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# HEALTHLINE



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### 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.

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## Digital Health Literacy and Women in India: Bridging the Chasm for a Healthier Tomorrow

Avantika Gupta<sup>1</sup>, Aditi Chandrakar<sup>2</sup>, Abhiruchi Galhotra<sup>3</sup>

<sup>1</sup>Senior Resident, <sup>2</sup>Assistant Professor, <sup>3</sup>Professor, Department of Community and Family Medicine, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India

**Correspondence:** Dr. Abhiruchi Galhotra, Email: abhiruchigalhotra@aaimsraipur.edu.in

### Abstract:

Digital health technologies (DHTs) can be transformative in the delivery and outcomes of healthcare, especially for women in countries like India. Despite their potential, their efficacy is undermined by existing gender-based disparities in autonomy, education, and access. This paper seeks to discuss the socio-cultural and technological factors which form barriers to women's digital health literacy in India. Data reveals that women are disproportionately marginalized from accessing telemedicine, mHealth applications, and health information systems due to a widening gender disparity in smartphone ownership and internet usage. In India, where socio-cultural, economic, and gender-based disparities are deeply rooted, improving digital health literacy among women presents both a challenge and a crucial opportunity. Closing these gaps is critical for fostering inclusive frameworks that advance gender-sensitive, participatory healthcare systems in alignment with the Sustainable Development Goals.

**Keywords:** Digital Health Literacy, Gender Gap, Women

### Introduction:

*“A woman’s health should never depend on someone else unlocking her phone.”*

In India’s drive for universal health and digital inclusion, are we confusing connectivity with empowerment? If millions of women now have mobile phones, why are so few able to navigate a health app or verify medical information online? Can we call it progress when a wife must rely on her husband to interpret a government health message sent to *her* phone? Is digital inclusion merely about connectivity or is it about comprehension, confidence, and choice?

As India accelerates toward a digital health future, these questions compel us to confront an uncomfortable truth: digital presence without digital power is not

progress. Its time to close the gap not just in connectivity, but in capability.

In the 21<sup>st</sup> century, digital technology has significantly transformed how societies engage with health systems. Innovations such as telemedicine, mobile health applications, digital health records, and AI-powered diagnostics have become integral to healthcare delivery. However, the extent to which these tools empower individuals largely depends on their digital health literacy the ability to seek, understand, and utilize health information from digital platforms. In India, where socio-cultural, economic, and gender-based disparities are deeply rooted, improving digital health literacy among women presents both a challenge and a crucial opportunity.

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### Understanding Digital Health Literacy

Digital health literacy is a multifaceted concept that encompasses the ability to seek, find, understand, and appraise health information from electronic sources and apply this knowledge to addressing or solving health problems.<sup>[1]</sup> In shaping digital health literacy, key influences include intrapersonal factors such as demographics and socio-economic status, interpersonal factors like social support and networks, and broader social and cultural contexts.<sup>[2,3]</sup>

### The Digital Health Landscape of India

The Digital India initiative in 2015 accelerated digital infrastructure. The National Digital Health Mission (NDHM) was established in 2020, with the goal of developing a digital health ecosystem, which was subsequently renamed as the Ayushman Bharat Digital Mission (ABDM) in 2021.<sup>[4]</sup> The integration of Unified Health Interface (UHI) and digital health IDs signalled a major shift toward accessible, patient-centric care. India has also pioneered innovative digital health solutions such as CoWIN, Aarogya Setu, e-Sanjeevani, Tele MANAS, NIKSHAY, Mother and Child Tracking System, ANMOL and many more that have collectively improved accessibility, affordability and efficiency in healthcare delivery, though challenges such as gender gaps and rural access to digital literacy still exists.

