with numerous benefits at various levels.[1] A population-based study from 2017-2018 revealed that coverage for vaccination among adult population in India is below 2% in which 1.5%, 0.6%, 1.9% were vaccinated against influenzae, pneumococcal vaccine and hepatitis B vaccine respectively.[2] Vaccination protects individuals from vaccine preventable diseases, reducing the risk of illness, disability, and death.[3] By preventing diseases such as influenza, pneumonia, and shingles, immunizations contribute to an individual's overall health and well-being, leading to improved quality of life.[4]

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Naskar S, Mondal A, Bysack RK, Basu M. Adult Vaccination among Diabetic Patients: An Assessment of Awareness, Coverage and Acceptance in a Tertiary Care Hospital in Kolkata, India. Healthline. 2025;16 (4): 291-299
	DOI : 10.51957/Healthline_764_2025	

Received : 14-07-2025 **Accepted** : 11-11-2025 **Published :** 31-12-2025

(or blood sugar) which damages heart, vessels, eyes, kidneys, nerves.[5] Globally approximately 422 million people are suffering from diabetes, and majority were from low to middle-income nations.[6] From the estimates of 2019 reported that 77 million individuals in India were suffering from diabetes, and by 2045 it is expected to rise to over 134 million. Around 1.5 million diabetes cases are diagnosed annually, and its prevalence has been steadily rising in recent decades. Still around 57% of these individuals remain undiagnosed.[7]

Around sixty million population of India are living with diabetics, and they are susceptible to morbidity, mortality as well as increased hospitalizations due to infectious diseases like influenza and pneumococcal disease.[8] Centres for Disease Control and Prevention provide guidelines for those who are more than 19 years and immune-compromised. It recommended different vaccines for adult like pneumococcal vaccine, Tdap (Diphtheria, Pertussis, Tetanus), Herpes Zoster, Hepatitis B vaccine, Human Papilloma Vaccine etc. The burden of vaccine-preventable diseases (VPDs) in adults is a significant public health concern.[9] Narrative review analysed that India had a disproportionately high share of globally reported cases of diphtheria (60%), Japanese encephalitis (44%), and tetanus (40%) in 2017.[10]

Though vaccination is more acceptable among children, but it is also essential for adults to prevent serious illnesses and complications. In India childhood immunization is followed as per National Immunization Schedule, but adult immunization is much more far behind. Diabetics face higher infection risk due to weakened immunity. Promoting vaccination awareness is vital to prevent complications and enhance public health. Despite vaccination benefits, some diabetics may not grasp their importance or have misconceptions, impacting their vaccination choices. With this background the study was conducted to assess the awareness of adult vaccination, to estimate the coverage of adult vaccination and to find out the level of acceptance of adult vaccination among study participants.

Methods:

An observational study with cross sectional design, was conducted at Diabetes OPD of tertiary care hospital in Kolkata among patients attending Diabetes OPD for a duration of 6 months (September 2023-February 2024).

Selection criteria: Those who were more than 18 years of age attending Diabetes OPD & has been treated for more than 1 year for diabetes were included in the study. Pregnant women and seriously ill patients & those who did not give informed written consent were excluded from the study.

Sample size: Proportion of awareness on adult vaccination (52%) was taken from a study conducted by Geneev *et al*[11] on knowledge of adult vaccination among type 2 Diabetes Mellitus. So, proportion of awareness of adult vaccination p=52%, q=1-p, Standard normal deviate (Z) = 1.96 at 95% Confidence Interval, Absolute error (d) = 5%; applying Cochranes formula sample size of 384 achieved, after taking 10% non-response, final sample size was 423.

Sampling technique: Consecutive sampling was done. Diabetes OPD is scheduled for three days a week; to attain the sample size data collected over 3 months and around twelve participants were interviewed each day.

Study tools: Study tool was prepared with socio-demographic variables and clinical (age, gender, marital status, religion, residence, highest level of education, occupation, their family income, type of family, addiction patterns, type of diabetes, family history of diabetes, blood glucose level, diabetes management, other co-morbidities etc), awareness of adult vaccination (Do you think adult vaccination is required for diabetes?, if yes reason and name of the vaccine, disease prevented from this vaccine etc), coverage of adult vaccination (name of the vaccine was taken by the individual, its dosage etc) and its acceptance (What are the vaccines you are ready to take after being aware- yes/no; if yes then which vaccine you want to take- flu vaccine/ pneumococcal/ Human Papilloma virus vaccine, Hepatitis B vaccine, Recombinant zoster, Tdap vaccine

etc. If no reason for non-acceptance). The study tool was a pre-designed, pre-tested, structured schedule which was designed by a team of two experts including one faculty of Community Medicine, and an Endocrinologist. The schedule was then pre-tested among 30 patients of the Diabetes OPD and necessary modifications were made. Those selected for pre-testing were not included in the final study population.

Study variables:

(a) Dependent variable: Awareness of adult vaccination, Coverage of adult vaccination, Acceptance of adult vaccination

(b) Independent variables: Socio-demographic & clinical profile- (Age, gender, religion, education, occupation, type of Diabetes, duration of diabetes, type of medication.)

Study technique and data collection: Diabetes OPD was visited, and consecutive eligible patients were selected. The informed consent was taken after ensuring anonymity and confidentiality and data were collected by face-to-face interview.

Operational definition & Data analysis:

Adult Vaccination: Adult Vaccination referred to the process of vaccinating individuals who have reached adulthood (typically 18 years and older) to protect them against various vaccine-preventable diseases.[12]

An awareness score was allocated to each study participant. For awareness of adult vaccination scoring the participants were asked the following questions- Do you think adult vaccination is required for diabetics? if the response is yes then next question was asked What is the name of vaccine? What is the dose of vaccine? The scoring is as follows: Do you think adult vaccination is required for diabetics? Yes - 1; No - 0; Dont know 0; If yes, name of the vaccine and number of doses taken, each vaccine/disease prevented - 1 point, correct dosage of each vaccine stated - 1 point, total score - 12 (since a total of 6 vaccines were recommended); thus Maximum score = 12 + 1 = 13 and those who scored more than equal to median ($\geq$6.5) were considered to have adequate awareness. All the responses were scored. Vaccination coverage for a given vaccine was the percentage of study participants who has been vaccinated by it and coverage was considered as whether they were vaccinated with any one of the vaccines (pneumococcal vaccine, Zoster vaccine, Flu vaccine, HPV vaccine, Tdap vaccine and Hepatitis B,). Acceptance was defined as the proportion of study participants who are willing to take the vaccines after making them aware.

Data were checked for correctness, completeness and tabulated in Microsoft Excel 2019 (Microsoft Corp, Redmond, WA, USA) and then imported to Statistical Package for the Social Sciences (SPSS for Windows, version 25.0, SPSS Inc., Chicago, USA) for interpretation and analysis. Descriptive Statistics were used to summarize the data. Multivariable binary logistic regression was performed to ascertain relationship between the dependent and the independent variables. All independent variables having p-value<0.20 were considered biologically plausible to be included in the multivariable model. Data was checked for multicollinearity (VIF<10) and variables with p-value<0.05 were considered statistically significant in the final model.

Ethical considerations: Institutional Ethics Committee permission was obtained prior to start of the study (Institute Name/IEC/2023/1082 dated 12.12.2023). Informed written consent was obtained before each interview and all ethical principles were strictly adhered to throughout the course of the study.

Results:

Responses were collected from 423 participants; it was found that the mean age group of them were 50.7 years (±11.2) with a range of 19 years to 85 years. More than half (57.2%) of the participants were male, more than four fifths (88.4%) were married; nearly three fifth of the participants were Hindu (59.8%). Around half of them (50.8%) belonged to rural area and one fourth of them (24.3%) had educational qualification of primary school. More than one fourth (29.8%) belonged to the Lower Middle Class of Socioeconomic status as per Modified B G Prasad Scale 2023[13] and twenty six percent (26%) were substance user. (Table 1)

Table 1: Distribution of study participants as per their socio-demographic characteristics (N=423)

Variables	Number	Percentage (%)
Age (Years)		
18-36	36	8.5
36-59	292	69.0
>59	95	22.5
Gender		
Female	181	57.2
Male	242	42.8
Marital status		
Married	374	88.4
Unmarried/ Divorced/ Separated/Widowed	49	11.6
Religion		
Hindu	253	59.8
Muslim	170	40.2
Residence		
Rural	215	50.8
Urban	208	49.2
Education		
Illiterate & non formal	74	17.5
Primary school	103	24.3
Middle School	45	10.7
Secondary	76	18
Higher Secondary	50	11.9
Graduate& above	75	17.7
Occupation		
Unskilled	57	13.5
Semi-skilled	66	15.6
Skilled	93	21.9
Semi-professional	12	2.8
Professional	13	3
Others	182	43.1
Socioeconomic status (SES)		
Upper	54	12.8
Upper middle	61	14.4
Middle	107	25.3
Lower middle	126	29.8
Lower	75	17.7
Type of family		
Nuclear	268	63.4
Joint	155	36.6
Substance use		
Yes	108	26
No	315	74

Out of the study participants majority (91.3%) had type II Diabetes, nearly half (48.2%) had diabetes for less than 5 years and more than half (57.2%) didnt have a family history of Diabetes, more than two third (67.4%) had other comorbidities. Nearly half (48.5%) and more than half (53.4%) of them had controlled fasting blood sugar and post prandial blood sugar respectively. Nearly two fifth (43.3%) were on oral hypoglycaemic agent and around one third (35.9%) were on Insulin therapy. (Table 2)

It has been found that thirteen (13%) were aware of adult vaccination, only one tenth (11.1%) had coverage for one or more than one vaccine and maximum coverage was for Hepatitis B (7.6%), Pneumococcal vaccine (2.6%), flu vaccine (2.4%). Vaccination was accepted maximally by nearly three fourth (71.8%) after making them aware of it.

Table 2: Distribution of study participants as per their Clinical profile (N=423)

Variables	Number	Percentage (%)
Type of diabetes		
Type1	37	8.7
Type 2	385	91.3
Family history of diabetes		
Yes	181	42.8
No	242	57.2
Duration of Diabetes (years)		
1-5	204	48.2
6-10	111	26.3
> 10	108	25.5
Fasting Blood Glucose		
Controlled	205	48.5
Uncontrolled	218	51.5
Post Prandial Blood Glucose		
Controlled	226	53.4
Uncontrolled	197	46.6
Medication History		
Oral Hypoglycaemic agent	183	43.3
Insulin	152	35.9
Oral Hypoglycaemic agent and Insulin	88	20.8
Presence of co-morbidities		
Yes	285	67.4
No	138	32.6

Multivariable Binary Logistic Regression showed that those who had educational qualification of higher secondary and above [AOR 0.226 (0.062-0.819] had significantly lower odds of coverage of adult vaccination. Those who were skilled, semi-professional and professional worker [AOR 2.930 (1.873-10.837)], belonged to upper and upper middle [AOR 2. 570 (1.985-6.707)] had higher odds of association with coverage of adult vaccination. (Table 3)

Multivariable Binary Logistic Regression showed that those educational qualification was higher secondary and above [AOR 0.439 (1.171-1.075)], belonged to socioeconomic status of middle class [AOR 1.607 (1.889-2.904) and had type 1 diabetes mellitus [2.378 (1.085-5.212] had significantly higher odds of acceptance of adult vaccination. (Table 4)

Sperman correlation showed that those who had more duration of diabetes mellitus had positive correlation with awareness score for adult vaccination which was statistically significant. (Figure 1)

Fear of adverse effects (55.5%), out of pocket expenditure (47.9%), and over reliance on existing immunity (32.7%) were the main reason for non-acceptance of adult vaccination among the study participants. (Figure 2)

Present study was conducted in Diabetes OPD tertiary care hospital in Kolkata, India, where it was found that most of the study participants were male with mean age of 50.7 years, whereas a study conducted by Geneev et al.[11] in endocrinology department of a tertiary care hospital of Punjab concluded that mean age group of the study participants were 65 years; Kunnuru et al.[14] in their South Indian research revealed that majority of the study participants were males (55.6%) and mean age group was 54 years. There was a community-based study conducted in Vishakhapatnam by Yeluri et al.[15] among health care professionals on their attitude, beliefs and barriers on adult vaccination showed that majority of the study participants were male (66%) with mean age of 45.2 years.

Table 3: Association between socio-demographic profile and adult vaccination coverage (N=423)*

Variables	Coverage, n (%)	OR (95% CI)	AOR (95% CI)	p value
Education				
Illiterate & non formal	4 (5.4)	Ref	Ref	-
Upto secondary	10 (4.5)	1.061 (0.339-3.325)	1.014 (0.356-3.248)	0.982
Higher Secondary and above	22 (17.6)	0.181 (0.058-0.565)	0.226 (0.062-0.819)	0.024
Occupation				
Unskilled, semiskilled	9 (7.3)	Ref	Ref	-
Skilled, semi-professional, professional	9 (7.6)	1.145 (1.393-4.437)	2.930 (1.873-10.837)	0.038
Others**	18 (9.9)	1.597 (1.145-3.311)	2.209 (0.465-8.481)	0.319
Socio-economic status				
Upper, Upper Middle	9 (4.5)	4.491 (1.970-10.241)	2.570 (1.985-6.707)	0.049
Middle	7 (6.5)	3.008 (1.216-7.437)	2.265 (0.828-6.198)	0.111
Lower Middle, Lower	20 (17.4)	Ref	Ref	-
Type of family				
Nuclear	28 (10.5)	1.46 (1.20-1.05)	0.74 (0.31-1.77)	0.512
Joint	8 (5.2)	Ref	Ref	Ref
Substance use				
Yes	5 (4.6)	2.24 (1.85-5.93)	2.07 (0.74-5.72)	0.218
No	31 (9.8)	Ref	Ref	-

Model fit: Omnibus test- 0.001, Hosmer-Lemeshow-0.487; Nagelkerke R-0.167. *Binary Logistic Regression, **(Housewife, business, retired/at home)

Table 4: Association between socio-demographic profile with acceptance of adult vaccine (N=423)*

Variables	Acceptance, n (%)	OR (95% CI)	AOR (95% CI)	p value
Gender				
Female	99 (54.7)	Ref	Ref	-
Male	151 (62.4)	1.371(0.929-2.032)	1.345(0.891-2.073)	0.151
Education				
Illiterate & non formal education	39 (52.7)	Ref	Ref	-
Upto Secondary	137 (61.2)	1.355(0.736-2.482)	1.143(0.564-2.333)	0.711
Higher Secondary and above	51 (40.8)	1.545(2.235-3.247)	0.439(1.171-1.075)	0.040
Occupation				
Unskilled, semiskilled	71 (42.8)	Ref	Ref	-
Skilled	63 (67.8)	0.893(0.563-1.417)	0.764(0.420-1.389)	0.324
Semi-professional, professional	16 (64)	0.581(0.344-0.980)	0.873(0.339-2.245)	0.777
Others **	100 (54.9)	0.686(0.288-1.633)	1.035(0.591-1.813)	0.905
SES				
Upper, Upper Middle	30 (39.5)	1.079(0.672-1.734)	0.964(0.561-1.658)	0.896
Middle	47 (37.6)	1.771(1.036-3.028)	1.607(1.889-2.904)	0.049
Lower Middle, Lower	54 (50.5)	Ref	Ref	-
Type of diabetes				
Type1	28 (75.7)	2.301(1.061-5.022)	2.378(1.085-5.212)	0.031
Type 2	221 (57.4)	Ref	Ref	-

Model fit: Omnibus Test-0.05, Hosmer-Lemeshow-0.878; Nagelkerke R-0.084. *Binary Logistic Regression, **(Housewife, business, retired/at home)

Figure 1: Scatter plot showing relationship between awareness and duration of diabetes (N=423)

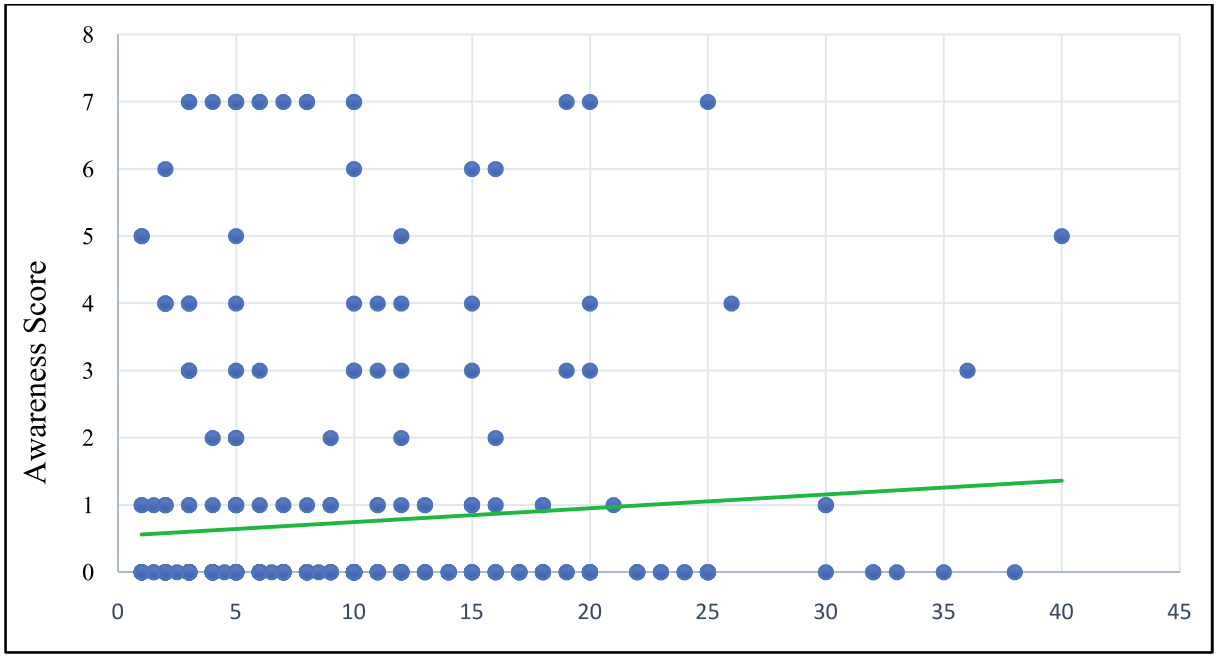
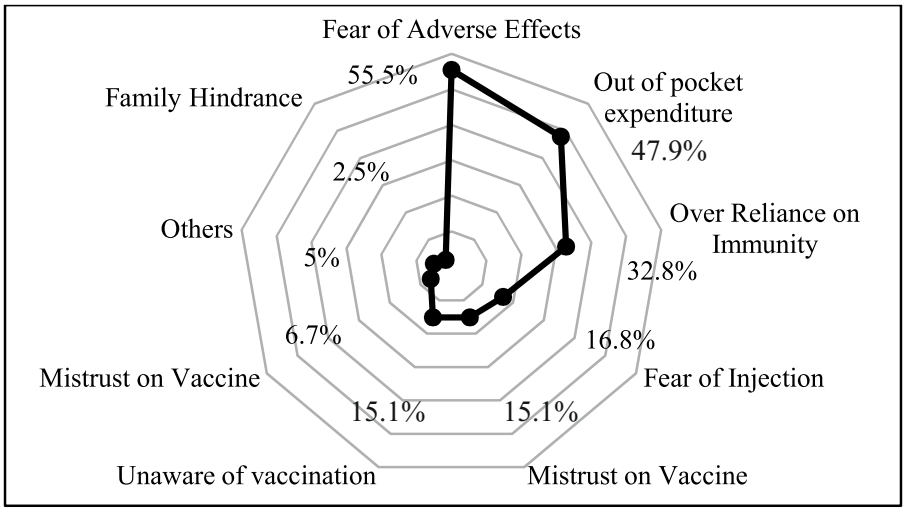


Figure 2: Rader diagram demonstrating distribution of adult vaccination among the study participants based on the reason for non-acceptance (N=119)



The recent study revealed that only 13% had adequate awareness towards vaccination and 7.6%, 2.6% and 2.4% had coverage towards Hepatitis B, PCV and flu vaccine coverage respectively; but Genev et al.[11] concluded that 53% of the study participants were aware of adult vaccination and the coverage for influenzae vaccine and pneumococcus vaccine were 2% and 0.7% respectively whereas Kunnuru et al[14] showed that only 2.5% had coverage towards PCV vaccine and 0.5% had coverage for influenzae vaccine.

Current study showed that 71.8% had acceptance towards vaccination after making them aware of adult vaccination, though Genev et al.[11] and Kunnuru et al.[14] had 72.4% and 76.2% acceptance towards adult vaccination.

Kwan Chan et al[16] conducted research in Hong Kong showed that those aged 65 years, with educational level of secondary school with household income above HKD 50000 were associated with low vaccination coverage but in this study those who had educational qualification of higher secondary and above [AOR 0.226 (0.062-0.819] had significantly lower odds of coverage of adult vaccination; and belonged to Upper class [AOR 11.95 (2.50-57.10)], skilled, semi-professional and professional worker [AOR 2.930 (1.873-10.837)], belonged to upper and upper middle [AOR 2.570 (1.985-6.707)] had higher odds of association with coverage of adult vaccination Also, in previous study[16] those who had coronary artery disease and older willing to take flu vaccination but with a secondary educational level and with income of HKD 15000-30000 or HKD 30000-50000 were less inclined towards vaccination but in this study those who had type 1 diabetes mellitus and socioeconomic status of middle class showed significantly higher odds of low acceptance of adult vaccination.

Current study revealed that fear of adverse effects, out of pocket expenditure and overreliance of immunity were the main reason for non-acceptance of adult vaccination; in Genev et al[11] and Kannur et al[14] it was identified that main reason for rejection were financial reasons and fear of complications respectively.