### Why Women Need Digital Health Literacy?

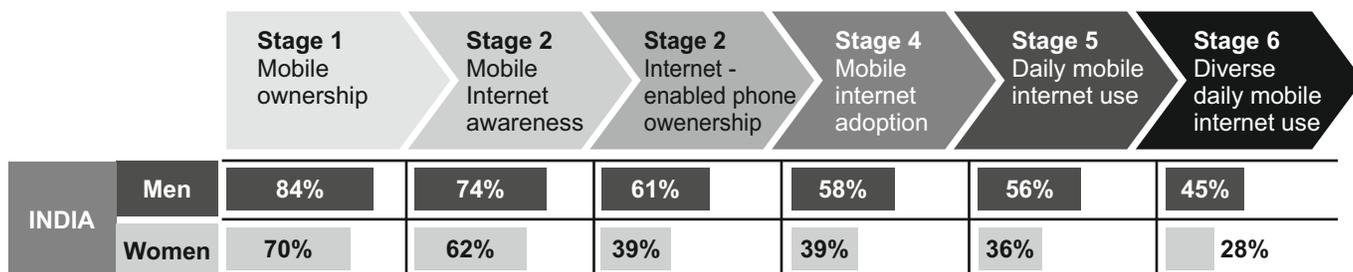
Digital health literacy enables women to access accurate, stigma-free information on reproductive, maternal, and sexual health. Women are able to track their health, avail teleconsultations, and get timely reminders for vaccinations, antenatal care, nutrition and monetary benefits through digital platforms such as

mMitra, Kilkari, eSanjeevani, Poshan Tracker, and Janani Suraksha Yojana apps. Evidence shows that digital technologies improve access to screening programs, encourage healthier lifestyle choices, and increase womens engagement with their personal health.<sup>[5,6]</sup> In disciplines like Psychiatry, Endocrinology, and Gynaecology, Digital Health Technologies (DHTs) have demonstrated a strong correlation with women’s health, empowerment, and gender equality. Their main influence is on literacy, health education, and skill development (reported frequency of occurrence [RFO] 93.6%, 95% CI: 82.5-98.7). Additionally, DHTs promote financial empowerment through cost-effective care and enhanced financial literacy (RFO 10.6%) and social connectivity with families and healthcare providers (RFO 10.6%).<sup>[6]</sup> DHTs empower women by improving healthcare access, maternal health, and decision-making, thereby enhancing health outcomes and supporting progress toward the Sustainable Development Goals.<sup>[5,6]</sup>

### The Gender Divide in Digital Access

According to the **Global System for Mobile Communications (GSMA) Mobile Gender Gap Report 2025**, gender gap in smartphone ownership has widened from 32% in 2023 to 39% in 2024.<sup>[7]</sup> According to National Family Health Survey-5, only 33% of women in India have ever used the internet, compared to 57% of men. In rural areas, the gap is wider 49% of men vs. just 25% of women.<sup>[8]</sup> Gender gap in internet literacy has been seen most in the state of Telangana followed by Chhattisgarh.<sup>[9]</sup> Unless the gaps in women’s mobile phone ownership and use are well understood and addressed, digital health interventions threaten to exacerbate existing health inequalities.

Figure 1 : Mobile Gender Gap Report 2025<sup>[7]</sup>



### Implications on Health Outcomes

Digital divide directly affects health-seeking behavior, particularly where digital solutions are supplementing or replacing conventional health services. In the wake of the COVID-19 pandemic, for instance, telemedicine became a lifeline. Yet, numerous women could not take advantage of remote consultations because they lacked digital know-how, were unwilling, lacked devices, or had no privacy at home.<sup>[10]</sup>

Where women are not digitally skilled, connected, or confident, they lose access to important health services such as telemedicine and web-based counselling. Research has shown women's phone ownership being associated with better RMNCH indicators.<sup>[11,12]</sup> Digital divide severely limits the potential of preventive care, antenatal and postnatal services, sexual and reproductive health counseling, and chronic disease management all of which are critical to women's health and empowerment. While healthcare systems go digital, women lacking digital literacy get left behind, widening health inequities and resulting in late diagnoses and poorer health outcomes.

### Barriers: Beyond Access

Women in India encounter several barriers in accessing and utilizing digital health technologies effectively, which restricts their entry into developing healthcare systems. Such hindrances are based on social, economic, and technological inequalities.<sup>[11,12]</sup>

- **Limited smartphone or internet access** on account of cost, unreliable connectivity, socio-economic status, geographic location etc.
- **Digital Illiteracy:** Despite having smartphones, many women are not able to use them for other purpose other than making calls. They are not aware of available digital health services or what benefits they can provide. They often depend on male members of their family or their children for access to digital tools.
- **Socio-cultural Norms:** Deep-rooted patriarchal mindsets and women's limited decision-making power persist in constraining their control over technology and health choices.

- **Language Constraints:** English or Hindi is predominantly the language of digital content, yet most women are conversant only in local dialects.
- **Privacy Concerns:** Inability to have private space to watch digital content or access telehealth services restricts women's openness to digital platforms.
- **Trust Deficit:** The internet is full of false information, and someone who lacks digital skills may easily believe and follow harmful health advice.
- **Time Constraints:** Family and household obligations often limit women with scarce time for interactive digital health facilities.