Healthcare professionals sometimes miss opportunities to assess and recommend vaccines during routine healthcare visits, it's important to continue efforts to improve adult vaccination rates to protect individuals and communities from vaccine-preventable diseases.[16] Public health organizations, healthcare providers, and individuals all have a role to play in achieving higher vaccination coverage among adults.[17-18] A study by Riccio et al[19] regarding knowledge, attitude, practices, and behaviour of healthcare professionals (HCPs) about vaccinations against pneumococcal, influenza, and hepatitis B in

patients with type 2 diabetes mellitus (DM) revealed that it is important to improve the vaccination coverage among the high-risk population.

American diabetes association proposed a standard comprehensive medical care to treat diabetic patients and to make them aware regarding different comorbidities, early assessment.[20]

People failed to realize the importance of vaccinations in adults for being unaware of the vaccines they need as they grew older.[20] Patients are more likely to get vaccinated when their healthcare provider recommends specific vaccines based on their age, health status, and other factors.[21-22]

Limitation:

A Mixed Method Study design (with a Qualitative component) would have explored the reasons of non-acceptance more comprehensively.

Conclusion & Recommendations:

Among the study participants, majority belonged to the age group of 50-60 years and nearly half of them were female and most of them were suffering from Type II Diabetes Mellitus. Eighty seven percent of study participants had inadequate awareness about adult vaccines. Only seven percent of study participants had some form of adult vaccination coverage. While most participants were willing to receive adult vaccines after being informed, few remained hesitant, primarily due to fears of adverse effects, out of pocket expenditure, reliance on existing immunity as their main reasons for rejection.

IEC (Information, education and communication) is required to be displayed in front of diabetes clinic as well as other outdoors, pharmacy of hospital to aware patients regarding adult vaccination. Doctor or counsellor present in Diabetes clinic should inform patient regarding vaccination benefits. Different public health campaigns need to be organized at community level at a regular interval. Adult vaccination should get incorporated into the adult immunization policies, should be available and affordable to diabetic patients.

Declaration

Funding: Nil

Conflict of Interest: Nil

Acknowledgments: We extend our sincere gratitude to National Institute of Health and Family Welfare, New Delhi, India and State Institute of Health and Family Welfare, Bangalore, India for their guidance and support.

References:

1. World Health organization. Immunization [Internet]. www.who.int. Available from: https://www.who.int/news-room. [Last accessed on 27.03.2024]
2. Rizvi AA, Singh A. Vaccination coverage among older adults: a population-based study in India. Bull World Health Organ. 2022 Jun 1;100(6):375-84.
3. Andre FE, Booy R, Bock HL, Clemens J, Datta SK, John TJ, Lee BW, Lolekha S, Peltola H, Ruff TA, Santosham M, Schmitt HJ. Vaccination greatly reduces disease, disability, death, and inequity worldwide. Bull World Health Organ. 2008 Feb;86(2):140-6.
4. Ciarambino T, Crispino P, Buono P, Giordano V, Trama U, Iodice V, Leoncini L, Giordano M. Efficacy and Safety of Vaccinations in Geriatric Patients: A Literature Review. Vaccines (Basel). 2023 Aug 24;11(9):1412.
5. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2009 Jan;32(1):62-7.
6. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, Colagiuri S, Guariguata L, Motala AA, Ogurtsova K, Shaw JE, Bright D, Williams R et al. IDF Diabetes Atlas Committee. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. Diabetes Res Clin Pract. 2019 Nov;157:107843.
7. Pradeepa R, Mohan V. Epidemiology of type 2 diabetes in India. Indian J Ophthalmol. 2021 Nov;69(11):2932-8.
8. Bhat R. A, Wani S. A, Kharbanda R, & Sethi S. An observational study on pneumococcal and influenza vaccination status of patients with type 2 diabetes mellitus. International Journal of Research in Medical Sciences. 2018;6(12):3842-5.
9. CDC. Adult Immunization Schedule by Age (Addendum updated August 7, 2025). Vaccines & Immunizations. Available from: https://www.cdc.gov/vaccines/hcp/imz-schedules/adult-age.html. [Last accessed on 22nd October 2025]
10. Dash R, Agrawal A, Nagvekar V, Lele J, Di Pasquale A, Kolhapure S, Parikh R. Towards adult vaccination in India: a narrative literature review. Hum Vaccin Immunother. 2020 Apr 2;16(4):991-1001.
11. Geneev C, Mathew N, Jacob JJ. Vaccination Status, Knowledge, and Acceptance of Adult Vaccinations against Respiratory Illness among Patients with Type 2 Diabetes Mellitus. Indian J Endocrinol Metab. 2018;22(2):280-2.

12. El Sayed, Nuha A., Grazia Aleppo, Vanita R. Aroda, Raveendhara R. Bannuru, Florence M. Brown, Dennis Bruemmer, Billy S. Collins, et al. 4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes. Diabetes Care. 2023;46(1)2.49-67.
13. Ghodke M. Updated BG Prasad's Socioeconomic Status Classification for the Year 2023. Indian J Community Med. 2023 Nov-Dec;48(6):934-6.
14. Kunnuru S, Vandana G, Shanthan V, and Beatrice A. A Study to Evaluate the Knowledge, Vaccination Status and Acceptance of Adult Vaccinations against Respiratory Infections in Patients with Type 2 Diabetes in South India. International Journal of Diabetes in Developing Countries. 2023;43 (5):772–8.
15. Yeluri S.R., Gara H.K., Vamsi G.S.S, Vanamali D.R. Health-care professional's attitude, beliefs, and perceived potential barriers for recommended adult immunization practices in patients with type-2 diabetes mellitus. International Journal of Research in Medical Sciences. 2020;9(1):148-54.
16. Wei Kwan Chan R, Mun Leung W. Influenza vaccine uptake and associated factors in adult patients with type 2 diabetes in a general outpatient clinic in Hong Kong. Aust J Gen Pract. 2023 Sep;52(9):643-9.
17. Poland CM, Ratishvili T. Vaccine hesitancy and health care providers: Using the preferred cognitive styles and decision-making model and empathy tool to make progress. Vaccine X. 2022 Jun 6; 11:100174.
18. Ortiz JR, Hartert TV. The Role American Thoracic Society Healthcare Providers Have in Immunization. Am J Respir Crit Care Med. 2021 Apr 15;203(8):944-5.
19. Riccio M, Marte M, Imeshtari V, Vezza F, Barletta VI, Shaholli D, Colaprico C, Di Chiara M, Caresta E, Terrin G, Papoff P, La Torre G et al. Analysis of Knowledge, Attitudes and Behaviours of Health Care Workers towards Vaccine-Preventable Diseases and Recommended Vaccinations: An Observational Study in a Teaching Hospital. Vaccines (Basel). 2023 Jan 16;11(1):196.
20. Anderson EL. Recommended solutions to the barriers to immunization in children and adults. Mo Med. 2014 Jul-Aug;111(4):344-8.
21. Kolobova I, Nyaku MK, Karakusevic A, Bridge D, Fotheringham I, O'Brien M. Burden of vaccine-preventable diseases among at-risk adult populations in the US. Hum Vaccin Immunother. 2022 Nov 30;18(5):2054602.
22. Tan L. Adult vaccination: Now is the time to realize an unfulfilled potential. Hum Vaccin Immunother. 2015;11(9):2158-66.

A Cross-Sectional Study of Diabetes Mellitus Profile among Bus Drivers of Surat City Depot, Gujarat, India

Pratik M Makwana[1], Krupa R Gondaliya[2], Sukesha P Gamit[3], Jayant R Patel[4]

[1]Senior Resident Doctor, [3]Assistant Professor, [4]Tutor, Community Medicine Department, Government Medical College, Surat, India
[2]Causality Medical Officer, Government Medical College, Surat, India

Correspondence: Dr. Pratik M Makwana, pratikkumar0505@gmail.com

Abstract:

Introduction: India is witnessing a growing burden of non-communicable diseases (NCDs), with type 2 diabetes mellitus emerging as a major public health challenge. Gujarat, with its oil- and sugar-rich diet, ranks second nationally in diabetes prevalence. Among high-risk occupational groups, professional bus drivers are particularly vulnerable due to sedentary lifestyles, poor dietary habits, and limited physical activity. **Objective:** To estimate the prevalence of diabetes among bus drivers. To determine risk factors associated with diabetes. **Methods:** This study was conducted from May to August 2023 at two major bus depots in Surat, Gujarat. Based on the NFHS-5 prevalence of diabetes and using universal sampling, a total of 321 eligible bus drivers were included. Data were collected via a pretested, semi-structured questionnaire. Data analysis was done using SPSS v26, Epi Info v3, and Excel 2019, applying univariate and bivariate analyses. **Results:** The majority were aged 31–40 years 167 (52%), belonged to socioeconomic Class 2 159 (50%), and had 0–5 years of job experience 188 (58%). About 45 (14%) reported health issues, primarily hypertension 13 (29%) and diabetes 12 (27%). Diabetes prevalence was significantly associated with education ($p<0.001$), socioeconomic class ($p=0.018$), and urban residence ($p=0.04$). Diabetic drivers were older, had longer job tenures, and higher incomes ($p<0.05$). **Conclusion:** There were significant associations between diabetes prevalence 30 (9.3%) and factors such as age, education, waist-to-hip ratio, residence, income and job tenure

Keywords: Bus drivers, Diabetes, Gujarat, Physical activity

Introduction:

India has experienced a shift in its disease patterns due to an epidemiological transition: mortality from communicable, maternal, neonatal, and nutritional diseases (CMNNDs) has significantly decreased, while non-communicable diseases (NCDs) and injuries have substantially increased their contribution to the overall disease burden and mortality.[1] By 2021, global estimates from the Global Burden of Disease (GBD) study indicate that non-communicable diseases accounted for approximately 63% of total disability-adjusted life years (DALYs) worldwide, while communicable, maternal, neonatal, and nutritional diseases contributed about 27% and injuries around 10%, reflecting a continued epidemiological transition toward chronic conditions.[2] Additionally, increasing urbanization and globalization in the developing world are likely to lead to a higher prevalence of NCDs.[3]

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Makwana PM, Gondaliya KR, Gamit SP, Patel JR. A Cross-Sectional Study of Diabetes Mellitus Profile among Bus Drivers of Surat City Depot, Gujarat, India. Healthline. 2025;16 (4):300-307
	DOI : 10.51957/Healthline_758_2025	

Received : 01-07-2025 **Accepted** : 08-01-2026 **Published :** 10-01-2026

Type 2 Diabetes Mellitus, which is often associated with lifestyle factors, has reached epidemic proportions. Several factors contribute to the development of diabetes, including genetics, lifestyle choices, and environmental factors. Healthcare costs associated with diabetes treatment, as well as the indirect costs related to lost productivity, are high. This can strain both national healthcare systems and individual households. Diabetes alone is responsible for 1.6 million deaths, making it the ninth leading cause of death globally.[4]

According to a 2025 article summarizing the most recent International Diabetes Federation (IDF) "Diabetes Atlas", India had about 89.8 million adults (age 20–79) with diabetes in 2024 - placing it among the countries with the largest diabetic adult populations worldwide.[5]

Recognized as one of the affluent and developed states of India, Gujarat's dietary habits—rich in oil and sugar—contribute to its high diabetes burden.[6] It ranks second in the country for the highest number of diabetic patients, following Tamil Nadu.[6] Although exact figures are not available, it is estimated that around 10% of Gujarat's population, close to 50 lakhs, may have diabetes.[6]

But beyond general population trends, professional bus drivers represent a particularly high-risk group. Health issues, particularly diabetes and its complications, can increase the risk of road accidents.[7] Both diabetic neuropathy and retinopathy can impair muscle function and vision, and treatment side effects such as hypoglycaemia may cause increased reaction time, imbalance, and even loss of consciousness.[8] These issues not only endanger drivers and others on the road but also lead to reduced work performance and increased absenteeism, adding to the societal financial burden.[9]

It is crucial to address the chronic disease risk factors among drivers. They sit over three hours longer than office workers, consume unhealthy diets, and engage in minimal physical activity.[10]

A study by Kohli P et al.[11] revealed that 25.0% of drivers in Gujarat had visual function-threatening systemic diseases, with diabetes mellitus being the most common pathology at 18.7%. Sudden hypoglycaemic episodes while driving have been experienced by 13 to 66% of drivers,[11–13] and peripheral neuropathy affecting lower limb sensation further impairs their ability to control vehicle pedals.[15]

Therefore, the present study aims to assess the burden of chronic disease and associated risk factors among drivers in order to better understand the extent of the problem and the contributing factors.

Methods:

A field based cross-sectional study was conducted from May to August 2023 at Bus Depot 1 and Depot 2, located in Sufi Baug, Mahidharpura, and Begampura areas of Surat, Gujarat.

Study Population and Sampling: A desk review identified a total of 373 bus drivers employed across both depots. Since the study population was finite and accessible, universal sampling was adopted**,** and all eligible drivers were approached for participation. Of these, 37 were unavailable or could not be contacted, and 15 were transferred during the study period. Therefore, data were collected from 321 bus drivers.

Inclusion Criteria: The participants were currently employed at the Surat bus depots and demonstrated a willingness to take part in the study. All eligible individuals provided informed consent prior to enrollment and agreed to undergo blood sample collection as part of the study protocol.

Exclusion Criteria: Individuals who were absent from duty or unwell during the study period were excluded. Additionally, those who could not be contacted despite three consecutive follow-up attempts through telephone calls or personal visits were also excluded from the study.

Ethics committee: ethical clearance was taken from the college ethics committee with reference number: - GMCS/ONLINE EC ID- Protocol number 720/23.

Data Collection: Data collection period was 4 months from 01/05/2023 to 30/08/2023. Following permission from depot authorities, daily lists of on-duty drivers were obtained. A minimum of five participants were

interviewed each day, covering various shifts. Data were collected using a pretested, semi-structured questionnaire capturing sociodemographic details, medical history (including diabetes and hypertension), lifestyle habits, occupational details, family history, treatment specifics, and associated costs.

Clinical Assessment: Random Blood Sugar (RBS) levels were measured using a glucometer. Diabetes was diagnosed according to the American Diabetes Association (ADA) Standards of Care 2023, using an RBS $\geq$ 200 mg/dL.[16] RBS 140–199 mg/dL used as prediabetes cut off. Known and newly diagnosed diabetic individuals received counselling and were referred to the Department of Medicine at New Civil Hospital, Surat, for further management.

Socio-economic status was assessed using the Modified BG Prasad Classification, updated as per the Consumer Price Index for Industrial Workers (CPI-IW), based on the 2022 revision by Pandey et al.[17]

Waist–Hip Ratio (WHR) was calculated by dividing waist circumference by hip circumference, and participants were classified according to WHO cut-off values. For men, a WHR of <0.90 was considered low, 0.90–0.99 moderate, and $\geq$1.00 high, as per the WHO Expert Consultation (2011) guidelines.

Body Mass Index (BMI) was calculated as weight in kilograms divided by height in meters squared (kg/m²), and participants were classified according to WHO criteria. Individuals with a BMI of less than 18.5 kg/m² were categorized as underweight, while those with a BMI between 18.5 and 24.9 kg/m² were considered to have normal weight. A BMI of 25.0 to 29.9 kg/m² was classified as overweight. Obesity was further categorized into three classes: Obese Class I (30.0–34.9 kg/m²), Obese Class II (35.0–39.9 kg/m²), and Obese Class III ($\geq$40.0 kg/m²), as per the WHO classification.[18]

Physical exercise status was categorized based on the World Health Organization (WHO) recommendations for adult physical activity. Participants reporting at least 150 minutes of moderate-intensity aerobic physical activity per week, according to WHO Global Physical Activity Guidelines.[19]

Frequency of consuming restaurant-prepared meals was assessed using a food frequency questionnaire approach commonly used in nutritional epidemiology. Participants were classified as None (no restaurant meals consumed), Occasional (infrequent consumption, less than once per week), or Regular (one or more restaurant meals per week), based on methods described in nutritional epidemiology literature.[20]

Data Analysis: Data were entered into Microsoft Excel (2019). Descriptive statistics (frequencies and percentages) were generated using Microsoft Excel (2019). Inferential statistical analyses were performed using IBM SPSS Statistics version 26. Associations between categorical variables were analysed using the Chi-square test, while comparisons of means were performed using one-way analysis of variance (ANOVA). A 95% confidence interval was considered, and exact p-values were reported. A p-value <0.05 was considered statistically significant.

Result:

A total of 321 bus drivers from both depots in Surat participated in the study. All participants 321 (100%) were male. The largest age group was 31-40 years, representing 156 (52%) of participants, followed by 84 (26%) aged 51-60, 49 (15%) aged 41-50, and 21 (7%) aged 21-30. Half of the participants 159 (50%) belonged to Socio-economic Class 2, earning between 4,411 and 8,821 per month. Class 3 comprised 84 (26%) of participants with incomes between 2,647 and 4,410, and Class 1 included 69 (21%) with incomes above 8,822. Only 9 (3%) belonged to Class 4, earning between 1,323 and 2,646, and none fell into Class 5 (below 1,323).

The largest group of participants 188 (58%) had 0-5 years of job experience, followed by 67 (21%) with 21-25 years, 31 (10%) with 6-10 years, and 29 (8%) with over 26 years. A small proportion had 9 (3%) had 11-20 years of experience. The majority 208 (65%) slept 0-7 hours daily, while 113 (35%) slept 8-14 hours.

Most participants 276 (86%) did not report any health problems, while 45 (14%) did. Among those with health concerns, hypertension 13 (29%) and diabetes mellitus 12 (27%) were the most prevalent. Other issues, such as piles, affected 5 (11%) of participants, and 7 (15%) reported additional health concerns.

Table 1: Sociodemographic and Health-Related Profile of the Study Population (N = 321)

Variable	Participants, n (%)
Marital status	
Married	306 (95)
Unmarried	13 (4)
Separated	2 (1)
Family	
Nuclear	145 (45)
Joint	98 (31)
Third generation	78 (24)
Duty hours/week	
1-20 hours	10 (3)
21-40 hours	14 (4)
41-60 hours	218 (68)
61-80 hours	67 (20)
81-100 hours	12 (5)
Diet	
Mixed food	140 (44)
Vegetarian	181 (56)
No of tea/day	
None	24 (7)
1-5 times	279 (87)
6-10 times	18 (6)
Habit of paan	
Yes	209 (65)
No	112 (35)

Counselling was widely utilised, with 29 (88%) participants receiving counselling mainly at the time of diabetes diagnosis and during follow-up visits. The counselling was provided by healthcare professionals at government health facilities, focusing on lifestyle modification, medication adherence, and complication prevention. Awareness of diabetes-related complications was high, with 24 (73%) participants being informed, while 9 (27%) were not.

A large majority 28 (85%) purchased their medication from private sources. In addition, 31 (91%) bought medicine monthly. In terms of spending, 17 (52%) of participants spent 0-500 on medicine, 8 (24%) spent 501-1000, and 5 (15%) spent more than 1000.

Most participants 27 (87%) used private facilities for medical investigations. Additionally, 21 (68%) undergoing monthly tests, 6 (19%) every three months, 1 (3%) every six months, and 2 (6%) irregularly. The majority 23 (77%) spent 0-500 on investigations, while 3 (10%) spent 501-1000, and 4 (13%) reported no costs.

Most participants 17 (85%) had been undergoing treatment for 0-7 years, 3 (15%) for 8-14 years.

Table 1 summarizes the majority of participants were married 306 (95%) and lived in nuclear families 145 (45%). Most reported working 41–60 hours per week 218 (67%). Dietary habits showed 181 (56%) were vegetarians, and 279 (87%) consumed tea 1–5 times daily. A significant portion 209 (65%) had a habit of chewing paan.

Among the study participants with known diabetes mellitus, the majority had a duration of illness of 0–7 years 17 (85%), while only 3 (15%) reported a duration of 8–14 years. Most participants were on oral hypoglycaemic agents 19 (95%), with a small proportion using Ayurvedic treatment 1 (5%). Treatment discontinuation was reported by nearly one-fourth of participants 5 (25%), whereas 15 (75%) were continuing treatment regularly. A family history of disease was present in 7 (35%) of participants, while 17 (65%) reported no such history. Only 4 (20%) of participants had Mediclaim coverage, and a large majority 16 (80%) were not covered by any health insurance.

In Table 2 a statistically significant association was observed between diabetes status and participants education level (χ^2=31.684, p<0.001) and their work/housing class (χ^2=11.87, p=0.018). Similarly, residence type showed a significant association with diabetes (χ^2=6.29, p=0.04), with urban participants showing higher prevalence. However, lifestyle factors such as alcohol consumption (χ^2=2.72, p=0.25), smoking (χ^2=2.83, p=0.24), and paan chewing (χ^2=0.37, p=0.83) did not show statistically significant associations.

Table 3 shows no statistically significant associations were found between diabetes status and sleeping time (χ^2=8.45, p=0.07), BMI classification (χ^2=14.92, p=0.135), physical exercise (χ^2=1.38, p=0.50), or frequency of restaurant meals (χ^2=4.04, p=0.40). Although higher proportion of diabetes observed among obese individuals and those with sedentary lifestyles, however, these differences did not attain statistical significance.

Table 2: Association Between Sociodemographic and Behavioural Correlates with Diabetes Status Among Participants (N = 321)

Variable	Disease			
	DM (30) n (%)	Normal (256) n (%)	Pre-DM (35) n (%)	χ^2 value, p-value
Education				
Primary education	8 (27.6)	16 (55.2)	5 (17.2)	31.684, <0.001
Secondary education	13 (14.0)	65 (69.9)	15 (16.1)	
Higher Secondary education	9 (6.7)	113 (84.3)	12 (9.0)	
Graduation	0 (0.0)	52 (94.5)	3 (5.5)	
Post-Graduation	0 (0.0)	10 (100.0)	0 (0.0)	
W/H Class				
High	13 (17.6)	55 (74.3)	6 (8.1)	11.87, 0.018
Low	10 (5.6)	152 (84.4)	18 (10.0)	
Moderate	7 (10.4)	49 (73.1)	11 (16.4)	
Residence				
Rural	14 (6.6)	177 (83.1)	22 (10.3)	6.29, 0.04
Urban	16 (14.8)	79 (73.1)	13 (12.0)	
Drinking (alcohol)				
Yes	9 (13.6)	48 (72.7)	9 (13.6)	2.72, 0.25
No	21 (8.2)	208 (81.6)	26 (10.2)	
Smoking				
Yes	5 (17.2)	20 (69.0)	4 (13.8)	2.83, 0.24
No	25 (8.6)	236 (80.8)	31 (10.6)	
Paan chewing				
Yes	21 (10.0)	165 (78.9)	23 (11.0)	0.37, 0.83
No	9 (8.0)	91 (81.3)	12 (10.7)	

Note. (χ2 = chi-square value, W/H= WAIST / HIP Ratio, DM= Diabetes Mellitus)

Table 3: Association of Sleep Pattern, BMI, and Lifestyle Behaviours with Diabetes Status Among Study Participants (N = 321)

Variable	Disease			
	DM (30) n (%)	Normal (256) n (%)	Pre-DM (35) n (%)	χ^2 value, p-value
Sleeping time				
Day	1 (1.4)	63 (88.7)	7 (9.9)	8.45, 0.07
Night	29 (11.8)	190 (77.2)	27 (11.0)	
Not defined	0 (0.0)	3 (75.0)	1 (25.0)	
BMI class				
Normal	10 (6.0)	141 (84.9)	15 (9.0)	14.92, 0.135
Obese 1	5 (20.0)	18 (72.0)	2 (8.0)	
Obese 2	0 (0.0)	3 (75.0)	1 (25.0)	
Obese 3	0 (0.0)	2 (66.7)	1 (33.3)	
Overweight	14 (14.3)	70 (71.4)	14 (14.3)	
Underweight	1 (4.0)	22 (88.0)	2 (8.0)	
Physical exercise				
Yes	4 (12.5)	23 (71.9)	5 (15.6)	1.38, 0.5
No	26 (9.0)	233 (80.6)	30 (10.4)	
Restaurant's meal				
None	18 (12.7)	107 (75.4)	17 (12.0)	4.04, 0.4
Occasional	4 (8.0)	41 (82.0)	5 (10.0)	
Regular	8 (6.2)	108 (83.7)	13 (10.1)	

Note. χ2 = chi-square value, BMI= Body Mass Index, DM= Diabetes Mellitus

Table 4: Association of Age, Income, Job Duration, and Medical Expenditures with Diabetes Status (N = 321)

Variables	Normal (256) (Mean ±SD)	Pre-DM (35) (Mean ±SD)	DM (30) (Mean ±SD)	f-value	P-value
Age (years)	39.9±8.4	45.5±8.4	49.5±8.5	22.134	.000
Per-capita income	6734±8618	7723±4251	9223±8130	3.129	.045
Driver job (years)	7.5±9.4	13.3±10.4	19.2±9.1	24.267	.000

(DM= Diabetes Mellitus)

In Table 4, a significant difference was observed in the mean age across the three glycaemic groups, with diabetic participants being older (Mean = 49.5 years) compared to pre-diabetic (45.5 years) and normal individuals (39.9 years) (F=22.134, p=0.000). Driver job duration also showed a significant increasing trend with glycaemic status (F=24.267, p=0.000), indicating longer job tenure among diabetic individuals. Per-capita income differed significantly across groups (F=3.129, p=0.045), with higher income seen among diabetics.

Discussion:

Present study demonstrates a significant association between educational level and diabetic status ($p < 0.001$), emphasizing the role of education in chronic disease prevention and the need for targeted health education interventions. In contrast, Kamal Batcha Mohamed Ali et al.[18] found no significant association between education and diabetes ($p = 0.998$).

A statistically significant association was observed between waist-to-hip (W/H) ratio classification and diabetic status ($p < 0.05$), suggesting its potential utility as a predictor for cardiometabolic risk. These findings align with those of Gadekar R D et al.[19] who also reported a significant association between W/H ratio and diabetes ($p < 0.001$).

A significant association was found between place of residence and diabetic status ($p < 0.05$), indicating the need for location-specific public health strategies to curb the diabetes burden. These findings are consistent with those of Mohamed Ali Kamal et al.[18] who reported a significant association between residence and diabetes ($p = 0.010$).

Although tea intake is often associated with added sugar consumption, and paan use is linked to tobacco exposure, both of which are known to influence glycaemic control and increase the risk of diabetes-related complications. But no significant associations were observed between lifestyle habits drinking ($p = 0.25$), smoking ($p = 0.24$), tea consumption($p = 0.423$) and paan/tobacco use ($p = 0.83$) and diabetic status, suggesting these behaviours may not play a major role in diabetes risk within the studied population. These findings align with studies by D. Suresh Kumar et al.[23] and Mohamed Ali Kamal et al.[18] who also found no significant links between diabetes and these behaviours.

Sleep patterns did not show a significant association with diabetic status ($p = 0.07$), suggesting that sleep behaviour may not be independently associated with diabetes status in this population. Additionally, no significant difference was found in daytime sleep hours across groups ($p = 0.695$). These findings are consistent with Sravanthi G et al.[21] who also reported no significant associations between sleep patterns and diabetes ($p = 0.327$).

BMI classification did not show a significant association with diabetes ($p = 0.135$), though trends were noted. However, Gadekar R D et al.[19] reported a significant association between BMI and diabetes ($p < 0.01$), which was not observed in our study.

Physical exercise showed no significant association with diabetic status ($p = 0.50$). These findings are supported by Sravanthi G et al.[21] who found no significant relationship between physical exercise and diabetes ($p = 0.809$).

The frequency of dining out showed no significant association with diabetic status ($p = 0.40$).

The analysis reveals a strong positive association

between increasing age and diabetes ($p < 0.001$), indicating that age is a major risk factor for both conditions. These findings are consistent with studies by D. Suresh Kumar et al.[20] who reported a significant association between age and diabetes ($p < 0.001$).

A significant association was also observed between higher income levels and diabetes ($p < 0.05$), suggesting income may influence diabetes risk. These results differ from Tamilarasan M et al.[22] who found no significant association between income and diabetes ($p = 0.103$).

No significant differences in healthcare costs were observed across diabetic groups ($p = 0.829$) indicating that disease-related expenses were relatively similar across categories.

Finally, a significant association was found between years spent in the driver profession and diabetes ($p < 0.001$), pointing to occupational exposure as a potential contributing factor. In contrast Mohamed Ali Kamal et al.[18] reported no significant link between job duration and diabetes ($p = 0.053$).

Limitation:

The cross-sectional design limits the ability to assess changes in health outcomes over time and about causal relationships between risk factors and health conditions. Diabetes screening was conducted using only Random Blood Sugar (RBS) tests, laboratory tests like HbA1c or lipid profile assessments was not done.

Conclusion:

The prevalence of diabetes among the 321 male bus drivers assessed, the prevalence of diabetes was 30 (10%). Several socio-demographic and occupational variables showed statistically significant associations with diabetes status. Diabetes was more common among older drivers and those with lower educational attainment, higher waist-to-hip ratios, urban residence, higher income, and longer duration of employment, underscoring the influence of socio-demographic factors, central obesity, and occupational exposure.

Lifestyle and behavioural factors such as alcohol use, smoking, paan/tobacco consumption, physical activity, body mass index, sleep duration, and frequency of dining out were not independently associated with diabetes in the present study. Although diabetes appeared more common among obese and physically inactive drivers, these associations were not statistically meaningful.

Recommendation:

Based on the observed prevalence of diabetes among bus drivers, routine screening and periodic health check-ups are recommended to ensure early detection and timely management. Drivers with higher age, lower education, central obesity, urban residence, and longer job tenure should be prioritized for targeted health education and lifestyle modification programs. Workplace interventions promoting physical activity and reducing sedentary behaviours are recommended to address key metabolic risks. Further studies with larger samples are needed to explore lifestyle factors that were not statistically significant in this study.

Acknowledgement:

Authers are thankful to Manger, Bus drivers and other staff of Bus Depot 1 and Depot 2.

Declaration

Funding: Nil

Conflict of Interest: Nil

AI: AI-based language tools were used exclusively to enhance grammar and clarity; all analyses, interpretations, and conclusions are solely those of the authors.

References:

1. Indian Council of Medical Research, Public Health Foundation of India, Institute for Health Metrics and Evaluation. India: Health of the Nation's States – The India State-Level Disease Burden Initiative. New Delhi: ICMR, PHFI, and IHME; 2017.
2. Global Burden of Disease (GBD) [Internet]. [cited 2025 Dec 13]. Available from: https://www.healthdata.org/research-analysis/gbd
3. Kumar DS, Ingalgeri BM, Edward S. A Study on the Prevalence of Non-Communicable Diseases, Its Associated Social Factors and Morbidity Pattern among the Registered Bus Drivers in Chennai-Cross Sectional Study. 2021;25(2).
4. World Health Organization. WHO reveals leading causes of death and disability worldwide: 2000–2019 [Internet]. Geneva: WHO; 2020 Dec 9 [cited 2025 Jun 26]. Available from: https://www.who.int/news/item/09-12-2020-who-reveals-leading-causes-of-death-and-disability-worldwide-2000-2019.

5. Dattani DJ. International Diabetes Federation Releases Diabetes Atlas 11th Edition (2025): Top 10 Key Takeaways from India. 2025 Apr 11 [cited 2025 Dec 9]; Available from: https://medicaldialogues.in/diabetes-endocrinology/news/international-diabetes-federation-releases-diabetes-atlas-11th-edition-2025-top-10-key-takeaways-from-india-146394

6. Prajapati D, Kedia G. Prevalence of diabetes and its risk factors: a cross-sectional study in Ahmedabad, Gujarat. Int J Med Sci Public Health. 2016;5(3):425.

7. Izadi N, Malek M, Aminian O, Saraei M. Medical risk factors of diabetes mellitus among professional drivers. J Diabetes Metab Disord. 2013 Jun 1;12(1):23. doi: 10.1186/2251-6581-12-23

8. Schmitt-Koopmann I. Direct medical costs of type 2 diabetes and its complications in Switzerland. Eur J Public Health. 2004 Mar 1;14(1):3–9. doi: 10.1093/eurpub/14.1.3

9. Second European Working Group on Diabetes and Driving. Final Report: Diabetes and Driving in Europe. Brussels: International Diabetes Federation Europe; 2005.

10. Costa TG, de Oliveira VN, Santos DAT, Viana RB, Andrade MS, Vancini RL, et al. The burden of prolonged sedentary behavior imposed by uberization. Sports Med Health Sci. 2023 Feb 18;5(2):159–63. doi: 10.1016/j.smhs.2023.02.005

11. Kohli P, Babu N, Mishra C, Damodaran S, Bhavani S, Kumar M, et al. Incidence of ocular and systemic diseases affecting visual function among state bus drivers. Indian J Ophthalmol. 2021;69(10):2625-2628. doi: 10.4103/ijo.IJO_76_21

12. Cox DJ, Ford D, Gonder-Frederick L, Clarke W, Mazze R, Weinger K, et al. Driving Mishaps Among Individuals With Type 1 Diabetes. Diabetes Care. 2009 Dec 1;32(12):2177–80. doi: 10.2337/dc08-1510

13. Bhorade AM, Yom VH, Barco P, Wilson B, Gordon M, Carr D. On-road Driving Performance of Patients With Bilateral Moderate and Advanced Glaucoma. Am J Ophthalmol. 2016 Jun;166:43–51. doi: 10.1016/j.ajo.2016.02.031

14. Murthy G, Deshmukh A, Mallidi A, Murthy P, Kattige J, Murthy V. Renewal of driving license in India and glaucoma: A study of prevalent practice and its lacunae. Indian J Ophthalmol. 2019;67(2):240.

15. Graveling AJ, Frier BM. Driving and diabetes: problems, licensing restrictions and recommendations for safe driving. Clin Diabetes Endocrinol. 2015 Dec;1(1):8.

16. Type 2 Diabetes Diagnostic Criteria by the ADA: Type 2 Diabetes ADA Diagnosis Criteria. 2025 Aug 11 [cited 2025 Dec 9]; Available from: https://emedicine.medscape.com/article/2172154-overview?utm_source=chatgpt.com&form=fpf

17. Pandey VK, Aggarwal P, Kakkar R. Modified BG Prasad Socio-economic Classification, Update - 2019. Indian J Community Health. 2019 Mar 31;31(1):150–2.

18. Purnell JQ. Definitions, Classification, and Epidemiology of Obesity. 2023 May 4. In: Feingold KR, Adler RA, Ahmed SF, Anawalt B, Blackman MR, Chrousos G, Corpas E, de Herder WW, Dhatariya K, Dungan K, Hamilton E, Hofland J, Jan de Beur S, Kalra S, Kaltsas G, Kapoor N, Kim M, Koch C, Kopp P, Korbonits M, Kovacs CS, Kuohung W, Laferrère B, Levy M, McGee EA, McLachlan R, Muzumdar R, Purnell J, Rey R, Sahay R, Shah AS, Sperling MA, Stratakis CA, Trence DL, Wilson DP, editors. Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000–. PMID: 25905390.

19. Physical activity [Internet]. [cited 2026 Jan 6]. Available from: https://www.who.int/initiatives/behealthy/physical-activity

20. Silva FM, Ramazanova M, Freitas IV, Silva FM, Ramazanova M, Freitas IV. Safeguarding Traditional Portuguese Gastronomy as an Intangible Cultural Heritage Through Tourism: The Case of North of Portugal. Tour Hosp. 2025 May:6(2):92. doi: 10.3390/tourhosp6020092

21. Mohamed Ali KB, Sathish Kumar S, Govindarajan PK, Mujibur Rahman KB, Nancy S. Predictors for diabetes and hypertension among bus drivers and conductors in South India. Bioinformation. 2024 May 31;20(5):495-501. doi: 10.6026/973206300200495. PMID: 39132233; PMCID: PMC11309115.

22. Nr A, Mk D, If I, Vk D, Sw P. Abnormal Glucose Tolerance and Associated Risk Factors in State Transport Bus Drivers. 2012;2(1).

23. Kumar DS, Ingalgeri BM, Edward S. A Study on the Prevalence of Non-Communicable Diseases, Its Associated Social Factors and Morbidity Pattern among the Registered Bus Drivers in Chennai-Cross Sectional Study. 2021;25(2):1266-1276

24. G. S, K. H, M. A, J. R. Assessment of non-communicable disease risk factors among Andhra Pradesh state road transport corporation bus drivers of Vijayawada. Int J Community Med Public Health. 2023 Feb 10;10(3):1065–70. doi: 10.18203/2394-6040.ijcmph20230333

25. M T, Kulothungan K, Rizvana S, Thirunavukkarasu S. A Cross-Sectional Study of Determinants of Type 2 Diabetes Mellitus Among Professional Drivers in the Perambalur Municipality Area of Tamil Nadu, India. Cureus. 2023 Jan 29;15(1):e34321. doi: 10.7759/cureus.34321. PMID: 36865964; PMCID: PMC9972006.

Assessment of Practices Regarding Hepatitis B Infection and Its Prevention among Undergraduate Students of a Government Medical College in Agra, Uttar Pradesh, India

Rudresh Negi[1], Renu Agarwal[2], Ishaan Virmani[3]

[1]Assistant Professor, [3]Post Graduate Student, Department of Community Medicine, Government Medical College, Haldwani, Uttarakhand, India
[2]Professor and Head, Department of Community Medicine, SN Medical College, Agra, Uttar Pradesh, India

Correspondence: Dr. Ishaan Virmani, Email: drishaanvirmani1997@gmail.com

Abstract:

Introduction: Hepatitis B virus (HBV) poses a significant occupational risk to healthcare workers, including medical students. Assessing their preventive practices is critical to mitigate future transmission risks within healthcare settings. **Objectives:** This study aimed to assess practices related to Hepatitis B infection and its prevention, and to identify associated factors among medical undergraduates. **Methods:** A cross-sectional study was conducted from April to November 2019, among 573 MBBS students at a government medical college in Western Uttar Pradesh. Data were collected via a semi-structured, pretested questionnaire, capturing socio-demographic details and responses on HBV practices. Practice scores were categorized as good, average, or poor. Statistical analysis was performed using SPSS 29 (trial version), applying Chi-square and Fisher's exact tests to assess associations. **Results:** Out of 600 eligible undergraduate students, 573 responded (96% response rate). Most students (97.2%) exhibited good preventive practices. However, only 74.5% were vaccinated, and a mere 18.8% had ever been tested for HBV. Razor-sharing was reported by 24.3%, highlighting risky behaviour. Lower professional years exhibited higher percentage of good practices. Professional year showed a statistically significant association with practice levels (p=0.01). **Conclusion:** A high proportion of students (97.2%) reported having good practices, however gaps persist in vaccination coverage, testing, and health education participation. Strengthening behavioural interventions, integrating routine HBV screening, and emphasizing preventive training throughout medical education are essential to ensure sustained safe practices.

Keywords: Hepatitis B, Medical Students, Preventive Practices, Public Health, Vaccination

Introduction:

Hepatitis B virus (HBV) infection remains a pressing public health concern globally, recognized not only for its widespread prevalence but also for its long-term clinical consequences. In 2022 alone, hepatitis B was responsible for an estimated 1.1 million deaths, largely attributable to liver cirrhosis and hepatocellular carcinoma (HCC). The World Health Organization (WHO) estimates that approximately 254 million individuals are living with chronic hepatitis B (CHB), with the majority residing in low- and middle-income countries, particularly in the African and Western Pacific regions.[1]

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Negi R, Agarwal R, Virmani I. Assessment of Practices Regarding Hepatitis B Infection and Its Prevention among Undergraduate Students of a Government Medical College in Agra, Uttar Pradesh, India. Healthline. 2025;16(4): 308-313
	DOI : 10.51957/Healthline_743_2025	

Received : 08-06-2025 **Accepted** : 16-12-2025 **Published :** 31-12-2025

India, which falls under the intermediate endemicity zone for HBV, accounts for one of the largest reservoirs of chronic HBV infection, with a hepatitis B surface antigen (HBsAg) prevalence of 2%–8% and an estimated 40–50 million chronic carriers.[2-5] Medical students and other healthcare trainees are at increased risk of HBV exposure due to early and frequent contact with blood and bodily fluids, often occurring during their formative years in clinical training. The risk is compounded by limited clinical experience, inconsistent adherence to infection control measures, and underutilization of protective strategies such as vaccination.[6,7] Needlestick injuries, unsafe handling of sharp instruments, and improper disposal of biomedical waste further elevate this risk.[5]

While the introduction of the hepatitis B vaccine and public health initiatives such as the Universal Immunization Programme (UIP) and the National Viral Hepatitis Control Programme (NVHCP) have improved vaccine access, there remains a significant gap in coverage and compliance among healthcare trainees. Research from various medical institutions in India has highlighted that although awareness about HBV is relatively widespread, complete vaccination and safe preventive practices are not universally followed.[4,5,8] For instance, studies have shown that a large proportion of medical students either remain unvaccinated or fail to complete the full three-dose vaccination schedule, and only a small fraction undergo post-vaccination serological testing.[7,8]

Given their critical role in future healthcare delivery, it is imperative that medical students not only possess adequate knowledge of HBV transmission and prevention, but also consistently adhere to protective practices. Evaluating their current practices can help identify gaps and inform interventions aimed at strengthening HBV prevention strategies in academic settings.

This research was carried out to study the practices regarding Hepatitis B infection and its prevention and identifying the factors associated with practices among medical undergraduate students at a government medical college, Agra Uttar Pradesh.

Methods:

This cross-sectional study was conducted on MBBS undergraduate students studying in a Medical College in Agra, Uttar Pradesh, India

The study was conducted between April to November 2019. All 600 undergraduate medical students, spanning from first to final professional year (150 students per batch), were invited to participate. Students who could not be contacted despite two follow-up attempts were excluded from the study. Data collection was carried out using a validated, pretested, semi-structured questionnaire, which gathered socio-demographic details and factors related to preventive practices. Validation of questionnaire was done by peer experts with overall Content Validity Index (CVI) value of 0.88. The participation was voluntary, informed written consent was taken prior to data collection.

The socioeconomic status of participants was assessed using the Modified BG Prasad scale 2019.[9] For analysis, the five original classes were grouped into three broader categories: 'Upper' (combining Class I and II), 'Middle' (including Class III and IV), and 'Lower' (Class V).

Preventive practices were assessed through five questions; these questions were selected on the basis of CVI score of 1 for each. Assessment was based on Likert scale of 1–3; poor, average and good respectively, with maximum score of 15 and minimum of 3. The participants were classified into three categories based on their scores as good practices meaning score more than 11; average practices meant score ranging from 6 – 10; and poor practices having score less than equal to 5.

The data was collected through self-administered questionnaire though Google forms and was entered to MS excel, the data was analyzed after data cleaning, the normality was checked, and other statistical tests such as chi square and Fischer exact test were applied to find out the factors associated with practices using SPSS 29 trial version. The ethical clearance was taken from institutional ethics committee vide letter no. IEC/2018/02.

Results

Out of total 600 participants that were enrolled in the study, 573 responded with the response rate of 96%. Among these 573 participants' more than half were of the age more than 22 years (297, 51.8%), with mean age of 22 ± 0.92 years and with dominant female participation (304, 53%). Nearly all of the students were of Hindu religion (529, 92.3%). There was almost equal distribution of participants from each professional year, majority (401, 70%) of the participants were permanent residents of urban areas.

Mean practices score based on questions was 14.02 ± 1.36, almost all of the participants (557, 97.2%) performed good preventive practices.