### Government and Civil Society Interventions

The policy landscape of India has recognized the difficulties involved in women obtaining digital health services. Projects like the National Digital Health Mission, eSanjeevani teleconsultation platform, and mMitraa maternal health information voice call service utilizes mobile technology to enhance healthcare delivery. The Digital Saksharta Abhiyan (DISHA) and the Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA) are some programs that specialize in improving rural communities' digital literacy, especially targeting women. National Digital Literacy Mission, Mahila E-Haat, DIGI LAMP, Digital Didi, Internet Saathi and various others are digital initiatives for women launched by Government of India.<sup>[12]</sup>

Civil society organizations (CSOs) and grassroots networks help bridge such gaps. For example, the Self-Employed Women's Association (SEWA) and the Digital Empowerment Foundation (DEF) have shown that community-based digital literacy programs can raise women's health knowledge and decision-making capability considerably.

In addition, state-specific programs such as Uttar Pradesh AI Pragya program seek to provide digital literacy to a cross-section of people, including women in Self-Help Groups, thus facilitating digital inclusion and empowerment.

These collaborative efforts highlight the need for focused interventions and participatory policies to

ensure that digital health technologies can serve all sections of the population, especially women.

### Enablers and Opportunities

Despite these efforts, significant implementation gaps persist. Many digital health programs lack integration of gender perspectives in their design, delivery, and monitoring processes. Despite these hurdles, there are bright spots of innovation and community engagement.<sup>[13]</sup>

- **Gender-Disaggregated Data:** Policies should be guided by strong data on women's access to and use of digital health tools by geographies and age groups.
- **Localization of Content:** Applications and health portals need to give prominent place to multilingual support, audio-visual modes, and culturally relevant messaging to overcome literacy barriers. Since there are literacy limitations, IVR (interactive voice response) services in local languages are found to be effective in communicating maternal and child health information.
- **Training and Empowerment of Frontline Health Workers:** ASHAs, ANMs, and Anganwadi workers can be trained not only to operate digital tools but to train the women they are working with producing a ripple effect in the community. Research indicates they are credible intermediaries and can bridge the digital divide.
- **Engagement of local leaders:** Engaging local stakeholders like women's Self-Help Groups and Panchayat Raj Institutions in the design and delivery of digital health literacy programs.
- **Digital Literacy Campaigns:** Targeted digital literacy programs that combine health education and skill-building are showing promising results in various states of India.
- **Curriculum development:** Integrate digital and health literacy into school curricula and adult education schemes, with special modules tailored for women.
- **Safe and Gender-Sensitive Digital Spaces:** Privacy, cybersecurity, and anti-harassment

measures must be central to any digital health platform targeting women.

- **Public-Private Partnerships:** Government agencies, technology firms, and NGOs can form partnerships to build sustainable, scalable digital health models.

### The Road Ahead: From Passive Recipients to Digital Health Leaders

In order to make India's digital health revolution inclusive in reality, a gender-responsive and intersectional strategy is a must. Policies should integrate gender equity into the center of digital health programs, and not as an afterthought. Strong monitoring through the use of gender-disaggregated data can facilitate assessing progress and informing improvements. Equally important is investing in research to comprehend the varied needs of women whether tribal, elderly, disabled, or belonging to rural poor communities and to develop scalable, context-specific innovations that empower them as active users and leaders in digital health.

### Conclusion:

Women's digital health literacy in India is not merely a matter of Technology- it is social concern. Although mobile health services, telemedicine, and digital platforms hold transformative promise, gender gaps in digital access, skills, and autonomy Persist and limit women's meaningful participation.

As India accelerates its digital health mission, inclusion must be intentional. Unless guided by a gender-sensitive strategy, digital health interventions risk perpetuating existing inequalities. The moment is now to tap technology's potential using empathy, equity, and empowerment as guiding principles. Closing this gap requires inclusive policy, grassroots engagement, and sustained investment. As Melinda Gates aptly said, "When we invest in women, we invest in the people who invest in everyone else."