Table 1 reports the investigation into specific Hepatitis B preventive practices. Almost all participants (556, 97.0%) reported always requesting a new syringe before injections. Majority of the participants (489, 85.3%) had adequate hygiene awareness as they always asked barbers to use new blades for shaving or haircutting. However, some of them (79, 13.8%) admitted sharing of razors with others, highlighting risky practice, most of the participants (509, 88.8%) wore gloves and (467, 81.5%) wore protective clothing and apron while performing laboratory and clinical procedures.

Table 2 provides details about Hepatitis B exposures, vaccination and preventive behaviours. Majority participants (525, 91.6%) reported no history of needle stick or any other exposure injuries, suggesting safe clinical practices. With regard to screening only 108 (18.8%) participants confirmed being tested for Hepatitis B, pointing a substantial gap in surveillance. Out of the total participants, three quarter (427, 74.5%) had received Hepatitis B vaccine, still a quarter (150, 25.5%) needed vaccination. Most of the participants (504, 88%) encouraged family and friends to get vaccinated against Hepatitis B. Only 229 (40%) of the participants had participated in health education program on Hepatitis B, highlighting gap of poor involvement in the community education.

Table 1. Frequency of preventive practices related to Hepatitis B among participants. (N = 573)

Preventive Practices	Always, n (%)	Sometimes, n (%)	Never, n (%)
Asking for a new syringe every time an injection is received	556 (97.0)	8 (1.4)	9 (1.6)
Asking barber to change blade or scissors before shaving or haircutting	489 (85.3)	34 (5.9)	50 (8.7)
Sharing razor/ blade among friends or family members	79 (13.8)	60 (10.5)	434 (75.7)
Wearing gloves when administering injections, taking blood samples, or dissection	509 (88.8)	46 (8.0)	18 (3.1)
Using protective clothing/ gown/ apron while performing clinical and laboratory procedures	467 (81.5)	36 (6.3)	7 (1.2)

Table 2: Hepatitis B–Related Preventive Behaviours and Exposures among participants (N=573)

Practice Items	Yes, n (%)	No, n (%)
Exposure to blood spillage or body Fluid of Hepatitis B infected patient	34 (5.9)	539 (94.1)
History of needle stick injury or instrumental injury	48 (8.4)	525 (91.6)
Ever been tested for Hepatitis B	108 (18.8)	465 (81.2)
Received Hepatitis B Vaccination	427 (74.5)	146 (25.5)
Advised family members/friends to vaccinate against Hepatitis B	504 (88.0)	69 (12.0)
Ever participated in health education program related to Hepatitis B	229 (40.0)	344 (60.0)

Note: Responses reflect self-reported experiences and actions related to hepatitis B prevention and exposure.

Table 3: Association between socio-demographic factors and Hepatitis B preventive practices among participants.

Variables	Good Practices n= 557 (97.2%)	Average Practices n= 16 (2.8%)	Total n= 573 (100%)	Chi Square	p-value
Age (in years)					
17-21	267 (46.6)	09 (1.6)	276 (48.2)	0.162	0.687
>21	290 (50.6)	07 (1.2)	297 (51.8)		
Gender					
Male	263 (45.9)	06 (1.0)	269 (46.9)	0.59	0.443
Female	294 (51.3)	10 (1.8)	304 (53.1)		
Socio Economic Class					
Upper	479 (83.5)	12 (2.1)	491 (85.6)	1.619#	0.445
Middle	48 (8.4)	03 (0.5)	51 (8.9)		
Lower	30 (5.3)	01 (0.2)	31 (5.5)		
Religion					
Hindu	513 (89.5)	16 (2.8)	529 (92.3)	0.625#	0.274
Others	44 (7.7)	00 (0.0)	44 (7.7)		
Professional Year					
1st	144 (25.1)	01 (0.2)	145 (25.3)	11.17#	0.01
2nd	145 (25.3)	01 (0.2)	146 (25.5)		
3rd	138 (24.1)	06 (1.0)	144 (25.1)		
Final	130 (22.7)	08 (1.4)	138 (24.1)		
Permanent Residence					
Urban	389 (67.9)	12 (2.1)	401 (70.0)	0.787#	0.448
Rural	168 (29.3)	04 (0.7)	172 (30.0)		

Note: #Fisher Exact Test

Table 3 shows the practices among various categories of different variables, as the age increasing the number of participants exercising average practices decreases, females had higher number of participants having good practices regarding Hepatitis B infection, among the socio economic class, higher the class higher the proportion of participants having good practices, very few participants belonged to religion other than Hindu and all of them had good preventive practices. Study reported that as the level of professional year increases, the number of participants having average practices increases. There was almost equal proportion of participants having good and average practices in urban and rural areas.

Only professional year was significantly associated with preventive practices (p value 0.01), rest other factors, age, sex, religion, socio-economic class and permanent residence area were non-significant.

Discussion

Hepatitis B is a known risk for the healthcare workers, including medical students undergoing training being exposed to blood and body fluids during this period.[10] This cross-sectional study was conducted in a Medical College in western Uttar Pradesh with participants being undergraduate medical students of all the batches that were studying at the time of study. Study received a high response rate of 96%, with female participants comprising 53% of the sample.

The mean age of participants in present study was 22±0.92 years, aligning well with findings from study done by Chhabra D et al.[4] reporting mean age of 21±5.7 years. Rathi A et al.[5] noted an age range of 17–25 years, with a peak concentration in the 19–20 year group. Although Baig VN et al.[8] reported a higher mean age of 26.08±8.69 years, this was likely influenced by their inclusion of both students and practicing clinicians.

It was found that 97.2% of students consistently requested new syringes for receiving injections, showing strong safe injection awareness. This finding is similar to findings of Sharma S et al.[11] (96%) and Baig VN et al.[8] (95.5%) conducted in other colleges of India. However, targeted awareness program is needed for those still not following this practice.

The vaccination coverage of 74.5% in this study is comparable to Chhabra D et al.[4] and Garg M et al.[12] (76.3% each) and Setia S et al.[11] (73%) but and higher than Rathi A et al.[5] (26.7%), this suggests a potentially more effective framework for vaccine awareness and advocacy. Still measures are required for vaccinating the unvaccinated.

One of the areas of concern highlighted in this study is low rate of Hepatitis B testing and screening rate, merely being 18.8%, which is lower as compared to the studies conducted elsewhere like Vasantha Mallika MC et al.[6] (79.5%) and Al Wutayd O et al.[13] (31.5%). Reluctance or lack of awareness and access to testing could be potential reasons for this finding. While the current medical curriculum prioritizes vaccination, these findings suggest equal importance should be given to routine serological screening.

Around a quarter proportion (24.3%) of the participants reported sharing razors or blades with others is another concerning finding of the study. A targeted health education intervention is required for behaviour change regarding the high risks these practices pose.

A statistically significant association (p value= 0.01) was identified between professional year of participants and overall preventive practices. This study found that higher proportion of participants of lower professional year having good practices as compared with senior participants, contrasting to these Sachidananda MH et al.[14] reported an increase in vaccination rates with increasing professional year which suggests improvement of one dimension of practices.

Overall, while students reported good and positive practices, there are some clear gaps, in vaccination, screening and some risky behaviours that should be addressed.

Conclusion:

In this study, important trends were observed in Hepatitis B preventive practices among medical undergraduates in Western Uttar Pradesh. Nearly all participants (97.2%) adhered to recommended preventive measures, particularly in safe injection practices. However, vaccination coverage remains suboptimal, with just 74.5% reporting being vaccinated, and a very low 18.8% having been ever screened for Hepatitis B infection. Notably, nearly a quarter of the students admitted to sharing razors, highlighting important behavioural risks. It was found that students in earlier professional years exhibited better preventive practices compared to their senior counterparts, indicating an opportunity for targeted educational interventions as students progress through their training. These findings highlight the pressing need for enhanced screening programs, reinforced health education, and focused behavioural change strategies to safeguard the future healthcare workforce from Hepatitis B infection.

Recommendations:

To strengthen preventive measures against Hepatitis B among medical students, it's recommended to implement mandatory Hepatitis B screening when students join and again before finishing their training course. Concurrently, there's a need for focusing on the habits of the participants not just increasing the knowledge component, specifically addressing high-risk behaviors such as the sharing of razors and other personal sharps. To reinforce these routine friendly talk and feedback from peers focusing on behavioural change can be done. Finally, a deeper investigation is required for assessing why "average practices" concerning

preventive behaviors tend to increase with seniority, ensuring consistent optimal behaviours throughout their medical training.

Limitations:

Being cross-sectional, this study offers only a snapshot of practices, preventing causal inferences or tracking changes over time. Self-reported data introduces potential social desirability bias, possibly inflating positive outcomes. This uni-centric study focus in Agra restricts generalizability to other medical colleges.

Declaration

Funding: Nil

Conflict of Interest: Nil

References:

1. Guidelines for the prevention, diagnosis, care and treatment for people with chronic hepatitis B infection. 2024
2. Gupta S, Gupta R, Joshi YK, Singh S. Role of horizontal transmission in hepatitis B virus spread among household contacts in north India. Intervirology. 2008;51(1):7–13. doi: 10.5555/20083139929
3. Hepatitis B [Internet]. [cited 2025 Sept 27]. Available from: https://iris.who.int/server/api/core/bitstreams/52f9b89c-9631-4a46-a34f-52315fdd1234/content
4. Chhabra D, Mishra S, Gawande K, Sharma A, Kishore S, Bhadoria AS. Knowledge, attitude, and practice study on hepatitis B among medical and nursing undergraduate students of an apex healthcare institute at Uttarakhand foothills: A descriptive analysis. J Family Med Prim Care. 2019 July;8(7):2354–60. doi: 10.4103/jfmpc.jfmpc_331_19
5. Rathi A, Kumar V, Majhi J, Jain S, Lal P, Singh S. Assessment of knowledge, attitude, and practices toward prevention of hepatitis B infection among medical students in a high-risk setting of a newly established medical institution. J Lab Physicians. 2018 Oct;10(04):374–9. doi: 10.4103/JLP.JLP_93_18
6. M. C. VM, S. S. Knowledge attitude and practice on prevention of hepatitis B infection among medical students of a tertiary care centre in Tamil Nadu, India. Int J Res Med Sci. 2020 Jan 27;8(2):492. doi: http://dx.doi.org/10.18203/2320-6012.ijrms20200223
7. Singh A, Jain S. Prevention of Hepatitis B; knowledge and practices among Medical students. 2011;2(2).
8. Baig VN, Gupta PK, Sharma AK, Swarnkar M. Assessment Of Knowledge, Attitude and Practice About Hepatitis B Among Clinicians & Medical Students: A Cross Sectional Study. National Journal of Community Medicine. 2015 Sept 30;6(03):415–22.
9. Mahmood SE. Prasad's Socioeconomic Scale Updated For 2019. Natl J Community Med. 2019 Jun. 30;10(06):388-388
10. Atlaw D, Sahiledengle B, Tariku Z. Hepatitis B and C virus infection among healthcare workers in Africa: a systematic review and meta-analysis. Environ Health Prev Med. 2021;26:61. doi: 10.1186/s12199-021-00983-9
11. Sharma S, Dixit M, Mittal H, Jain J, Jain D, Khandelwal A. Assessment of knowledge, attitudes and practices toward prevention of hepatitis B virus infection among medical students in Geetanjali Medical College, Udaipur. Int J Community Med Public Health. 2018 Mar 23;5(4):1509. doi: 10.18203/2394-6040.ijcmph20181226
12. Garg M, Sridhar B, Katyal V, Goyal S. Assessment of Knowledge, Attitude, and Practices (KAP) Toward Hepatitis B Infection, Its Prevention, and Vaccination Among Health Care Workers. Cureus. 2023 May;15(5):e39747. doi: 10.7759/cureus.39747
13. Al Wutayd O, AlRehaili A, AlSafrani K, Abalkhail A, AlEidi SM. Current Knowledge, Attitudes, and Practice of Medical Students Regarding the Risk of Hepatitis B Virus Infection and Control Measures at Qassim University. Open Access Maced J Med Sci. 2019 Feb 15;7(3):435–9. doi: 10.3889/oamjms.2019.118
14. Sachidananda MH, Dhanalakshmi TA, Venkatesha D. Knowledge, attitude and practices toward prevention of Hepatitis B Virus infection among medical students: A cross-sectional study. Journal of The Academy of Clinical Microbiologists. 2022 June;24(1):8. doi: 10.4103/jacm.jacm_2_22

Resilience among the Undergraduate Students in a Medical College in Kolkata: A Cross-Sectional Study

Subhajoy Maitra[1], Sayeli Mitra[1], Archi Chandra[1], Aditi Aikat[2]

[1]Assistant Professor, [2]Professor, Jagannath Gupta Institute of Medical Sciences and Hospital, Kolkata, India

Correspondence: Dr. Subhajoy Maitra, Email: drsubhajoymaitra@gmail.scom

Abstract:

Introduction: Medical education is competitive, causing academic, clinical, and psychosocial stress, which contributes to rising depression and suicide rates among students. Resilience, the ability to cope with setbacks, serves as a stable protective factor against stress and burnout. **Objectives:** To estimate resilience among Undergraduate students of a Medical College in Kolkata and to determine the association of resilience with selected sociodemographic and academic variables. **Methods:** A facility-based observational study, cross-sectional in design, was conducted among 160 undergraduate students selected by stratified random sampling in a medical college of Kolkata. Sample size was calculated considering p=0.5, a precision of 7 %, design effect of 0.8 and considering 5% nonresponder rate. A predesigned, pre-validated structured questionnaire was used, comprising socio-demographic variables, the WHO 5 wellbeing score, and the Brief Resilience Scale. Association was calculated by the Chi-square test. Those having a significant association with them were taken for binary logistic regression. The value of p less than 0.05 was considered statistically significant. **Results:** Among 160 study participants, 33% had a low level of resilience. In multivariable logistic regression analysis, higher age [AOR 2.22(1.03-4.76)], having no problems in the family [AOR 2.44(1.07-5.56)], and having a good WHO five wellbeing score [AOR 2.7(1.23-5.88)], have higher odds of having adequate resilience. **Conclusion:** About one-third of the study participants (33%) had low resilience. Male sex, higher age, belonging to joint family, having no problem in the family, absence of any comorbidity and having good WHO 5 wellbeing score had higher odds of developing adequate resilience.

Keywords: Brief Resilience Scale, Burnout psychological, Burnout professional, Resilience psychological, Students

Introduction:

Resilience is the ability to cope with and recover from setbacks. Those facing adversity often show a remarkable capacity to regain normal functioning and overcome hardship. Resilience is a dynamic process at any level of functioning that encompasses the capacity by which these individuals adapt positively following adversity.[1] A resilient individual has strong coping skills, effectively uses resources, seeks help when needed, and finds ways to manage challenges. Resilience has both positive and negative aspects. The degree to which a person may be resilient varies greatly depending on their unique circumstances and the challenges they face.[2]

Medical education is highly competitive, exposing students to numerous academic, clinical, and

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Maitra S, Mitra S, Chandra A, Aikat A. Resilience among the Undergraduate Students in a Medical College in Kolkata: A Cross-Sectional Study. Healthline. 2025;16(4): 314-322
	DOI : 10.51957/Healthline_741_2025	

Received : 30-05-2025 **Accepted** : 19-11-2025 **Published :** 31-12-2025

psychosocial stressors. Key challenges include excessive workloads and the need to master complex information, leading to increased stress. Students compete for high grades in examinations, which increases anxiety, with fears of failure affecting their academic and professional futures. This combination of rigorous demands and peer competition necessitates effective coping strategies and support systems to foster students' overall well-being and success.[3]

Stress extends beyond undergraduate studies, affecting internships, postgraduate studies, and a physician's practical life.[4] First-year medical students experience higher stress levels due to the transition from school to college, while fourth-year students face new challenges where developing resilience becomes crucial.[5] About 77% of global suicides occur in developing countries, including India, according to the WHO.[6] Medical students have a higher risk of suicidal ideation and attempts compared to other academic professions and the general population.[7] A recent study conducted in India found that 19.6% of medical students had suicidal behaviour.[8] A recent Right to Information (RTI) response from the National Medical Commission (NMC) reveals a crisis in India's medical education: over the past five years, 1,166 medical students have dropped out, and 119 have tragically died by suicide.[9] A National Medical Commission (NMC) online survey reveals that 28% of undergraduate medical students and 15% of post-graduate students have mental health disorders, such as anxiety and depression.[10] Resilience is crucial for enhancing medical students' psychological health and reducing burnout during clinical training. It serves as a protective factor against stress. This study aimed to estimate resilience among undergraduate medical students in Kolkata and examine its association with various socio demographic and academic factors.

Methods:

An institution-based observation study, cross-sectional in design was conducted in a medical college in West Bengal over a period of 6 months from Dec 24 to May 25.

Study population: The study population was undergraduate medical students during the study period where the number of student enrolled in first, second, third and fourth year were 200, 180, 116 and 152 respectively.

Inclusion criteria: Those who had given written informed consent were included in the study. Exclusion criteria: Severely ill and hospitalised students were excluded from the study.

Sample size: Since the prevalence of resilience among medical students in this part of the world was not available after extensive literature search, for determining minimum sample size requirement for this study, prevalence of good resilience among medical students in India was considered as 50 %, i.e., p=0.5. Taking a precision of 7 %, design effect of 0.85 , and adding 5% non-responder, the final sample size was 160.

Sampling Technique: Stratified Random Sampling was used. Each professional year was considered to be a stratum. The number of participants from each stratum was proportional to stratum size. From each stratum, the required number of participants were selected by systematic random sampling.

Research Instrument: Pre-designed, pre-tested, structured questionnaire consisting of socio-demographic, personal, and academic variables. The second part contained the WHO-5 Wellbeing Index questionnaire[11] and the Brief Resilience Scale.[12] The WHO-5 is a self-report instrument measuring mental well-being. It contained five statements relating to the past two weeks. Each statement was rated on a 6-point scale, with higher scores indicating better mental well-being.[11] The total raw score, ranging from 0 to 25, was multiplied by 4 to give the final score, with 0 representing the worst imaginable well-being and 100 representing the best imaginable well-being. A percentage score below 50 (or a raw score below 13) was considered as the cut-off for poor mental well-being. The BRS was a 6-item scale designed to measure resilience.[13] Items 1, 3, and 5 were positively worded, and items 2, 4, and 6 were negatively worded.[12] An average score of

1.00-2.99 signified low resilience. A score between 3.00– 4.30 signified normal resilience, and a score of 4.31-5.00 signified high resilience. Academic performance satisfaction, and faculty support are measured by self-reported visual analogue score of range 1-10.

Variables: In this study, the outcome variable was resilience among medical students, and the predictor variables were selected sociodemographic, academic, and personal factors.

Data Collection Method: Informed written consent was taken from the study participant. The data collection was done by face-to-face interview using a predesigned pretested structured questionnaire.

Operational Definitions:

Categories of residence:

Urban- Urban areas are the towns (places with municipal corporation, municipal area committee, town committee, notified area committee and cantonment board), also all places having 5000 or more inhabitants, a density not less than 1000 persons per square mile or 390 per square kilometre, pronounced urban characteristics, and three forth of the adult male population employed in persuits other than agriculture.[14]

Rural- Rural areas are all places having less than 5000 inhabitants, a density is less than 1000 persons per square mile or 390 per square kilometre, and three forth of the adult male population employed in persuits agriculture.[14]

Smoking:

Never- An adult who has never smoked, or who has smoked less than 100 cigarettes in his or her lifetime.[15]

Current users- The individual is currently smoking, which can be daily or non-daily (on occasion).[15]

Used in past- An adult who has smoked at least 100 cigarettes in his or her lifetime, but who had quit smoking at the time of interview.[15]

In this study 'never' and 'used in past' have been clubbed together as 'others'

Alcohol intake:

Never- The "Non-drinker" / "Current non-drinker" definitions include people who do not drink at present[16]

Current users- An individual who consumed at least one alcoholic drink within past one month[16]

Used in past- A past alcohol user is a person who had consumed alcoholic beverages previously but does not currently consume alcohol (i.e. no recent use).[16]

In this study 'never' and 'used in past' have been clubbed together as 'others'

Substance use:

Never- An individual who does not engage in the use of narcotic substances, such as opioids or other controlled substances, either currently or in the past.[17]

Current users-use within the past 12 months[17]

Used in past- use more than 12 months ago[17]

Statistical Analysis: Data analysis was done with the help of SPSS software (IBM version 16)[18]and Microsoft Excel 365. Continuous type variables were described by Mean with Standard Deviation (SD) or median with Interquartile Range(IQR). Categorical Variables were expressed as numbers and percentages. Binary logistic regression was done to find out the adjusted and unadjusted odds ratios. The significance level of the association was taken to be < 0.05. Ethical Clearance: This study was conducted after ethical clearance from the institutional ethical committee.

Results :

Table 1 shows the distribution of study participants according to socio demographic characteristics and its association with adequate resilience. The mean age of the study participants was 21.28 years (± 1.87), and more than half of them were male. The majority of the study subjects were Hindu by religion and from an urban residence background. About three-fourths of the study participants used to live inside the campus of the medical college campus. The median per capita monthly income was Rs 30625 (IQR 16166, 50000). About 11.2% participants had per capita monthly income below Rs 10000, 18.8% between Rs 10001 to Rs 20000, 20%

Table 1: Distribution of study participants according to socio demographic characteristics and its association with adequate resilience (N=160)

Variables	Frequency n (%)	Adequate resilience n (%)	Crude Odds Ratio (95%CI)	X^2p value
Age (in completed years)				
>Median	69 (43.1)	53 (76.8)	2.27 (1.13-4.56)	5.41, 0.02
≤ Median	91 (56.9)	54 (59.3)	1	
Gender				
Male	85 (53.1)	63 (74.1)	2.02 (1.03-3.94)	4.294, 0.038
Female	75 (46.9)	44 (58.7)	1	
Religion				
Hindu	147 (91.9)	99 (67.3)	1.29 (0.41-4.15)	0.19, 0.67
Others	13 (8.1)	8 (61.5)	1	
Permanent Residence				
Rural	27 (16.9)	19 (70.4)	1.21 (0.49-2.99)	0.17, 0.67
Urban	133 (83.1)	88 (66.2)	1	
Type of present residence				
Days Scholar	27 (16.9)	18 (66.7)	0.98 (0.41-2.37)	0.01, 0.98
In campus	133 (83.1)	89 (66.9)	1	
Family type				
Joint	35 (21.9)	29 (82.9)	2.91 (1.13-7.56)	5.17, 0.02
Nuclear	125 (78.1)	78 (62.4)	2	

between Rs 20001 to Rs 30000, 20% between Rs 30001 to 40000 and the rest that is about 30% of the participants had per capita monthly income above Rs 40000.