### Declaration:

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## How Students Learn: Perspective of Medical Graduates about Teaching-Learning and Academic Performance

SupriyaDhakne-Palwe<sup>1</sup>, Sandeep Kadu<sup>2</sup>, Gaurang Baxi<sup>3</sup>, Shrunkhala Kaushik<sup>4</sup>, Mrunal Patil<sup>5</sup>, Madhuri Kanitkar<sup>6</sup>

<sup>1</sup>Professor & Head, Institute of Medical Education Technology and Teachers Training, and Convener, NMC Regional Centre, Maharashtra University Of Health Sciences, Nashik, India

<sup>2</sup>Controller of Examinations, <sup>3</sup>Dean (Academics), <sup>6</sup>Vice Chancellor, Maharashtra University of Health Sciences, Nashik, India

<sup>3</sup>AssociateProfessor, <sup>4</sup>Assistant Professor, Institute of Medical Education Technology and Teachers Training, Maharashtra University Of Health Sciences, Nashik, India

**Correspondence:** Lt. Gen. Dr. Madhuri Kanitkar (Retd), Email: mkanitkar15@gmail.com

### Abstract:

**Introduction:** This study investigates medical students' perceptions of teaching-learning experiences across ten medical colleges affiliated with the Maharashtra University of Health Sciences (MUHS), focusing on high resource colleges (HRCs) and low resource colleges (LRCs). **Objectives:** To assess the perceived quality of teaching-learning experiences among undergraduate medical students in HRCs and LRCs affiliated with MUHS, and to examine the association between these perceptions, self-reported academic performance, and compliance with teaching schedules. **Methods:** A cross-sectional study was conducted among 1,024 undergraduate students selected from 10 out of 62 MUHS-affiliated medical colleges, using purposive sampling based on resource availability (5 HRCs, 5 LRCs). Data were collected via a validated 24-item questionnaire administered online. The sampling technique was convenience-based, and the response rate was approximately 14.6%. Statistical analysis included Chi-square tests to compare categorical variables. **Results:** Statistically significant differences were observed in compliance with planned teaching schedules and perceived quality of education between HRCs and LRCs ( $p < 0.05$ ). HRC students reported higher prevalence of  $>80\%$  self-reported attendance (53.7%) compared to LRC students (38.1%). Students from HRCs reported higher mean scores for perceived quality of education ( $4.2 \pm 0.5$ ) compared to LRCs ( $3.5 \pm 0.7$ ). Both groups favoured hybrid learning methods, but LRC students cited infrastructure deficiencies as barriers. **Conclusions:** The study underscores that resource availability correlates with student perceptions of teaching quality and schedule adherence.

**Keywords:** Academic Performance, Learning, Medical Graduates, Medical Students, Teaching

### Introduction:

The medical education landscape in India is witnessing revolution with changing roles of teachers and learners, stakeholder expectations, community needs and advancing educational technologies. In Competency Based Medical Education (CBME), the

outcome in terms of Competent Indian Medical Graduate (IMG) is explicitly defined with the mandatory certifiable skills and outcomes.<sup>[1]</sup> Students' academic performance is one of the most important aspects of assessing how well the curriculum is being delivered. Medical students are stakeholders who participate first-

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hand in the instruction provided by faculty. They experience first-hand how the process of learning is taking place. As a result, using student perceptions to evaluate the learning process can provide important information for evaluating academic processes.<sup>[2]</sup> The feedback and feed-forward interplay has a pivotal role in shaping the curriculum delivery.

Assessing the learning process by student perception can give valuable input to predict the academic achievement. Faculty's capacity and integrated modules are the most influential factors in medical students' academic performance, with learning experience being a key factor.<sup>[3]</sup> Medical students' opinions of instruction and training provide a solid foundation for improving and modifying medical education.<sup>[4]</sup> In India, medical education faces challenges including shortages of adequately trained faculty and issues with preparedness, as highlighted in a study conducted by Ananthakrishnan N.<sup>[5]</sup> The NITI Aayog, Govt. of India report 2023 by SahaManthran Pvt. Ltd. highlights challenges in faculty recruitment and preparedness in Indian medical colleges, emphasizing the need for systemic improvements.<sup>[6]</sup>

A previous study conducted by Hira R et al<sup>[7]</sup> in 2009 highlighted that medical students in Maharashtra viewed the medical education system as stagnant. Satisfaction level of student respondents for quality of teaching was 37.8%, while 92% students stated that the fundamental problem was the inability of the system to attract good, quality teachers. The reasons stated were low salaries, low level of job satisfaction, high level of bureaucracy, and high workload.<sup>[7]</sup>