Table 2 shows the distribution of study participants according to socio personal and academic characteristics and its association with adequate resilience Most of the study participants were not involved in any kind of substance use. However 3(1.9%) participants reported as current users of narcotics and 2 (1.2%) had past history of narcotics usage. Among the families of the study participants, 15.6 % of the families had debt or a loan. Comorbidity was present among 11.3 % of the study participants, and allergic disorder was the most common comorbidity. About 80(50%) participants were involved in outdoor sports, workout in gymnasiums, dance etc for about 1 to 3 days per week, another 40(25%) participants reported working out 4 to 7 days per week, while the remaining 25% said they were not involved in any of these activities. The majority of them that is 137 (85.6%) had joined MBBS because of their personal choice, and about one-third of them that is 50 students (31.3%) had a history of failure in at least one exam in the course curriculum. The median self-perceived academic satisfaction score was 6(IQR 5,8), and the median of self-reported faculty support score was 7(IQR 5,8). Among the study participants, the median WHO 5 Well-being Index score was 14(IQR 9,18), and more than one-third of the study participants belonged to the poor category of the WHO 5 Well-being Index score.

The median Brief Resilience Score was 3 (IQR 2.8, 3.3) with a minimum score of 1.17 and the maximum score of 5.0. Resilience was categorised according to the Brief Score.[12] An average score of 1.00-2.99 signified low resilience. A score between 3.00– 4.30 signified normal resilience, and a score of 4.31-5.00 signified high resilience. In our study, about one-third of the study participants (33%) had low resilience, 64% had normal resilience and only 3% had high resilience score.

Table 2: Distribution of study participants according to personal and academic characteristics and their association with adequate resilience (N=160)

Variables	Frequency n (%)	Adequate resilience n (%)	Crude Odds Ratio (95%CI)	X^2 value p value
Smoking				
Current Users	13 (8.1)	10 (76.9)	0.58 (0.15-2.21)	0.65, 0.42
Others	147 (91.9)	97 (66)	1	
Alcohol				
Never	145 (90.6)	97 (66.9)	1.01 (0.33-3.12)	0.1, 0.96
Current Users	15 (9.4)	10 (66.7)	1	
Presence of problem in the family				
No	123 (76.9)	89 (72.9)	2.99 (1.41-6.36)	8.56, 0.03
Yes	37 (23.1)	18 (47.4)	1	
Presence of comorbidity				
No	142 (88.7)	97 (68.3)	2.91 (1.13-7.54)	5.17, 0.02
Yes	18 (11.3)	10 (55.6)	1	
In a Committed relationship				
No	111 (69.3)	73 (65.8)	0.84 (0.41-1.74)	0.21, 0.65
Yes	49 (30.7)	34 (69.4)	1	
Reason behind joining MBBS				
Choice of others	23 (14.4)	15 (65.2)	0.91 (0.36-2.32)	0.33, 0.85
Personal choice	137 (85.6)	92 (67.2)	1	
Academic year				
First & second	93 (58.1)	58 (62.4)	0.61 (0.31-1.21)	2.03, 0.153
Third & fourth	67 (41.9)	49 (73.1)	1	
History of failure in any exam of course curriculum				
No	110 (68.7)	70 (63.6)	0.62 (0.29-1.29)	1.67, 0.19
Yes	50 (31.3)	37 (74.0)	1	
Academic Satisfaction Score				
> median	78 (48.7)	58 (74.4)	1.95 (0.99-3.83)	3.85, 0.05
≤ median	82 (51.3)	49 (59.8)	1	
Faculty support score				
> median	56 (35.0)	39 (69.6)	1.21 (0.61-2.44)	0.29, 0.58
≤ median	104 (65.0)	68 (65.4)	1	
WHO's Five Well-Being Score				
Good	100 (62.5)	77 (77.0)	3.35 (1.68-6.66)	12.34, <0.01
Poor	60 (37.5)	30 (50.0)	1	

Bivariate analysis showed that there were higher odds of some sociodemographic, personal, and academic variables in developing adequate resilience, i.e., normal and high resilience. Those factors were male gender OR 2.02 (1.03-3.94), higher age OR 2.27 (CI 1.13 -4.56), belonging to joint family OR 2.91 (CI 1.13-7.56), having no problem in the family OR 2.99(CI 1.41-6.36), absence of any comorbidity OR 2.91(CI 1.13-7.54) and having good WHO 5 wellbeing score OR 3.35(CI 1.68-6.66).

In Table 3, all significant and biologically plausible variables found in the univariate model (at $p<0.2$) were put in the final multivariable logistic regression model. In multivariable logistic regression analysis, three variables were found to be independent predictors for having adequate resilience after controlling for possible confounders. Those having a higher age were 2.22 times to develop adequate resilience [AOR 2.22 (1.03-4.76)] compared to those having an age below the median. Participants having no problem in family were 2.44

Table 3: Binary Logistic Regression showing association of selected variables with adequate resilience (n=160)

Variables	Crude Odds Ratio (95% CI)	P value	AOR(95% CI)	P value
Gender				
Male	2.02 (1.03-3.94)	0.03	1.26 (0.59-2.75)	0.54
Female	1		1	
Age				
>Median	2.27 (1.13-4.56)	0.02	2.22 (1.03-4.76)	0.04
≤Median	1		1	
Family				
Joint	2.91 (1.13-7.56)	0.02	2.56 (0.92-7.14)	0.07
Nuclear	1		1	
Problem in the family				
No	2.99 (1.41-6.36)	0.003	2.44 (1.07-5.56)	0.03
Yes	1		1	
Comorbidity				
No	2.91 (1.13-7.54)	0.02	0.75 (0.24-2.33)	0.6
Yes	1		1	
Academic environment score				
>Median	1.95 (0.99-3.83)	0.05	0.62 (0.29-1.33)	0.22
≤Median	1		1	
WHO 5 Well-being score				
Good	3.35 (1.68-6.66)	<0.01	2.7 (1.23-5.88)	0.01
Poor	1		1	

Note. Cox & Snell R square – 0.17, Nagelkerke R Square – 0.23, Horseman Lemeshow test – p=0.31 (x^2 9.98, df-8)

times to develop adequate resilience [AOR 2.44 (1.07-5.56)]. Participants having a good WHO 5 wellbeing score were 2.7 times to develop adequate resilience [AOR 2.7 (1.23–5.88)]. In this model, 17 % of the variance (Cox & Snell R Square value= 0.17) and 23 % (Nagelkerke R Square= 0.23) of the dependent variable was explained by the independent variables. Goodness of fit was present in this model, Hosmer and Lemeshow test (X^2=9.98, df-8, p–0.31).

Discussion

This study was planned to determine the resilience among undergraduate medical students and also characterize the relationships between several different demographics, academic and personal factors, with resilience. The male resilience score was higher than the female resilience score in our study. This finding is consistent with the study by Peng et al in China.[19] Houpy et al[20] in their study in the United States also found similar results. In a study done by Wang et al among medical students, resilience uni-directionally and positively predicted life satisfaction, while academic burnout uni-directionally and negatively predicted life satisfaction.[21] Similar to current study, 74.5 % of the study participants who had higher academic satisfaction scores had adequate resilience in comparison to 59.8 % who had a less than median academic satisfaction score.

Resilience was found to be a positive predictor of life satisfaction among medical students. In our study, participants having a good WHO-5 well-being score had 2.7 times higher odds of developing adequate resilience [AOR 2.7(1.23-5.88)]. This finding was consistent with the result of a six-year longitudinal study by Shek and Liang, which found that resilience was a significant positive predictor of life satisfaction, but the sample in this study was Chinese adolescents.[22] In another study by Chow et al,[22] self-reported resilience emerged as a

significant predictor of perceived well-being (regression coefficient B = 0.259; p < .001).[23] The findings are consistent with the findings of our study. Participants having good WHO 5 well-being score were having higher resilience score.

In a study by Lee et al[24] better interpersonal relationships were related to higher levels of resilience, which were related to fewer depressive symptoms. Chung et al.[25] in their study also found that living with a single parent was associated with lower resilience, which in turn was associated with higher levels of depression. The presence of problems in the family has an impact on the development of resilience. In this study, those who didn't have any problems in the family had 2.44 times higher odds of developing adequate resilience [AOR 2.44(1.07-5.56)]. Researchers believed that age is the decisive factor of emotional ability and resilience and found that both will increase with age. In a study done by lubili et at,[26] compared to the reference sample, medical students in their first year of study showed significantly lower values for resilience (p < 0.01). Current study did not find any association between resilience score with the year of study of the study participants, but the higher age group shows better resilience. In present study, those having an age greater than the median had 2.22 times higher odds of developing adequate resilience [AOR 2.22(1.03-4.76)]. Many studies in the past tried to find out the relationship between resilience and chronic illness. As per systematic reviews tudying resilience in different chronic diseases, found an inverse association between resilience and HbA1c levels (glycosylated haemoglobin level) in diabetes, the degree of depression in patients with hepatitis C, and the levels of activity of the disease in ankylosing spondylitis (BASDAI-ankylosing spondylitis activity index), respectively, which makes us think that the capacity of resilience may have had an influence on the progression of illness.[27] The higher the resilience, the lower the vulnerability and risk of illness. An individual with a chronic illness may have different coping. Problem-solving solving coping, and emotional coping may benefit the individual. Whereas avoidance coping may be due to low resilience. In our study, participants without any chronic illness had higher odds [OR 2.91(1.13-7.54)] of developing adequate resilience.

In a study done by Sahar and Muzaffar the majority of participants belonging to joint families had higher rates of good social adjustment(38%)and greater resilience (17%), compared to those in nuclear families, where only 21% reported good social adjustment and 13% reported high resilience.[28] In another study, adolescents in joint families appeared to exhibit greater personal adequacy, interpersonal adequacy, social adequacy, and consequently, higher social maturity when compared to adolescents from nuclear families.[29] Similar findings in our study, where participants belonging to the joint family had a higher level of resilience [OR 2.91(1.13-7.56)]

Studies show that the prevalence of depression and other mental disorders is higher among medical students.[30] There has been a notable increase in dropout and suicide rates among medical students.[31] Consequently, a targeted intervention is necessary for this population.

Conclusion:

In present study, about one-third of the study participants (33%) had low resilience. Male gender, higher age, belonging to joint family, having no problem in the family, absence of any comorbidity and having good WHO 5 wellbeing score had higher odds of developing adequate resilience, i.e., normal and high resilience. In multivariable logistic regression analysis, three variables - higher age, participants having no problem in family and having a good WHO 5 wellbeing score were found to be independent predictors for having adequate resilience.

Strength and Limitation:

Use of a validated study tool among the target participants is the strength of this study. There are some limitations to current study. A study was conducted at a single medical school, and this could limit the external validity of the results. Due to non-response, selection bias may be present. The timing of the study may influence the response of the participants. Responses may have been different had the study been conducted at a different time of year.

Recommendation:

Findings suggest a need for further resilience training for clinical medical students and guide the development of educational interventions. More curricula promoting medical student resilience are needed, specifically focused on skills to help students cope with difficult situations. NMC has launched the mentor-mentee program to enhance student welfare and academic performance, promote participation in co-curricular activities, and foster a supportive learning environment. [32] This initiative encourages building resilience along with counselling and peer support.

Declaration

Funding: Nil

Conflict of Interest: Nil

References:

1. VanMeter F, Cicchetti D. Resilience. InHandbook of clinical neurology 2020 Jan 1 (Vol. 173, pp. 67-73). Elsevier.
2. Rice A. Psych Central [Internet]. 2016 [cited 2025 May 6]. What Is Resilience? Available from: https://psychcentral.com/lib/what-is-resilience
3. Cochrane Developmental, Psychosocial and Learning Problems Group, Kunzler AM, Helmreich I, König J, Chmitorz A, Wessa M, Binder H, Lieb K. Psychological interventions to foster resilience in healthcare students. Cochrane Database of Systematic Reviews. 1996 Sep 1;2020(7).
4. Archana R. Enhanced resilience in undergraduate medical students with increased years of study - ClinicalKey [Internet]. [cited 2025 May 6]. Available from: https://www.clinicalkey.com/#!/content/playContent/1-s2.0-S1876201822002295? returnurl=https:%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS1876201822002295%3Fshowall%3Dtrue&referrer=https:%2F%2Fpubmed.ncbi.nlm.nih.gov%2F
5. Houpy JC, Lee WW, Woodruff JN, Pincavage AT. Medical student resilience and stressful clinical events during clinical training. Medical education online. 2017 Jan 1;22(1):1320187.
6. Fact sheets [Internet]. [cited 2025 May 6]. Available from: https://www.who.int/news-room/fact-sheets
7. Duarte D, El-Hagrassy MM, e Couto TC, Gurgel W, Fregni F, Correa H. Male and female physician suicidality: a systematic review and meta-analysis. JAMA psychiatry. 2020 Jun 1;77(6): 587-97.
8. Garg S, Chauhan A, Singh S, Bansal K. Epidemiological risk factors of suicidal behavior and effects of the components of coping strategies on suicidal behavior in medical students: An institution-based cross-sectional study in India. Indian journal of psychiatry. 2022 Jul 1;64(4):377-86.
9. Anand A. ,1,166 Medical Students Dropped Out, 119 Died by Suicide in India Over Five Years: Reveals RTI Data [Internet]. [cited 2025 May 6]. Available from: https://www.shiksha.com/news/medicine-health-sciences-1-166-medical-students-dropped-out-119-died-by-suicide-in-india-over -five-years-reveals-rti-data-blogId-198140
10. Jha D.N, 'Mental health issues in 28% of UG medicos.' The Times of India [Internet]. 2024 Aug 16 [cited 2025 May 6]; Available from: https://timesofindia.indiatimes.com/india/mental-health-issues-in-28-of-ug-medicos/articleshow/112552113.cms
11. Topp CW, Østergaard SD, Søndergaard S, Bech P. The WHO-5 Well-Being Index: a systematic review of the literature. Psychotherapy and psychosomatics. 2015 Mar 28;84(3):167-76.
12. Smith BW, Dalen J, Wiggins K, Tooley E, Christopher P, Bernard J. The brief resilience scale: assessing the ability to bounce back. International journal of behavioral medicine. 2008 Sep;15(3):194-200.
13. Smith BW, deCruz-Dixon N, Schodt K, Torres F. Brief resilience scale (BRS). InHandbook of assessment in mindfulness research 2025 Jul 3 (pp. 1677-1695). Cham: Springer Nature Switzerland.
14. WHO (2008). Health situation in South East Asia Region 2001-2007.
15. NHIS - Adult Tobacco Use - Glossary [Internet]. 2024 [cited 2025 Oct 9]. Available from: https://archive.cdc.gov/www_cdc_gov/nchs/nhis/tobacco/tobacco_glossary.htm
16. NHIS - Adult Alcohol Use - Glossary [Internet]. 2024 [cited 2025 Oct 9]. Available from: https://archive.cdc.gov/www_cdc_gov/nchs/nhis/alcohol/alcohol_glossary.htm
17. CDC. NCHS Data Query System. 2025 [cited 2025 Oct 9]. Substance Use and Abuse. Available from: https://www.cdc.gov/nchs/dqs/topics/substance-use-abuse.html
18. IBM Corp. (2023). IBM SPSS Statistics for Windows, Version 16.0. IBM Corp. https://www.ibm.com/products/spss-statistics
19. Peng L, Zhang J, Li M, Li P, Zhang Y, Zuo X, Miao Y, Xu Y. Negative life events and mental health of Chinese medical students: the effect of resilience, personality and social support. Psychiatry research. 2012 Mar 30;196(1):138-41.
20. Houpy JC, Lee WW, Woodruff JN, Pincavage AT. Medical student resilience and stressful clinical events during clinical training. Medical education online. 2017 Jan 1;22(1):1320187.
21. Wang Q, Sun W, Wu H. Associations between academic burnout, resilience and life satisfaction among medical students: a three-wave longitudinal study. BMC Medical Education. 2022 Apr 5;22(1):248.
22. Shek DT, Liang LY. Psychosocial factors influencing individual well-being in Chinese adolescents in Hong Kong: A six-year longitudinal study. Applied research in quality of life. 2018 Sep;13(3):561-84.
23. Chow KM, Tang WK, Chan WH, Sit WH, Choi KC, Chan S. Resilience and well-being of university nursing students in Hong Kong: a cross-sectional study. BMC medical education. 2018 Jan 12;18(1):13.

24. Lee TS, Wu YJ, Chao E, Chang CW, Hwang KS, Wu WC. Resilience as a mediator of interpersonal relationships and depressive symptoms amongst 10th to 12th grade students. Journal of Affective Disorders. 2021 Jan 1;278:107-13.

25. Chung JO, Lam KK, Ho KY, Cheung AT, Ho LL, Gibson F, Li WH. Relationships among resilience, self-esteem, and depressive symptoms in Chinese adolescents. Journal of health psychology. 2020 Nov;25(13-14):2396-405.

26. Luibl L, Traversari J, Paulsen F, Scholz M, Burger P. Resilience and sense of coherence in first year medical students-a cross-sectional study. BMC Medical Education. 2021 Mar 4;21(1):142.

27. Cal SF, Sá LR, Glustak ME, Santiago MB. Resilience in chronic diseases: A systematic review. Cogent Psychology. 2015 Dec 31;2(1):1024928.

28. Sahar NU, Muzaffar NM. Role of family system, positive emotions and resilience in social adjustment among Pakistani adolescents. Journal of Educational, Health and Community Psychology. 2017 Aug 1;6(2):46-58.

29. Chandrasekhar S. The Hindu joint family. Social Forces. 1943 Mar 1:327-33.

30. Dutta G, Rajendran N, Kumar T, Varthya SB, Rajendran V. Prevalence of depression among undergraduate medical students in India: A systemic review and meta-analysis. Cureus. 2023 Jan 10;15(1).

31. Coentre R, Góis C. Suicidal ideation in medical students: recent insights. Advances in medical education and practice. 2018 Nov 29:873-80.

32. Misra B. Mentor-Mentee Programme, Meeting between institutes and parents: Here's what NMC guidelines suggest to Stop Ragging [Internet]. 2024 [cited 2025 May 14]. Available from: https://medicaldialogues.in/health-news/nmc/mentor-mentee-programme-meeting-between-institutes-and-parents-heres-what-nmc-guidelines-suggest-to-stop-ragging-134384

A Cross-Sectional Study of Input-Output Performance of Health Facilities Under LaQshya: Evidence from Western Gujarat, India

Gaurav B. Shukla[1], Mahaveer G. Golechha[2], Bharti D. Koria[d], Mitesh N. Bhanderi[4], Hiral A. Raval[5], Apurva Ratnu[6]

[1]Senior Program Coordinator, [6]Managing Trustee, Niramay Charitable Trust, Gujarat, India
[2]Professor, Indian Institute of Public Health, Gandhinagar, India
[3]Associate Professor, Department of Community Medicine, PDU Government Medical College, Rajkot, India
[4]Chief District Health Officer, Kutch District, India
[5]Independent Researcher, Gujarat, India

Correspondence: Dr. Gaurav B Shukla, Email: dr.gbshukla@gmail.com

Abstract:

Introduction: The Government of India has implemented LaQshya initiative to improve quality of intrapartum and postpartum care in public health facilities through structured quality improvement initiatives. Yet, empirical evidence on how preparedness at facility level affects outcomes in maternal service delivery is lacking in majority of districts in Gujarat. **Objective:** To measure the association between input preparedness and output performance indicators of the labour rooms in public health facilities implementing LaQshya in Rajkot district, Gujarat. **Methods:** A cross-sectional study (March–June 2022) in eight LaQshya-notified government facilities of Rajkot assessed input readiness using a checklist adapted from LaQshya standards. Domains included infrastructure, equipment, drugs, and human resources, summarized as composite input scores. Output measures covered deliveries, caesarean rates, PPH, breastfeeding initiation, patient satisfaction, and referral delays. Descriptive analysis and Spearman's rank correlation examined associations between facility readiness and maternal health service outcomes. **Results:** Composite input scores in facilities ranged from 56.2% to 89.5%. There were statistically significant positive correlations between input scores and early initiation of breastfeeding ($\rho = 0.72$, $p = 0.043$) and delivery volume ($\rho = 0.61$, $p = 0.05$). Facilities with higher input scores consistently performed better in critical maternal health outcomes. Facilities with low input scores had evidence of delays in the referral process, low patient satisfaction rates, and gaps in availability of supplies. **Conclusion:** Facilities with stronger LaQshya input showed better maternal outcomes, especially breastfeeding and delivery volume. Strengthening inputs in facilities with poor score may reduce maternal morbidity and improve patient satisfaction significantly.

Keywords: Breast Feeding, Maternal Health Services, Health Facilities, Quality of Health Care

Introduction:

India has made optimistic strides towards maternal health metrics over the past 20 years. A significant 40% rise in institutional deliveries has largely been achieved through a steady transition from home births to facility-based delivery services. Whereas the institutional delivery increases from 38.7% in the National Family Health Survey-3 (2005-06) to 94.3% in NFHS-5 (2019-20), largely as a result of government programs aimed at addressing economic barriers to access institutional deliveries for poor women, like Janani Suraksha Yojana (JSY) and Janani Shishu Suraksha Karyakram (JSSK).[1] Despite the advancements in quantitative measurements of maternal health, qualitative differences in that care

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Shukla GB, Golechha MG, Koria BD, Bhanderi MN, Raval HA, Ratnu A. A Cross-Sectional Study of Input-Output Performance of Health Facilities Under LaQshya: Evidence from Western Gujarat, India. Healthline. 2025;16 (4): 323-331
	DOI : 10.51957/Healthline_789_2025	

Received : 06-09-2025 **Accepted** : 15-12-2025 **Published :** 31-12-2025

remain, especially around intrapartum care and immediate postpartum care.