Alongside the National Medical Commission, the role of health sciences universities is crucial in closely monitoring the availability of teaching learning resources, infrastructure, qualified and trained faculty, to ensure an effective and meaningful curricular delivery. The Maharashtra University of Health Sciences, Nashik (MUHS) oversees the educational standards of over 600 health sciences institutions, including around 62 medical colleges in the state of Maharashtra. For example, regular inspections of affiliated colleges are conducted at medical colleges, to ensure that the minimum standard

regulation with respect to teaching learning activities, faculty availability, resources and infrastructure are readily available at colleges.<sup>[8]</sup> Robust assessment processes including blueprinting, online question paper setting and assessment have been introduced by MUHS to ensure transparency and efficiency of results.<sup>[9,10]</sup>

Participating in faculty development programs has been made mandatory by the NMC as well as MUHS for all medical teachers. It is necessary to explore whether these policies have made any impact on teaching and learning at grass root level. Therefore, the present study was carried out primarily to assess the perceived quality of teaching-learning experiences among undergraduate medical students in High Resource Colleges (HRCs) and Low Resource Colleges (LRCs) affiliated with MUHS and a secondary objective to examine the association between these perceptions, self-reported academic performance, and compliance with teaching schedules.

#### **Methods:**

The present study was conducted among 10 affiliated medical colleges of MUHS, Nashik during November 2024- January 2025. Out of all affiliated medical colleges of MUHS, 5 colleges which fulfil the criteria for the faculty availability and teaching learning resources perfectly as per the National Medical Commissions Minimum Standard Requirements<sup>[11]</sup> based on the routine inspection records of MUHS were included as the high resource colleges and 5 lowest performers as per the MSR were included as the low resource colleges. Resources and infrastructure availability at the medical colleges is a dynamic process. The classification as HRCs or LRCs was done based on the prevailing recent inspection reports. The data on students performance in the final University exams from these 10 identified colleges was collected from examination department of MUHS. Ethics committee approval was obtained for the present study (MUHS/EC/58/2024 dated 22/10/2024) based on the location of the investigators team. A questionnaire exploring the perceptions of medical students and the actual practices being followed at colleges was created and peer-validated by experts who have completed the Advanced Course in Medical Education, (ACME) or the

FAIMER Fellowship. The Google form consisted of 24 closed and open-ended questions which were to be rated on a 5-point Likert scale. Participation of students was voluntary. Informed consent was collected before conduction of the study and anonymity of students maintained. Questions were based on timetable, communication and compliance to subject-wise teaching learning schedule, student attendance, preferred TL methods and implementation of various elements of competency based medical education (CBME).

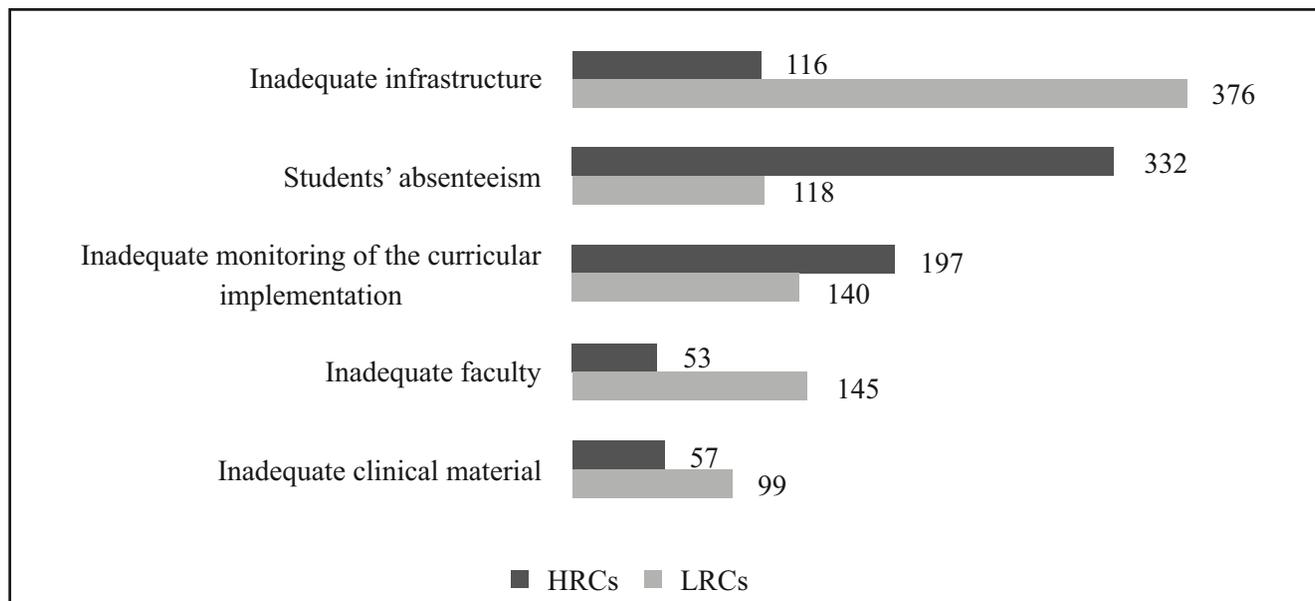
The student general secretaries of the above 10 colleges were contacted and a primary zoom meeting was conducted with them to inform them regarding the purpose of the survey. The identity of the respondents was not collected to ensure that genuine responses are received. Through these student general secretaries, the