A substantial amount of the maternal and neonatal mortality takes place within the critical window of labor and the first 24 hours post-delivery. Estimates show that about 46% of maternal deaths, 40% of stillbirths, and 40% of neonatal deaths occur on the day of delivery.[2] There is a need to improve the quality of care around labor and delivery and not just the coverage of facility delivery. The factors identified include a lack of preparedness by the facility, delays in providing the timely intervention, lack of skilled persons available and a lack of respectful maternity care.[3]

To address these gaps, India's Health and Family Welfare (MoHFW), Government of India initiated a LaQshya – Labour Room Quality Improvement Initiative in 2017[4]; with the aim of overall reduction of preventable maternal and neonatal mortality and morbidity by enabling and provisioning to provide respectful, safe and quality intrapartum care across public health facilities. LaQshya is specific to labour rooms and maternity OTs of medical colleges, district hospitals, sub-district hospitals; and community health centres (CHCs) with high delivery load; and focuses on interventions related to infrastructure standing, availability of skilled human resources, live monitoring of data; and standardization of quality standards and protocols.[5]

The LaQshya Initiative has at its core a facility-level certification process, which assesses facilities on quality standards within the National Quality Assurance Standards (NQAS) framework.[6] Though it is comprehensive, the process is still being implemented, so the effects are only partially observable. State and district level context may impact implementation of the LaQshya Initiative´s audits and objectives. There is agreement from multiple studies that availability of inputs – equipment, drugs, human resources – do not automatically lead to improved maternal health outcomes, particularly if there is no regular process or accountability, or if there is a lack of view to patient care.[7,8]

In regards to Gujarat, although there are attempts to prioritize maternal health at the state-level, evidence about the performance of LaQshya-certified or aligned facilities' performance regarding their actual services is limited. Evaluating the relationship between inputs and service provision can help to identify constraints and manage resources. An input to output analysis aligned to the LaQshya framework is a practical way to establish whether increased inputs, such as trained staff, minimum supplies, infection prevention, and clinical practices, are resulting in desired lived outcomes, such as institutional births, readiness to do caesarean sections and starting breastfeeding in the 'Golden Hour'.

This study aims to address this evidence gap to elucidate input-output performance across selected secondary and community health facilities in Rajkot district, Western Gujarat. This study examines the association of inputs as they are seized by LaQshya - controlled inputs and maternal service outputs, which will facilitate decision-makers and program implementers to mid-course corrections and consolidate health ahead in high quantitative burden contexts.

Methods:

The study was a cross-sectional facility based observational study conducted in a public health context in the Rajkot district of Western Gujarat, India from March to June 2022. The study sought to ascertain the association between facility-level input preparedness and maternal care service outputs under LaQshya (quality improvement initiative for the labour room), a national program established by the Ministry of Health and Family Welfare, the purpose of which is to improve standards of intrapartum care and preventable maternal and neonatal morbidity and mortality.

A total eight health facilities were purposively selected through stratification of all levels of obstetric care (primary and secondary). Since there were only five government Sub-District Hospitals (SDHs) in the district we wanted to make sure we had an accurate representation of secondary care delivery points and therefore included the five SDHs. For the purpose of capturing primary-level institutional delivery, we randomly selected three of the six LaQshya-notified

CHCs (Community Health Centres). All the selected facilities were labelled as SDH-A,SDH-B so one for identification. Such selections allowed for evidence to include variation with regard to size, geographic spread, and available resources.

The data was captured using a pre-tested, semi-structured checklist adapted from the Government of India standard LaQshya Facility Assessment Tool. This tool addressed four broad categories: (i) infrastructure adequacy (availability of a functioning labour room, electricity, water supply, and clean toilets); (ii) essential equipment (delivery table, radiant warmer, oxygen, suction); (iii) availability of life-saving drugs (oxytocin, magnesium sulphate, antibiotic); and (iv) human resources (number and training status of medical officers, nurses and specialists). Each item within each domain were scored as a percentage - available items to the expected items. Thereafter, the composite input score was calculated by determining the mean percentage score of each domain per facility.

Within the identified study sites, output performance indicators were collected from the delivery register, referral log, and monthly report for the same time period. Some of the key output variables have included the total number of institutional deliveries, proportion of caesarean section, proportion of deliveries occurring at night (proxy for 24-hour facility availability), incidence of postpartum haemorrhage (PPH), early initiation of breastfeeding (within the hour), patient satisfaction (using existing exit feedback tools), and number of cases with referral delays due to lack of services.

Data on all indicators were collected using direct observation, interviewing the staff, and reviewing records by trained field investigators. Data were then entered into Microsoft Excel for digitization and subsequently analysed using Jamovi version 2.4.6. Descriptive statistics were employed to describe inputs and outputs at the facility level.

Input readiness at each facility was assessed across four domains: basic infrastructure, essential equipment, medicine availability, and human resources. Each domain was scored as the percentage of required items available. The Composite Input Score was computed as the average of these four domain percentages.

To assess the strength and direction of association between the composite input scores and each of the output indicators, Spearman “LOs rank correlation (Spearman “LOs ñ) was performed. The Spearman correlation could be carried out based on the small sample size and lack of normal distribution among many denominators. Correlation coefficients were considered based on acceptable thresholds, and a p-value less than 0.05 was regarded as indicative of statistical significance.

The study protocol was lodged with, and approved by, the Institutional Ethic Committee of the Indian Institute of Public Health, Gandhinagar (IIPH). Administrative permission for data collection and facility visits was obtained from the Additional Director (Family Welfare), Government of Gujarat, and the Chief District Health Officer, Rajkot. To ensure confidentiality and respect for ethical norms, identifiers at the patient-level were never considered in the analysis of data, only aggregate data at the facility level were included.

Results:

The input analysis of evaluated health facilities in Rajkot district exhibited significant variability in preparation by LaQshya criteria. Among the secondary level hospitals, SDH-B and SDH-A had composite input scores of 90% and 87.25%, respectively. SDH-B and SDH-A scored uniformly high across the domains of infrastructure, equipment, availability of medicines and human resources. These hospitals were well equipped to provide quality intrapartum care and achieve LaQshya certification. Conversely, moderately scoring facilities like SDH-E, CHC-C and SDH-C exhibited imbalanced readiness: some aspects around equipment and human resources displayed unbalanced readiness indicators where one or multiple aspects did not meet criteria. While most centres appeared to have sufficient availability of medicines, weaknesses in the deployment of staff and essential equipment limited their service delivery capacity. (Table.1)

Table 1: Facility wise input and composite input score

Facility	Basic Infra Structure (%)	Equipment (%)	Medicine (%)	Human Resource (%)	Composite Input (%)
CHC-A	62	36	82	25	51.25
SDH-A	92	91	91	75	87.25
SDH-B	85	100	100	75	90.00
CHC-B	69	36	91	38	58.50
CHC-C	69	64	82	50	66.25
SDH-C	69	64	91	25	62.25
SDH-D	54	55	82	63	63.50
SDH-E	77	45	100	75	74.25

Table 2: Facility wise deliveries and output performance

Facility	Total Deliveries	C-Sections/ Month	Night Deliveries	Stillbirths	PPH Cases	Breastfeeding <1 hr (%)
CHC-A	9	0	4	1	0	40%
SDH-A	149	33	41	0	1	92%
SDH-B	110	14	38	1	2	88%
CHC-B	38	0	17	0	0	60%
CHC-C	54	0	23	1	0	65%
SDH-C	54	0	23	0	1	75%
SDH-D	100	2	48	1	2	78%
SDH-E	80	21	23	0	1	85%

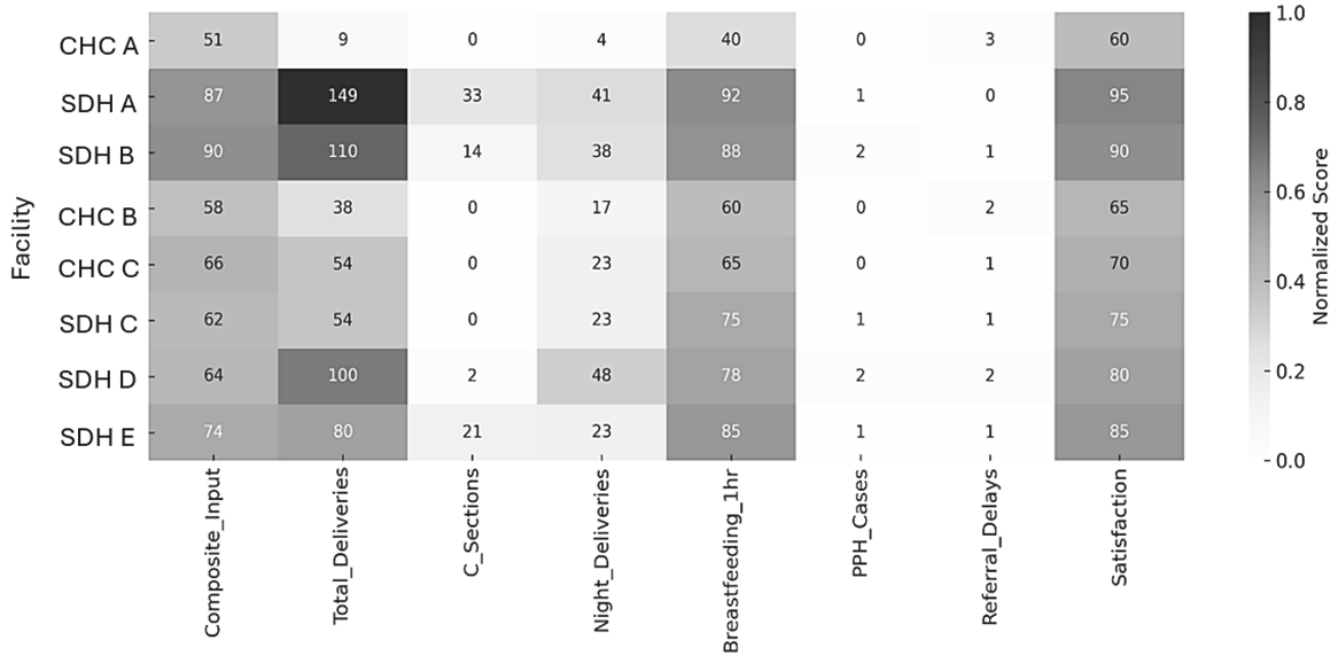
Table 3: Additional inputs assessed in terms of staff training, audits, satisfaction level and referral delays

Facility	%Staff LaQshya Trained	No. of Audits (Last 3 months)	Patient Satisfaction (%)	Referral Delay Cases
CHC-A	40%	0	60%	3
SDH-A	90%	3	95%	0
SDH-B	85%	2	90%	1
CHC-B	50%	1	65%	2
CHC-C	60%	1	70%	1
SDH-C	70%	2	75%	1
SDH-D	60%	2	80%	2
SDH-E	80%	2	85%	1

Table 4: Spearman's Rank Correlation between Composite Input Score and Output Indicators

Output Indicator	Spearman's rho (ρ)	p-value
Total Deliveries	0.886	0.005
Breastfeeding Initiation <1hr (%)	0.790	0.012
PPH Cases	-0.710	0.033
Stillbirths	-0.520	0.085
Patient Satisfaction (%)	0.815	0.009
Referral Delays	-0.670	0.042

Figure 1: Facility-wise Cp,[psote Input Readiness and Maternal Service Output Indicators under LaQshya



The two facilities that performed very low CHC-A (51.25%) and CHC-B (58.50%) had clear deficiencies related their human resource availability and the readiness of their equipment systems. The facility indicated 25% human resource availability that significantly limited the maternal care services that were provided even though the medical infrastructure and drug supply were relatively good. The authorities emphasized that we need to measure and have consistencies in the input quality across all independent variables a necessary condition for turning around maternal welfare service delivery. (Table 1)

The report of the delivery indictors from the selected centres showed obvious differences in delivery volumes and maternal-newborn outcomes. As would be expected, the secondary-level hospitals SDH-A, SDH-B, and SDH-D had the largest caseload, and SDH-A had by far the largest volume of monthly deliveries (149) and caesarean section volume (33 per month), closely followed by SDH-B and SDH-E. These facilities are also likely to have 24-hour services available, reflecting in their higher volume of deliveries at night. Interestingly, SDH-A had achieved a 92 percent rate of early initiation of breastfeeding within one hour of birth, a quality indicator in LaQshya, and an indicator of good postnatal care. In general, however, the lower-level facilities (for example, CHC-A and CHC-B) had very low delivery volumes (9 and 38, with no surgical capability -low capacity for providing new-born care) that restricted their service orientation.(Table 2)

In total, PPH (post-partum Haemorrhage) cases were low across almost all facilities but nevertheless, their existence, though few, suggested and reinforced the need for readiness; one should be prepared and not need it, then not be prepared and needed it. SDH-B and SDH-D had over one reported case of PPH corresponding to their overall larger caseload. The initiation of early breastfeeding ranged from 40 percent (for CHC-A) to 88-92 percent (the better performing SDHs) which suggested that in the early breastfeeding example, quality components of maternal new-born care were directly linked to the quality of composite input. Generally, the CHCs lagged in service volume and all other outcome measurements for maternal-newborn care based on the performance measures in this study. As previously noted, CHCs are at risk of falling behind if they offer a composite input score that is low enough such that they struggle to reach the maternal-care

outcomes outlined by LaQshya previously. Summing all dimensions of the assessment, facilities aligned with composite inputs and better staffed than other facilities not only had higher volumes but also had better indicators of quality care. (Table 2)

Examining the more detailed input indicators relating to LaQshya training coverage, clinical audits, patient satisfaction and referrals gaps provided further understanding of facility level quality systems (what conditions, what staff trained, what extent audits practice undertaken, etc.). For example, the SDH-A, SDH-B, and SDH-E Level hospitals reported high proportions of the staff that had received LaQshya training (90%, 85%, and 80% respectively), the most audits performed in the last three months, and higher patient satisfaction scores (90-95%) with limited gaps for referrals reported. Overall, the indicator's trend suggested that internal quality systems were functioning, but, CHC-A reported the lowest coverage of staff training (40%), had reported no audits, a patient satisfaction score of only 60%, and three referrals reported - reflecting low capacity and responsiveness and consequently concerning. (Table 3)

Facilities categorized as moderate performers, including CHC-C, SDH-C, SDH-D - had reported incomplete staff training (60-70%), moderate audit processes (1-2 audits completed in last 3 months), and moderate patient satisfaction (70-80%). These facilities even reported only sometimes being constrained by issues with referrals. The concerns with referrals by both CHCs and some SDHs suggested there could also be additional constraining factors/ barriers relating to readiness for emergency obstetrics or gaps in transport logistics. Overall, those facilities reporting higher levels of coverage, staff training, and systematic audit processes, in turn, reported most likely to be provide patient cantered care and appropriate and timely response to complications. This finding supports LaQshya's dual aim of supporting quality of care and respectful care during the provision of maternity care. Moreover, the findings indicated that sustained improved quality of care during labour and delivery will necessitate ongoing service staff capacity-building and formalized feedback processes. (Table 3)

The correlation analysis between composite input scores and key output measures revealed statistically significant and meaningful associations, providing additional evidence of the relationship between inputs preparedness and quality of service delivery. There was a strong positive correlation between composite input scores, and total deliveries was 0.886 ($p = 0.005$), suggesting that well-equipped and well-staffed facilities were more likely to attract and manage above-average levels of deliveries. However, we also found that early breast-feeding within one hour of birth showed moderate to strong positive correlation (0.790, $p = 0.012$), indicating that facilities with better inputs were more likely to follow aspiration newborn care practices. We also uncovered a strong positive association between patient satisfaction and input scores (0.815, $p = 0.009$), which may suggest that we can have reasonable expectation that those facilities that could demonstrate systemic readiness and capacity of personnel are more likely to provide respectful, quality-based care.(Table 4)

On the contrary, the poor maternal and system-related outcomes evaluated in the study (PPH and delays in referral) showed clear evidence of strong negative correlations with the input scores. Facilities with greater input preparedness reported fewer PPHs ($\rho = -0.710$, $p = 0.033$), and significantly fewer delays in referrals ($\rho = -0.670$, $p = 0.042$). This means that the presence of an acceptable structure, trained staff, and effectively functioning emergency structures, each of which supports the potential for overcoming complications, matters. Lastly, while the association between input score and stillbirths was negative ($\rho=-0.520$) the strength was falling short of being statistically significant ($p=0.085$); this could have been due to the smaller number of stillbirth events observed or un-measured confounders. Our thoughts are that these results provide support for our initial hypothesis that input aligned LaQshya-affiliated facilities were associated with improved maternal or newborn health service outputs as a function of both quantity and quality.(Table 4)

The heat map displayed the aforementioned variations in readiness for composite inputs and maternal service outputs by facilities under LaQshya, and

program implementation level. Facilities performing in the upper quartile such as SDH-A, SDH-B, and SDH-E were displaying darker colours on the heatmap across much of the input and output parameters indicating they had excellent input readiness and exhibited high volumes of deliveries, caesarean section performance, early initiation of breastfeeding, patient satisfaction and number of referral delays. Facilities that were performing in the lowest quartile such as CHC-A and CHC-B were displaying lighter colours across most of the indicators suggesting the facilities showed poor input readiness, high volumes of caesarean sections, or any of the other negative outcome indicators including limited surgical capacity, and poor-quality indicators or measures. When we examine the facilities that were performing in the mid-range performance: CHC-C, SDH-C, and SDH-D, we see there was variable performance, with mid-range scores falling in inputs and variable outputs. The heat map indicated the aforementioned positive relationship between better levels of input readiness and better maternal service outcomes. Therefore, there was implication that intentional capacity enhancement might be needed for that. (Fig.1)

Discussion:

This study from Rajkot district, Gujarat shows clear evidence that facilities with stronger input readiness under the LaQshya initiative achieve better maternal care outcomes. Higher-scoring facilities—such as SDH-A, SDH-B, and SDH-E—had well-developed infrastructure and processes, and consistently showed better results, including higher delivery and C-section numbers, timely breastfeeding initiation, minimal PPH, greater patient satisfaction, and no referral delays. In contrast, lower-scoring facilities like CHC-A and CHC-B showed weaker readiness and unequal service performance.

A correlation analysis was conducted and corroborated the presumed relationships. Scores of inputs had strong positive correlation with total deliveries ($\rho = 0.886$, $p = 0.005$) and patient satisfaction ($\rho = 0.815$, $p = 0.009$). The scores of inputs affirm previous studies that determined that structural quality feels have a direct effect on service uptake and perceptions of quality of care.[9-11] The scores of inputs also resulted in a statistically significant correlation moderate to strong correlation with timely breast feeding initiation ($\rho = 0.790$, $p = 0.012$), confirming the WHO that immediate postpartum care relies heavily on the readiness of the facility and trained human resource.[12]

The strong negative correlations for PPH cases ($\rho = -0.710$) and delayed or absent referrals ($\rho = -0.670$) suggest that good infrastructure and adequately trained staff significantly improve a facility's readiness.[4] When these structural elements are in place, obstetric emergencies can be managed more promptly, leading to faster clinical decisions and reduced delays in care.

Using a heat map visualization allowed for an insightful and nuanced interpretation of the data and we were able to see the clear continuities in respect to the high-performing and low-performing facilities. As mentioned above, SDH-A had full staff uptake, valid audit procedures, and nearly full LaQshya training uptake (90%) so it was not particularly surprising that this was the facility that had the greatest functional consistency with national labour room QI standards as suggested across the data in panels A and B. This was not dissimilar to what was seen in Tamil Nadu and Maharashtra[10-12], who also noted that paying attention to the implementation of LaQshya standards was broadly correlated with a systems improvement in maternal care particularly in sub-district level and district hospitals.

Those facilities that demonstrated low percentages of LaQshya-trained staff (e.g., CHC-A), and had no audit platform in place, also had less favourable experience and quantitative maternal experience, providing support for the notion that any QI framework will only be implemented successfully when the emphasis is on integrating and maintaining accountability; not on only providing inputs.[5] Although the initiative articulated through documents required clinical audits and illustrative practices and procedures pertaining to respectful maternity care, the frequency of audits and patient feedback systems across facilities varied. The facilities those have conducted (e.g. SDH-A, SDH-B, and SDH E) audits regularly, also had the positive

maternal outcomes and patient satisfaction, suggesting that continuous quality monitoring, and corrective feedback loops are important in planning and implementing.[5,13] Previous evidence from Uttar Pradesh and Bihar provide evidence of this; maternal care indicators improves systematically once audits, supervisory visits and corrective feedback loops are made standard.[14]

The weak correlation ($\rho = -0.520$, $p = 0.085$) inputs scores to stillbirths deserve some consideration. While stillbirths are comparatively rare in this data set, they may often occur with upstream features such as quality of antenatal care, timeliness of referral, and maternal co-morbidities, which may not be adequately amenable through LaQshya interventions.[15] However, the continued observation of stillbirths in some facilities shown to perform well, demonstrates the feasibility of integrating antenatal surveillance and referral risk mapping as an additional layer to the planned improvement guidance that LaQshya developed for labour rooms.

The study has generated practical supply chain implications, but there are also limitations. First, the inclusion of eight facilities limits generalizability. Second, since this study is cross-sectional, it could not account for seasonality or longitudinal progress. Third, while we did measure input and output indicators of LaQshya quantitatively, we did not measure provider behaviour, the quality of communication or the patient perspective, which would be central to the idea of Respectful Maternity Care (RMC).[16,17] Finally, simply basing referral delay measurement on facility tracking, rather than timing on referring patients may underplay delay.

In the future, research should be undertaken with a mixed methodology to evaluate the experiences of patients and providers, consider comparisons in the private sector, and assess the impact of digital health tools and tele-audits under the LaQshya program. It is also important to develop real-time dashboards and ensure equitable implementation (i.e., in the case of the CHC) and incorporate proactive strategies for sustainable behavioural change into all LaQshya trainings. Finally, LaQshya's ability to succeed will ultimately depend on how synergistically the components of infrastructure, clinical competence, respectful care, and accountability can be combined, a model that is gaining traction in the global maternity and newborn health (MNH) discussion.[18,19]

Conclusion:

The input–output analysis of LaQshya implementation in Rajkot district shows that strong infrastructure, adequate equipment, skilled staff, and reliable medicine supply are key drivers of improved maternal health outcomes. Facilities with better input readiness demonstrated higher delivery loads, timely referrals, early initiation of breastfeeding, reduced postpartum haemorrhage, and better patient satisfaction. Overall, the LaQshya framework has the potential to significantly strengthen labour room care, provided that resources are equitably allocated, performance is regularly monitored, and implementation remains consistent across all facilities.

Recommendations:

Strengthen Facility Based Infrastructure and Supplies: Health facilities with low composite input scores should be targeted for infrastructure strengthening, provision of essential obstetric equipment and continued supply of drugs especially at CHC levels. Ensure adequate Skilled Human Resources: Deploy qualified HR with access to obstetrical specialists proportionally based on workload. LaQshya certified training should scale up to 100% staff coverage across all health facilities, especially where HR coverage is low. Audit And Feedback Loop Routine Institutionalization: Scheduled clinical audits and patient satisfaction surveys should be mandatory, to monitor performance and quality in real time. Facilities that have not had an audit in the last 24 months should be identified for quality assurance for potential review as soon as possible. Ensure Equitable Distribution of Cesarean Capacity: In some CHCs and even some SDHs cesarean services were not available. Regional health planners will need to assess and 'to redistribute surgical capacity sourced centrally for normal and rare surgical

items with a view to reducing inappropriate referrals and avoid referral delays. Addressing Referral System Concerns: Facilities with significant referral delays require support with transport linkages, emergency protocols and 24 × 7 specialist services. Maintaining Certification and Quality Standards: laQshya certification of hospitals should not be a "one-off" activity but should be a continuous process through renewal and/or reassessment of performance (ideally every 3 years; not the 3-5 years suggested in the guidelines) and by relating it to the on-going maternal health program (including PMSMA and JSY).

Declaration

Funding: Nil

Conflict of Interest: Nil

Acknowledgments: We extend our sincere gratitude to State Health Department Gujarat and IIPH-Gandhinagar for their support & guidance.

References:

1. National Family Health Survey (NFHS-5), India, 2019-20: International Institute for Population Sciences (IIPS) and ICF. Mumbai: IIPS; 2020.
2. UNICEF. Every Newborn: An Action Plan to End Preventable Deaths. Geneva: World Health Organization; 2014.
3. Bhutta ZA, Das JK, Bahl R, Lawn JE, Salam RA, Paul VK, et al. Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? Lancet. 2014;384(9940):347–70.
4. Ministry of Health and Family Welfare. LaQshya – Labour Room Quality Improvement Initiative: Operational Guidelines. Government of India; 2017.
5. Srivastava A, Avan BI, Rajbangshi P, Bhattacharyya S. Determinants of women's satisfaction with maternal health care: a review of literature from developing countries. BMC Pregnancy Childbirth. 2015;15:97.
6. National Health Systems Resource Centre. Operational Guidelines for Quality Assurance in Public Health Facilities. New Delhi: MoHFW; 2013.
7. Sharma G, Mathur S, Singh S. Understanding Implementation Challenges of LaQshya in High Delivery Load Facilities: Insights from Madhya Pradesh. Indian J Public Health. 2021;65(2):124–30.
8. Agarwal S, Sripad P, Johnson C, Kirk K, Bellows B, Ana J, et al. A conceptual framework for measuring community health workforce performance within primary health care systems. Hum Resour Health. 2019;17(1):86.
9. Donabedian A. The quality of care. How can it be assessed? JAMA. 1988;260(12):1743–8.
10. Raj A, Dey A, Boyce S, Seth A, Bora S, Chandurkar D, et al. Associations between Quality of Facility-Based Maternity and Newborn Care and Maternal and Newborn Health Outcomes in Uttar Pradesh, India. PLoS One. 2017 Oct 6;12(10):e0184787.
11. Kruk ME, Gage AD, Arsenault C, Jordan K, Leslie HH, Roder-DeWan S, et al. High-quality health systems in the Sustainable Development Goals era: time for a revolution. Lancet Glob Health. 2018 Nov;6(11):e1196–252.
12. World Health Organization. Standards for improving quality of maternal and newborn care in health facilities. Geneva: WHO; 2016.
13. Sharma G, Powell-Jackson T, Haider S, Ranganathan M. Quality of routine essential care during childbirth: clinical observations of uncomplicated births in Uttar Pradesh, India. Bull World Health Organ. 2017 Jul 1;95(7):419–29.
14. Miller S, Abalos E, Chamillard M, Ciapponi A, Colaci D, Comandé D, et al. Beyond too little, too late and too much, too soon: a pathway towards evidence-based, respectful maternity care worldwide. Lancet. 2016 Nov 5;388(10056):2176–92.
15. Chou D, Daelmans B, Jolivet RR, Kinney M, Say L. Ending preventable maternal and newborn mortality and stillbirths. BMJ. 2015 Sep 14;351:h4255.
16. Bowser D, Hill K. Exploring Evidence for Disrespect and Abuse in Facility-Based Childbirth. USAID/TRAction Project; 2010.
17. White Ribbon Alliance. Respectful Maternity Care: The Universal Rights of Childbearing Women. Washington DC: WRA; 2011.
18. Tunçalp Ö, Were WM, MacLennan C, Oladapo OT, Gülmezoglu AM, Bahl R, et al. Quality of care for pregnant women and newborns—the WHO vision. BJOG. 2015 Jul;122(8):1045–9.
19. Renfrew MJ, McFadden A, Bastos MH, Campbell J, Channon AA, Cheung NF, et al. Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care. Lancet. 2014 Sep 20;384(9948):1129–45.

Knowledge of Rabies and Wound Care after Animal Bite among Accredited Social Health Activists (ASHA) in Ahmedabad Municipal Corporation (AMC): A Cross-Sectional Study

Vibhuti Chandera[1], Bhavna Puwar[2], Vaibhavi Patel[2], Birenkumar Patel[1], Bhavin Solanki[3]

[1]Postgraduate Student, [2]Associate Professor, Community Medicine Department, Smt. NHL Municipal Medical College, Ahmedabad, India

[3]Medical Officer of Health, Ahmedabad Municipal Corporation, Ahmedabad, India

Correspondence: Dr. Vibhuti Chandera, Email: drvibhutichandera@gmail.com

Abstract:

Introduction: Rabies is a vaccine preventable disease having 100% fatality. India is endemic for Rabies accounting for 36% of the world's Rabies deaths. ASHAs are the grass root level worker who spreads awareness about Rabies and wound care after animal bite. **Objectives:** 1. To assess the knowledge of Rabies among ASHAs. 2. To assess the knowledge of wound care after animal bite among them. 3. To determine the association of various sociodemographic factors with knowledge of Rabies and wound care after animal bite among ASHA. **Methods:** A cross-sectional study was conducted on 139 ASHAs from Ahmedabad Municipal Corporation selected by stratified random sampling from 86 UPHC from September 2024 to November 2024. A self-administrating questionnaire was used. **Results:** The mean age of ASHAs was 43.8 ± 8.1 years and mean work experience of 11.6 ± 5.8 years. None of them had any prior training in Rabies or wound care. Dog bite (92.1%) was the commonest source recognized by the majority of participants and 82% thought Rabies is fatal. About 97.1% knew about Rabies vaccine, 20% knew the right number of doses. 62.6% believed in traditional remedies for wound care, while 76.3% knew about washing the wound with soap and water. Total knowledge score was most strongly associated with work experience (p = 0.024). **Conclusion:** This study identifies lack of knowledge regarding Rabies and appropriate care of wounds following animal bites among ASHA workers in Ahmedabad city suggesting the need for training.

Keywords: Ahmedabad, ASHA workers, Rabies

Introduction:

Rabies remains a significant public health challenge with the disease maintaining a fatality rate of almost 100% once symptoms appear, despite being vaccine-preventable. India currently is considered a global hotspot for the disease. India contributes about 36% to the world's total Rabies-related deaths (18,000-20,000 annually).[1] According to the National Rabies Control Program, dog bites account for a staggering 96% of these cases, while other local wildlife like monkeys, mongoose, jackals, and cats act as important viral reservoirs. The Program was initiated in five pilot cities including Ahmedabad. This initiative intended to prevent human deaths by enhancing awareness among

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Chandera V, Puwar B, Patel V, Patel B, Solanki B. Knowledge of Rabies and Wound Care after Animal Bite among Accredited Social Health Activists (ASHA) in Ahmedabad Municipal Corporation (AMC): A Cross-Sectional Study. Healthline. 2025;16 (4): 332-338
	DOI : 10.51957/Healthline_799_2025	

Received : 07-10-2025 **Accepted** : 08-01-2026 **Published :** 10-01-2026

the public, training medical personnel, and enhancing both diagnostic and surveillance infrastructures. The aforementioned activities were a part of the more comprehensive "One Health" approach specified in the National Action Plan for Dog Mediated Rabies Elimination from India (NAPRE) with goals to achieve a "Zero by 2030" global mortality burden.[2]

According to the National Urban Health Mission, ASHAs are the nodal contact for 1,000–2,500 resident of urban slum areas.[3] The ASHAs as grassroot healthcare workers provides information on wound care and post-exposure prophylaxis, including soap-and-water washing of the wound site. They also help refer cases to a vaccination site and promote immunization of pet animals.[4]

Although ASHA workers also play a role in control of zoonotic diseases in cities like Ahmedabad, studies that assess the true level of their knowledge concerning Rabies are limited.[5] Thus, it is important that ASHA workers have adequate knowledge about Rabies and wound care after animal bite which will increase awareness in the community and help in prevention of the Rabies at large.

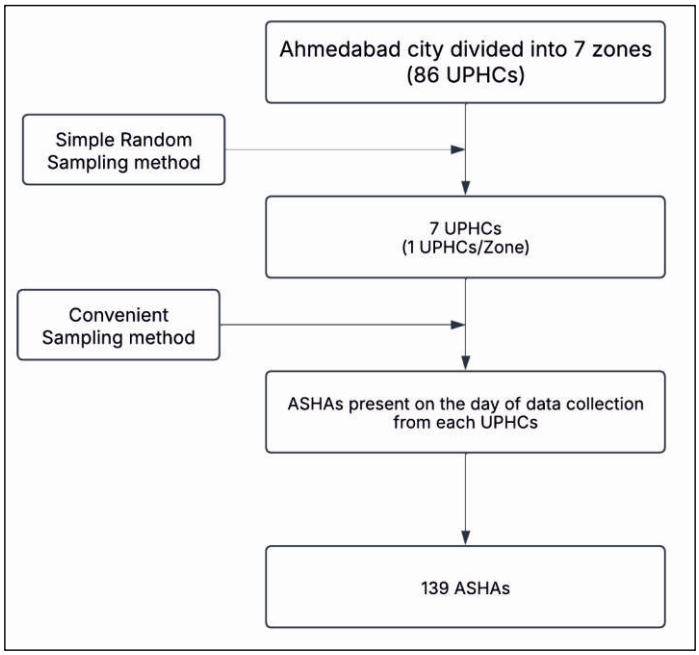
So, this study was conducted with the purpose to assess the knowledge of Rabies among ASHAs, to assess the knowledge of wound care after animal bite among them and to determine the association of various sociodemographic factors with knowledge of Rabies and wound care after animal bite among ASHA.

Methods:

It was an observational cross-sectional study done in Urban Primary Health Centers (UPHCs) of Ahmedabad Municipal Corporation (AMC). Ahmedabad city is divided into seven-zones that include a total of 86 UPHCs. Multi-stage sampling method was applied and one UPHC from each zone was randomly selected through lottery method. Thus, seven UPHCs were included in the study. All the existing Accredited Social Health Activists (ASHAs) from these selected UPHCs were studied from September 2024 through November 2024 (3 months).

Sample size: Total 139 ASHAs were included from the selected 7 UPHCs by convenient sampling method. (Figure 1)

Figure 1 : Sampling Method



Inclusion criteria: ASHAs from selected UPHCs of Ahmedabad Municipal Corporation.

Exclusion criteria: ASHAs not willing to participate in the study. ASHAs absent on the day of data collection.

Study Tool: A self-administrating semi structured questionnaire in English and Gujarati was prepared using Training Module for ASHAs (July 2006) by Ministry of Health and Family Welfare.[4] The questionnaire consisted of demographic details and questions to assess the knowledge on Rabies and wound care after animal bite. The questionnaire included 33 items, and each correct response was scored as one and incorrect or "don't know" was scored as zero. The total questions for knowledge about Rabies including sub-sections were 17, for knowledge about vaccination were 7 and for knowledge about wound care after animal bite were 9. Thus, the total knowledge score ranged from 0 to 33. The questionnaire was validated by a panel of experts from Community Medicine, and mean score was used as cut-off for analysis as per their recommendation.

Ethical Consideration: The permission of the Medical Officer of Health of Ahmedabad Municipal Corporation was obtained to conduct this study. Ethical clearance was obtained for the study (No. NHLIRB/2024/09/25/No-10). Written informed consent was taken from ASHAs before filling the questionnaire. Data confidentiality was maintained.

Data Analysis: Analysis was conducted using descriptive statistics. Sociodemographic variables such as age, education, and work experience were considered as exposure variables and the total score of knowledge regarding Rabies and wound management with a maximum score of 33 was considered as the outcome variable. The data was normally distributed so independent t-test was used to compare the mean of total knowledge score between variables. All computations were carried out with a sample size of 139 participants using SPSS software version 20.0.

Results:

A total of 139 ASHAs from 7 zones of Ahmedabad city participated in the study. The mean age of the participants was 43.82 years with a standard deviation of 8.07, ranging from 25 to 63 years. The mean duration of work experience was 11.64 years with a standard deviation of 5.80, ranging from 3 months to 21 years. None of the ASHAs had received any training regarding Rabies or the management of wounds following animal bites (Table 1).

Multiple responses were recorded about transmission of Rabies in which majority 128(92.1%) of ASHAs believed that Rabies is transmitted through dog bite followed by monkey bite 31(22.3%). About 48(34.5%) ASHA believed that Rabies could spread through licks and scratch from the rabid animal. 114(82%) ASHAs knew that death is inevitable in case of Rabies. For identifying Rabid animal, response of majority 107(77%) of ASHAs was salivation of animal followed by 59(42.4%) animal keeps biting and 29(20.9%) increase in aggression of animal (Table 2).

Table 1: Socio demographic details of the participants (N=139)

Variable	N	%
Age (years)		
Under 25	1	0.7
26-35	24	17.3
36-45	53	38.1
46-55	53	38.1
56 and above	8	5.8
Educational Status		
Secondary	53	38.1
Higher secondary	47	33.8
Graduate	36	25.9
Postgraduate	3	2.2
Work Experience (years)		
1-5	23	16.5
6-10	34	24.4
11-15	47	33.8
16-20	30	21.6
More than 20	5	3.6

Table 2: Knowledge about Rabies among ASHA workers (N=139)

Variable	N	%
How is Rabies transmitted?*		
Dog bite	128	92.1
Monkey bite	31	22.3
Cat bite	22	15.8
Wild animals	19	13.7
Rodent bite	13	9.4
Don't know	7	5
Others	1	0.7
Does Rabies spread from human to human?		
Yes	60	43.2
No	66	47.5
Don't know	13	9.4
Does Rabies spread through licks/scratches from a rabid animal?		
Yes	48	34.5
No	79	56.8
Don't know	12	8.6
Does Rabies spread through contaminated food or water?		
Yes	13	9.4
No	118	84.9
Don't know	8	5.8
Is death inevitable in case of Rabies?		
Yes	114	82
No	18	12.9
Don't know	7	5
Rabid animal is likely to die within how many days?		
<10 days	33	23.7
10 days	3	2.2
>10 days	53	38.1
Don't know	50	36
Is Rabies a preventable disease?		
Yes	108	77.7
No	21	15.1
Don't know	10	7.2
How do you identify a Rabid animal?*		
Salivating	107	77
Keep biting	59	42.4
Aggressive	29	20.9
Hydrophobic	16	11.5
Dumb	6	4.3
Don't know	6	4.3
If biting animal is not seen around, would the wound be considered infected with Rabies?		
Yes	51	36.7
No	36	25.9
Don't know	52	37.4

***Multiple responses**

Table 3: Knowledge about vaccination of Rabies (N=139)

Variable	N	%
Is there a vaccine for Rabies? (n=139)		
Yes	135	97.1
No	2	1.4
Don't know	2	1.4
How early should Anti-Rabies Vaccine be given? (n=135)		
Immediately	119	88.1
≤ 1 day	12	8.8
≤ 1 Week	3	2.2
Anytime	0	0
Don't know	1	0.7
Are you aware of the schedule of the Anti-Rabies Vaccine? (n=135)		
Yes	90	66.7
No	49	36.3
Does ARV protection stays for lifetime? (n=135)		
Yes	40	29.6
No	76	56.2
Don't know	19	14
If no, when to repeat the vaccine after animal bite? (n=76)		
< 1 Year	29	38.1
≥ 1 Year	21	27.6
Don't know	28	36.8

Significant number of ASHAs 135 (97.1%) knew that there is a vaccine for Rabies. Out of 135 ASHAs knowing that Anti Rabies Vaccine (ARV) is available 119 (88.1%) said that vaccine should be provided to the animal bite victim immediately. A schedule is available for the ARV was known by 90 (66.7%) of study participants, out of which only 25 (20%) knew that the current ARV schedule included four doses. Out of which correct days of the doses i.e., 0,3,7,28 was known by 5 (20%) of ASHAs. The knowledge about when to give immunoglobulin was present in 4 (29.6%) ASHAs. Furthermore, 76 (56.2%) participants reported that the anti-rabies vaccine does not confer lifelong protection, and only one-fifth of the participants, 29 (38.1%), knew when the vaccine should be repeated following a subsequent animal bite (Table 3).

Table 4: Knowledge about wound care after animal bite (N=139)

Variable	N	%
Is traditional treatment useful?		
Yes	87	62.6
No	42	30.2
Don't know	10	7.2
If yes, things which can be applied to a wound after an animal bite.*		
Turmeric	53	37.4
Tobacco	35	25.2
Chilli powder	20	14.4
Toothpaste	3	2.2
Others	1	0.7
Is washing wound with soap and water useful?		
Yes	106	76.3
No	28	20.1
Don't know	5	3.6
If yes, how long the wound should be washed?		
>10-15 min	18	16.9
<10-15 min	74	69.8
Don't know	14	13.2
Is application of antiseptics useful in animal bite wound care?		
Yes	68	48.9
No	40	28.8
Don't know	31	22.3
Should one suture the animal bite wound?		
Yes	40	28.8
No	75	54
Don't know	24	17.3
Should one apply loose dressing to the wound?		
Yes	81	58.3
No	46	33.1
Don't know	12	8.6

*Multiple responses

More than half of ASHAs (62.6%) believed that the traditional treatment for the wound care after animal bite is useful. All (62.6%) ASHAs who believed that traditional treatment was useful were further asked about substances applied to animal bite wounds. Multiple responses were recorded, with turmeric being the most commonly reported (37.4%), followed by tobacco (25.2%) and chilli powder (14.4%).

There is statistically significant difference between work experience and knowledge of Rabies and wound care after animal bite (p=0.024) which suggests the work experience of ASHAs increases the knowledge about Rabies and wound care after animal bite also increases. However, there was no statistically significant association between age and the knowledge scores, and educational status and the knowledge scores of ASHA workers.(Table 5)

Discussion:

ASHA workers are the first line of contact for health illnesses in the community. They are the most frequent visitors among health workers in households.[5] This vital link between the health system and the community is very important to fight against this preventable yet deadliest disease. This study involved 139 ASHA workers from Ahmedabad city; and none of the ASHAs had received any formal training. A study done by Aptriana CD et al.[8] showed that on implementation of

Table 5: Association of Sociodemographic Factors with Knowledge of Rabies and Wound Care After Animal Bite (N = 139)

Variable	n (%)	Knowledge Score			t value	p value
		Mean	SD	SEM		
Age (years)						
<43	62 (44.6)	14.5	4.7	0.6	1.081	0.282
≥43	77 (55.4)	15.3	4.1	0.4		
Educational status						
Secondary	53 (38.1)	14.9	4.1	0.5	-0.145	0.885
>Secondary	86 (61.8)	15	4.5	0.5		
Work experience(years)						
≥11	82 (59.0)	15.6	4.9	0.5	2.285	0.024
<11	57 (41.0)	13.9	4.1	0.5		

Note: Independent samples t-test was applied.

One health approach for Rabies and training of health workers helped in decreasing the case fatality rate from 6.25% in 2014 to zero in 2019. However, when training was not repeated in new workers in 2020 Rabies cases increased to 1.75 per million population and increased death due to Rabies by 0.84%. Thus, it is found that regular training programs are helpful in the progress toward Rabies elimination goals.