questionnaire was circulated as a Google form among all undergraduate students of the identified 10 colleges. Data collected was analysed using appropriate statistical methods.

**Results:**

In the present exploratory study, 1024 students responded out of an estimated 7000 undergraduate students across the ten selected colleges. The response rate was low possibly due to the voluntary nature of the participation. Amongst these, 554 responses were received from 5 High Resource Colleges (HRCs) (n1= 3800 students, response rate = 14.58 %) and 470 responses were received from 5 Low Resource Colleges (LRCs) (n2= 3200 students, response rate = 14.69 %). The Median NEET rank of the respondents from HRCs was 10,091 and that of LRCs was 38,200.

**Figure 1: Perceived Reasons for Non-compliance to Teaching Learning Schedules by students (n = 1024)**



**Table 1: Distributions of the LRCs and HRCs students according to preferred mode of learning for theoretical concepts (n = 1024)**

Preferred mode of learning for theoretical concepts	LRCs (%) n = 470	HRCs (%) n = 554	Chi-square test
Hybrid	285 (60.54%)	395 (71.28%)	Chi Square = 13.0 p=0.0015
Offline	93 (19.82%)	82 (14.89%)	
Online	92 (19.64%)	77 (13.83%)	
Total	470	554	

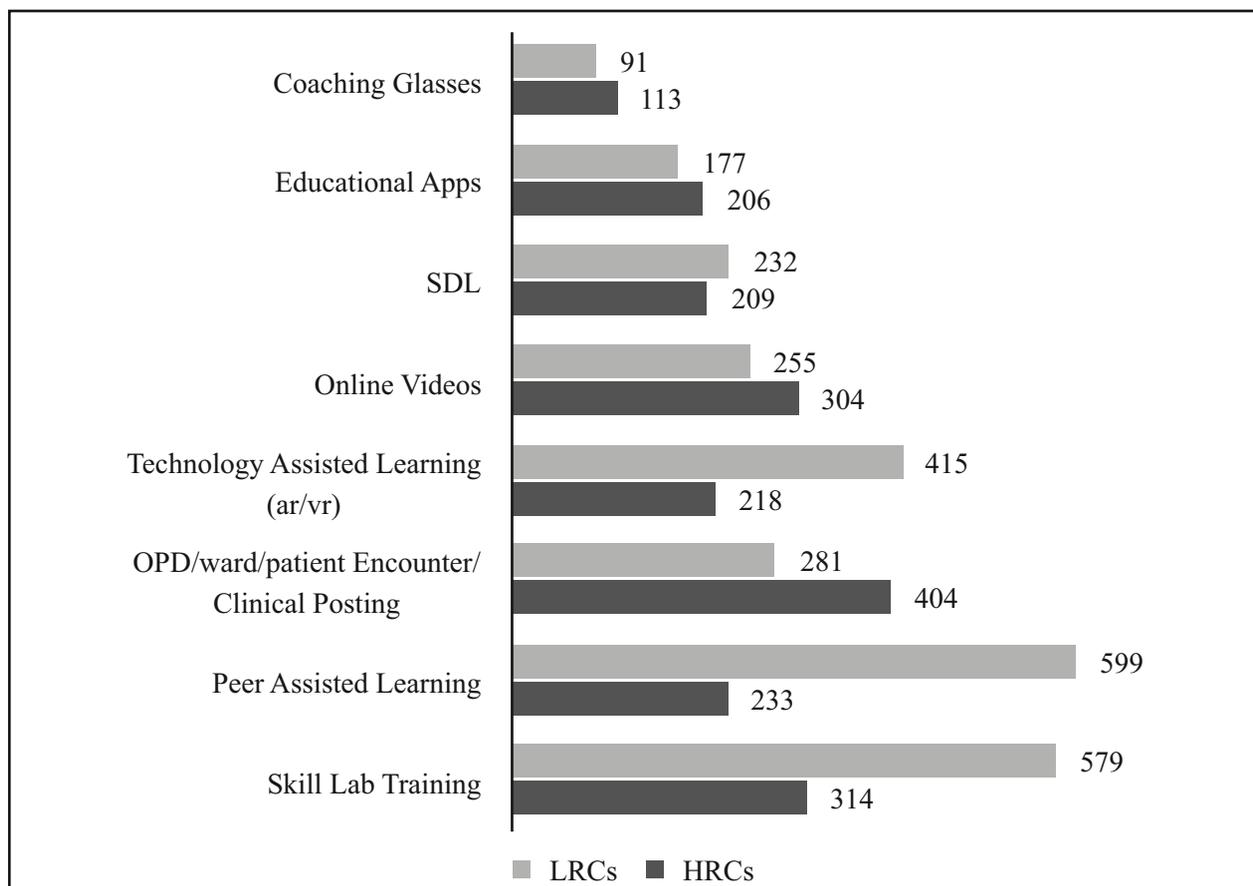
A total of 404 (72.92%) of HRC students and 333 (70.85%) LRC students stated that the annual academic calendar was displayed on the college website. Regarding compliance to TL schedule, students reported maximum compliance to planned TL schedules for the Pre-clinical subjects, Community Medicine, Pharmacology, Forensic Medicine and Toxicology, Pathology, Microbiology followed by the clinical subjects. The top reasons stated by the students for non-compliance to TL schedule (Fig. 1) were inadequate infrastructure, faculty availability and limited clinical resources