In present study, regarding knowledge about transmission of Rabies, majority of ASHA workers (92.1%) recognized that dog is the major transmitter of Rabies, only a few believed that Rabies can also spread by cats, monkeys and wild animals. A study conducted by Sahu DP et al.[9] showed the similar results. Additionally, in present study, only 34.5% of ASHAs believed that Rabies can spread through licks/ scratches of animal whereas a study conducted by Tiwari HK et al.[10], found that 54% of the health workers thought Rabies can spread with licks/ scratches from an animal.

In present study, awareness regarding existence of Rabies vaccine was present in 97.1% of ASHAs; and 88.1% had the knowledge about its immediate administration. However, detailed understanding of the vaccine schedule, number and timing of doses, and the role of immunoglobulin was poor. Similar results in knowledge related to Rabies vaccination among health workers were observed in study conducted in Baramati by Tiwari HK et al.[10] and by Sahu DP et al.[9] This may affect referral and counselling for animal bite.

Total 62.6% of ASHAs in this study believed traditional treatment for wound care after animal bite with turmeric, tobacco and chilli powder is useful. In contrast to these findings, a study conducted among para medical staff by Tiwari HK. et al.[10] found 96% of the health workers didn't think traditional treatment is useful in Rabies. These differences are because Para-medical staff are involved in clinical management of Rabies, while ASHAs are more exposed to community beliefs and lack of training program contribute to these misconceptions leading to delay in appropriate medical care.

Majority of ASHAs (76.3%) in present study were aware that the wound should be washed with soap and water but didn't know how long. A similar result was found in a study by Kapoor P et al.[11] and Kamat U et al.[12] that 56.07% and 54.5% of health workers respectively knew that the practice of wound washing with soap and water is beneficial in Rabies treatment.

There was statistically significant association between work experience and knowledge of Rabies and wound care after animal bite in present study. This finding was supported in the study by Tiwari HK et al.[10] among health workers.

Recommendations:

Regular training and retraining of ASHAs especially focusing on Rabies and wound care after animal bite will improve Rabies control in the community and support national elimination strategies through NAPRE.

Limitations:

Present study included only ASHA workers from urban areas and not from rural areas. Convenient sampling method was used to select ASHA workers.

Conclusion:

The findings of the study indicates that with increased work experience among ASHA workers, their knowledge regarding Rabies was found to be better. However, overall mean knowledge score indicates deficiencies in understanding of Rabies prevention and appropriate wound care after animal bite.

Acknowledgement:

We would like to thank all the ASHA workers for being the part of this study and selected UPHCs for being positive and supportive. We would also like to thank Ahmedabad Municipal Corporation for giving me opportunity and granting me permission to conduct this study.

Declaration :

Funding: Nil

Conflict of Interest: Nil

References:

1. World Health Organization. Rabies [Internet]. Geneva: World Health Organization; 2025 [cited 2025 May 22]. Available from: https://www.who.int/news-room/fact-sheets/detail/rabies
2. National Centre for Disease Control (NCDC). National Rabies Control Programme [Internet]. New Delhi: Ministry of Health and Family Welfare, Government of India. Available from: https://ncdc.mohfw.gov.in/national-rabies-control-programme/
3. Park K. Health programmes in India. In: Park's textbook of preventive and social medicine. 27th ed. Jabalpur: m/s Banarsidas Bhanot; 2023. p. 472-553
4. Ministry of Health and Family Welfare Government of India Reading Material for ASHA National Health Programmes, AYUSH & Management of Minor Ailments Minor Ailments. 2005.
5. Yasobant S, Bruchhausen W, Saxena D, Memon FZ, Falkenberg T. Health System Contact and Awareness of Zoonotic Diseases: Can it Serve as One Health Entry Point in the Urban Community of Ahmedabad, India? Yale J Biol Med. 2021 Jun 1;94(2):259.
6. Sivagurunathan C, Umadevi R, Balaji A, Rama R, Gopalakrishnan S. Knowledge, attitude, and practice study on animal bite, rabies, and its prevention in an urban community. J Family Med Prim Care. 2021 Feb;10(2):850.
7. Dinbiso TD, Mekonnen AT, Olana TN, Ayana GM, Kelbesa KA, Deso HD, et al. Community knowledge, attitude, and practice, incidence of suspected cases, and epidemiological distribution of rabies in humans and animals in Southwest Shewa zone, Oromia, Ethiopia. Front Vet Sci. 2025;12:1448-448.
8. Aptriana CD, Sudarnika E, Basri C. Nationally and locally-initiated One Health approach in controlling rabies in West Kalimantan, Indonesia. Vet World. 2022 Dec 1;15(12):2953.
9. Sahu DP, PS P, Bhatia V, Singh AK. Anti-Rabies Vaccine Compliance and Knowledge of Community Health Worker Regarding Animal Bite Management in Rural Area of Eastern India. Cureus. 2021 Apr 1;13(3).
10. Tiwari HK, Vanak AT, O'Dea M, Robertson ID. Knowledge, attitudes and practices towards dog-bite related rabies in para-medical staff at rural primary health centres in Baramati, western India. PLoS One. 2018 Nov 1;13(11):e0207025.
11. Kapoor P, Baig VN, Kacker S, Sharma M, Sharma M. A cross-sectional study of knowledge regarding rabies among attendees of anti-rabies clinic of a teaching hospital, Jaipur. J Family Med Prim Care. 2019;8(1):194.
12. Kamat U, Cacodcar J, Raiker K. Prevalence of Dog Bite among Field Workers at a Primary Health Care Level in Goa. Indian J Occup Environ Med. 2020 May;24(2):125

INSTRUCTION FOR AUTHORS

"Healthline" journal is a peer-reviewed official open access publication of the Indian Association of Preventive and Social Medicine (IAPSM). It is an indexed medical journal (in DOAJ, Index Copernicus, and Index Medicus-SEAR) published quarterly.

Aims and Objectives of the Journal:

The "Healthline" journal aims at

- Promotion of high-quality medical research by ensuring the accessibility to novel ideas, observations, and advanced knowledge for all by adopting open access policy
- Providing a platform to researches in Community Medicine and Public Health
- Improving the visibility of public health issues for concerned stakeholders

Process for submission:

Authors are requested to strictly follow the guidelines provided herewith, while preparing the manuscripts for submission to the "Healthline" journal. User needs to register first on website. Once registered, author can submit their manuscript and track progress. Author needs to follow this submission checklist strictly. For any queries or technical issues, please contact: editorhealthline@gmail.com

Types of Manuscripts:

Healthline Journal follows the following categories of manuscripts: Editorial (by invitation only), Continuing Medical Education/Review Article, Original Article, Short Communication, Letter to Editor, Book Review.

Preparation of the Manuscript

Manuscripts should be double-spaced, with 2.54 cm margins, and written in 12-point Times New Roman font (including title and headings). The text should be justified, and pages must be formatted in A4 size with page numbers placed at the bottom right corner.

Language and Writing Style:

Manuscripts should be written in *Indian English*. The full form for each abbreviation should be written out at its first occurrence in the title, abstract, keywords, and text, unless it is a standard unit of measure. Acronyms and abbreviations should be used sparingly, and the full form should be followed by the acronym or abbreviation in parentheses upon first mention.

Manuscripts will be edited to conform to the style guidelines of the Healthline Journal. Authors are requested to carefully proofread their manuscripts for spelling, grammar, and punctuation errors before submission. Headings and sub-headings should be in sentence case, not all caps. Tables should be formatted according to APA style, and charts should be submitted in an editable format.

Submission of the Manuscript

The submission includes *three* primary *documents: the Manuscript, Title page and IEC certificate.*

The manuscript must encompass the title, abstract, keywords, manuscript body (including introduction, methods, results, discussion, and conclusion etc), and references. The acknowledgment section should be appended at the end of the main manuscript, but it must not mention the name of the city or the institution.

The title page should include the names of the authors along with their affiliations, email ID, and phone number.

Organization of Sections in an Article

Abstract: An abstract is required for all manuscript types except for editorials and letters to the editor. Abstracts should not exceed 250 words. For original

research articles, the abstract should be structured into five subheadings: *introduction, objective/s, methods, results,* and *conclusions*. Authors should provide up to five keywords aligned with the *MeSH database* at the end of the abstract. The abstract must not include figures, tables, references.

Introduction: The introduction must outline the objective of the study. Authors should articulate the specific goal or purpose of the research and its significance. The introduction should also describe the hypothesis to be tested, or the gap in knowledge the study seeks to address. Objectives should be mentioned in the last part of introduction.

Methods: This section must detail the research plan, materials (or subjects), and methods used. It should specify how the disease or condition was confirmed, controls utilized, data collected, and analysis performed. Detailed descriptions of any devices, medications, or apparatus must include the branded name, manufacturer s details, city, and country.

Study Design: Clearly describe study type, settings, sample size calculation, selection criteria for participants (sampling techniques), including eligibility, exclusion criteria, and the source population.

Technical Information: Provide detailed information on methods, apparatus, and procedures, referencing established methods and explaining any new or modified techniques.

Ethics: Authors must supply evidence of approval by a local ethics committee.

Statistics: Specify statistical methods used, measurement errors, and confidence intervals. Avoid misuse of technical terms and provide precise definitions. All P values must be exact (e.g., P = .032) rather than thresholds (e.g., P < .05).

Results: Results should be presented in a logical sequence aligned with the study objectives. Numeric results should include absolute numbers alongside percentages and other derivatives. Tables and graphs should not duplicate data. Trends and critical findings should be highlighted.

Discussion: The discussion should interpret the findings in the context of the hypothesis, existing evidence, and clinical or policy implications. It must include key findings, strengths, limitations, and a comparison with previous studies. Refrain from reiterating data already presented in the introduction or results sections.

Recommendation: Authors should provide well-grounded recommendations based on the key findings of their study. These recommendations should align with the study objectives and contribute to clinical practice, public health policies, or future research directions. Recommendations should be practical, evidence-based, and clearly linked to the results, avoiding overgeneralization or claims beyond the studys scope.

Limitation: A clear and transparent discussion of study limitations is essential to ensure scientific integrity. Authors should acknowledge methodological constraints, potential biases, sample size limitations, or other factors that may affect the interpretation and generalizability of the findings. Rather than undermining the study, an honest account of its limitations strengthens credibility and allows readers to understand its applicability in different contexts.

Declaration: Authors must disclose any conflicts of interest that may have influenced the study, including financial, institutional, or personal relationships. Details of funding sources should be clearly stated, specifying whether the funding body had any role in study design, data collection, analysis, or manuscript preparation. Additionally, authors must declare any use of artificial intelligence (AI) in research, data analysis, or manuscript drafting, ensuring transparency in the research process.

References: References must be numbered sequentially in the order they appear in the manuscript, following Vancouver style. ANSI standard style adapted by the National Library of Medicine (NLM) should be followed. Consult https://www.nlm.nih.gov/bsd/ uniform_ requirements.html. Alternatively if author using reference manager software like Mendeley or Zotero they can use this specific tailored custom citation style: *https://csl.mendeley.com/styles/ 610628321/ Healthline*. Citation numbers should be superscripted and enclosed in square brackets after punctuation. Example: "... with no evidence of intratubular testicular neoplasia.[1]" When there are more than two citation number present in the sequence then cite as a "... with no evidence of intratubular testicular neoplasia.[1-3]"

Tables (Maximum 4): Tables must adhere to APA style, include descriptive titles, and be self-explanatory without duplicating text data. Each table must define abbreviations used below the table and ensure arithmetic accuracy.

Illustrations (Maximum 4): Graphs: Graphs should be in editable format. Axes must be clearly labelled, and error bars must be defined in the legend. Indicate whether the ± values represent standard error (SEM) or standard deviation (SD). **Figures/Images:** Images must be in JPEG format with a maximum size of 2 MB. Figures should be numbered consecutively and accompanied by descriptive legends. Titles and detailed explanations should not be placed on the images themselves but in the legends. Written permissions are required for patient photographs, and identifiable features like eyes must be covered. Any reproduction of figures must include a credit line and written copyright permission.

Type of Article	Maximum Word Limit
Editorial (by invitation only)	1500
Continuing Medical Education/ Review article	4500
Original article (Excluding abstract, references, tables, graphs and images)	3000
Short Communication	1500
Letter to Editor	750
Book review (Should not be sponsored by any company/organization)	500

Specific Details for Each Manuscript Type

Original Manuscript:

Each of the following sections should begin on a separate page. Number all pages in sequence.

Abstract:

Abstract should be a structured condensation of the work not exceeding 250 words for original research articles. It should be structured under the following headings: *Introduction, Objectives, Methods, Results, Conclusions,* and *3- 5 Key Words* to index the subject matter of the article. Please do not make any other heading.

Manuscript:

It must be concise and should include *Title, Introduction, Methods, Result, Discussion, Conclusion, Recommendations, Limitations, Declarations and References*. The manuscript should not contain names, or any other information related to authors. The matter must be written in a manner, which is easy to understand, and should be restricted to the topic being presented. Insert tables and figures within the text at appropriate places. Written permissions of persons/agency acknowledged should be provided, if applicable.

Review Articles / Continuing Medical Education (CME)

The Healthline publishes various types of review articles, including but not limited to rapid reviews, mapping reviews, and scoping reviews. Only those review articles authored by experts who have published quality original research in the relevant area will be considered. These articles can be up to 4000 words (excluding the abstract and references) and should not exceed 100 references, focusing on recent and relevant literature. The methodology should be clearly defined, including the search strategy employed. The abstract should be unstructured, with a word limit of 250 words. Tables and figures may be included as needed. If any published tables or figures are reproduced, copyright permission must be obtained from the original copyright holder.

Letters to the Editor

Letters to the Editor should be concise, presenting decisive observations. Ideally, they should relate to articles previously published in the journal or comments made within it. The word limit for letters is 750 words, with no more than 5 references.

Short Communications

Short communications should adhere to the same guidelines as original research articles, but with a word limit of 1500 words, and the abstract should not exceed 150 words. The manuscript should include no more than 3 tables and/or figures, and references should be limited to 12.

Author Responsibilities

The journal accepts only original works that have not been published or submitted elsewhere. Authors must confirm that the manuscript, in whole or in part, has not been previously published or is under consideration for publication elsewhere. Abstracts presented at conferences are not considered prior publication and may be submitted for consideration, provided that the details of such presentations are disclosed in the Acknowledgements section. Any material protected by copyright laws that is used in the manuscript must be properly acknowledged. Publication of material on a website may constitute prior publication and must be disclosed at the time of submission. Additionally, authors should disclose details of related papers, even if authored in a different language.

Once accepted, changes to authorship (additions, removals, or modifications) are not permitted.

Authorship Criteria: Authorship credit should be granted based on substantial contributions to the conceptualisation and design of the study, data acquisition, or data analysis and interpretation; drafting or critically revising the manuscript for important intellectual content; final approval of the version to be published; and accountability for the accuracy and integrity of all aspects of the work.

Each author must take responsibility for their contributions and publicly affirm the manuscripts content. The sequence of authorship should reflect each contributors relative contributions and cannot be changed post-submission without written consent from all authors.

The Corresponding Author is responsible for all communication with the journal and for ensuring that the final manuscript reflects the required changes from editors and reviewers.

Ethics

Research must adhere to the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans. Scientific

misconduct, as defined by the Federal Research Misconduct Policy, includes data falsification, which refers to the fabrication, distortion, or selective reporting of findings, and plagiarism, which involves using anothers language, ideas, or work without permission or presenting it as original. Authors must ensure that no text has been inadvertently copied verbatim from previously published work.

Institutional Review Board Approval and Informed Consent: All human studies must have approval from an institutional review board. Signed informed consent from participants is mandatory. If applicable, a waiver of consent granted by the board should be explicitly stated in the manuscript. Articles lacking these requirements will not be considered for publication. Patient consent and ethical approval details, including protocol numbers and dates, must be included in all research articles.

Patient Privacy: Informed consent must be obtained from all participants (or their guardians for minors under 16) and explicitly stated in the manuscript. Identifiable information, such as names, initials, or hospital numbers, should not be included unless essential for scientific purposes. In such cases, written informed consent for publication must be obtained and documented.

Use of Artificial Intelligence (AI): Authors must disclose any use of artificial intelligence (AI) tools in research, data analysis, manuscript drafting, or editing. The statement should specify the AI tool used, its purpose, and the extent of its contribution while ensuring that human oversight, critical interpretation, and intellectual input remain central to the research. AI-generated content must be verified for accuracy, and authors bear full responsibility for any errors or ethical concerns arising from its use.

Reporting Guidelines

Authors should adhere to following guidelines while preparing manuscript,

Guideline	Type Of Study
STROBE	Observational Studies Including Cohort, Case-control, And Cross cross-sectional Studies
CONSORT	Randomized controlled trials
SQUIRE	Quality improvement projects
PRISMA	Systematic reviews and meta-analyses
STARD	Studies of diagnostic accuracy
AGREE	Clinical Practice Guidelines
SPIRIT	Protocol Reporting
COREQ	Qualitative Studies

For other study types, reporting guidelines can be accessed at https://www.equator-network.org/reporting-guidelines/.

Conflict of interest and financial support

The situations where conflict of interest arises are when an author (or the author's institution), reviewer, or editor has financial or personal relationships that inappropriately influence (bias) his or her actions (such relationships are also known as dual commitments, competing interests, or competing loyalties). The potential of influences can vary from the insignificant ones to the significant ones where the results of the reviews or publication process. The conflict of interest can also occur if an individual believes that the relationship affects his or her scientific judgment. Financial relationships (such as employment, consultancies, stock ownership, honoraria, paid expert testimony) are also one of the identifiable conflicts of interest and the most likely to undermine the credibility of the journal, the authors, and of science itself. The other potential conflicts can occur for other reasons, such as academic rivalry, personal relationships and

intellectual desire. (Source: International Committee of Medical Journal Editors ("Uniform Requirements for Manuscripts Submitted to Biomedical Journals"), February 2006) A brief statement on source of funding and conflict of interest should be included in the manuscript.

Data Sharing Policy

The authors must submit a statement of data sharing that, the data pertaining to original articles, published in "Healthline" journal must be provided, without restrictions, whenever asked for by the editorial board of the journal. Failure to comply this condition may lead to rejection of the article.

Charges are applicable to all the **manuscripts accepted for publication** in Healthline Journal from 1st April 2023 onwards.

	1st Author is an IAPSM Member	1st Author is not an IAPSM Member
Original Article	5000	7000
Short Communication	5000	7000
Review Article	5000	7000
Letter to Editor	3000	5000
Editorial	NIL	NIL
Other	5000	7000

The charges as mentioned above can be paid by cheque / online transfer in favour of below mentioned account.

Name of Account	: HEALTHLINE IAPSMGC
Account Number	: 34898725422
IFSC Code	: SBIN0003043
Address	: State Bank of India, Civil Hospital Precincts Branch, Opp. B. J. Medical College, PO Bag No. 1, Ahmedabad-380016
MICR Code	: 380002011

Manuscript Processing Charges

The manuscript processing charges (APC-Article Processing Charges) are applicable **only at the time of acceptance of the manuscript** for publication in "Healthline" journal, as mentioned below. Authors are instructed to avoid doing upfront payment at the time of submission of manuscript.

Following online payment of charges, the receipt of fund transfer should be emailed to editorhealthline@gmail.com.

If paid by cheque, duly prepared cheque should be sent to **Dr. Viral Dave, Editor in Chief, Community Medicine Department, GCS Medical College, Opp. DRM Office, Nr. Chamunda Bridge, Naroda Road, Ahmedabad-380025, Gujarat, India.**

Creative Commons Licensing

For More Information, scan this QR code

The editorial board is highly obliged to the following reviewers for their kind co-operation in review of manuscripts published in Volume 16 Issue 1,2,3 & 4 of ''Healthline Journal''

Dr Akhila K	Dr Jay Sheth	Dr Parimal Patel
Dr Anand Shah	Dr Kalpita Shringarpure	Dr Parth Thakar
Dr Anas Patni	Dr Khushbu Makadiya	Dr Parul Katara
Dr Anjali Modi	Dr Kishor Sochaliya	Dr Paulami Nag
Dr Ankit Sheth	Dr Krupal Joshi	Dr Pradeep Aggarwal
Dr Anupam Benerjee	Dr Kunj Gajjar	Dr Pradeep Kumar
Dr Arihant Jain	Dr Latika Tarun Chugh	Dr Priti Solanky
Dr Astha Vala	Dr Mallika Chavda	Dr Priyanka Devgun
Dr Bharatkumar Patel	Dr Mamtarani Verma	Dr Radhika Kuthari
Dr Bhargav Dave	Dr Manisha Gohel	Dr Rashmi Sharma
Dr Bharti Koria	Dr Mansi Patel	Dr Sanjukta Ghosh
Dr Bhavik Rana	Dr Mausumi Basu	Dr Sanyogita Gupta
Dr Brijesh Gadhethariya	Dr Medha Mathur	Dr Saurabh Kashyap
Dr Deepak Sharma	Dr Mihir Rupani	Dr Shailesh Prajapati
Dr Dinesh Kumar	Dr Mittal Rathod	Dr Shaili Vyas
Dr Dipesh Zalavadiya	Dr Mohit N. Makwana	Dr Sonal Shah
Dr Donald Christian	Dr Naresh Chauhan	Dr Sukesha Gamit
Dr Ghanshyam Ahir	Dr Naresh Makwana	Dr Tejas Shah
Dr Gneyaa Bhatt	Dr Navya Gangadharan	Dr Tuhina Shree
Dr Harsh Patel	Dr Neel Desai	Dr Tulika Goswami
Dr Hemangini Shah	Dr Neha Patel	Dr Urvinkumar Shah
Dr Himadri Bhattacharjya	Dr Nilesh Thakor	Dr Urvish Joshi
Dr Hinal Baria	Dr Nirav Joshi	Dr Viral Shah
Dr Hitesh Shah	Dr Nirmika Patel	

HEALTHLINE JOURNAL

A National Journal of

Indian Association of Preventive and Social Medicine managed by IAPSM-GC

Volume : 16 Issue : 4 (October-December 2025)

INDEX