for the LRCs and student absenteeism for the HRCs. This was contrary to the self-reported attendance of >80% by the students of HRCs. Information on students self-reported attendance was solicited for the past 6 months of the data collection. Around 53.69% students of HRCs self-reported their approximate attendance > 80% as compared to 38.09% of the LRCs students (Standard Error of difference = 3.128, Z = 4.987, p<0.0001).

**Preferred mode of Teaching-Learning**

Upon enquiry on the preferred mode of learning for theoretical concepts- between online/ offline/ hybrid mode, maximum students from LRCs and HRCs preferred a hybrid mode. The proportion of students opting for hybrid mode from HRCs were significantly higher than those from the LRCs. (Table 1). The online media utilized by students included online lectures/videos -99 (17.87%) in the HRCs and 76 (16.17%) in the LRCs, Educational apps -13 (2.35%) in HRCs and 9 (1.62%) in LRCs. Augmented reality visuals 5 (0.9%) in HRCs and 4 (0.85%) in LRCs

Regarding the most interesting TL method that students would like to learn from, there was a significant difference in the responses of students from HRCs and LRCs. Students from the LRCs stated that they would like to learn by skill lab training, peer assisted learning and technology assisted learning AR/VR. While the students from HRCs stated clinical teaching encounters

**Figure 2: Teaching Learning method which interests students the most (n = 1024)**



like OPD, ward, clinical posting, followed by skill lab training and online videos as their preferred TL methods. (Figure 2). (Chi Square = 252.5, p=0.000).

**Overall quality of teaching and learning**

The students were asked to rate the overall quality of teaching and learning at their respective institute, on an ordinal scale from poor to excellent.

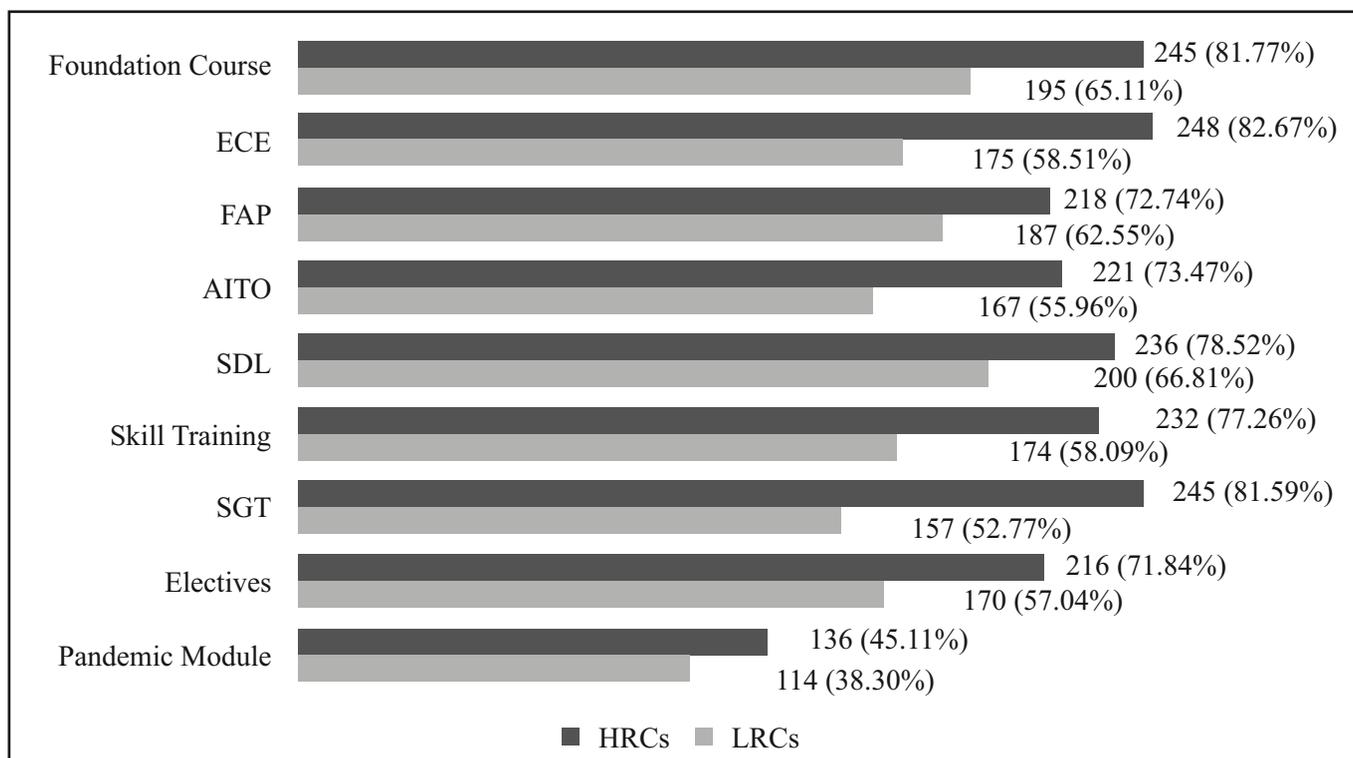
Around 312 (56.22%) of the HRCs students reported the TL quality as Excellent or Very good as compared to 186 (20.64%) of the LRCs. Average or Poor TL quality was reported by 378 (42.13%) students of the LRCs and 87 (15.68%) students of the HRCs. (Chi Square = 154.8029, p=0.0000)

Perceived quality of implementation of CBME Components were assessed. On a 5-point Likert scale > 75% of HRCs students responded, Strongly agree and Agree for elements like Foundation course, early clinical exposure, self-directed learning, skill training and Small group teaching. The difference between the responses of

HRC and LRC students was not statistically significant, (Chi-square=6.9014, p=0.5473) The most adverse response regarding the CBME implementation was pertaining to the pandemic module.

Students were asked regarding the improvements to further improve the teaching learning environment of their institute. For students from the LRCs, >2/3<sup>rd</sup> inputs were pertaining to improvements needed in the Infrastructure such as TL facilities, library, skill lab, practical labs, availability of instruments, equipment, cadavers, etc. Few students suggested that the practical classes should be time-relevant; e.g., Sahlis Hb estimation/ manual cell count should be replaced with current methods. The suggestions from the students of the HRCs were- Lecture/ Theory component should be conducted online, more time should be spared for self-study, SGT sessions should be more than lectures, guidance for SDL should be provided. Skill lab training, AR/ VR, Research exposure were also suggested by the HRC students.

**Figure 3: Perceived quality implementation of CBME components (n = 1024)**  
 (% of students who 'Strongly agree + Agree')



\*ECE: Early Clinical Exposure, FAP: Family Adoption Program, AITO: Alignment and Integration Topics, SDL: Self-Directed Learning, SGT: Small Group Teaching

**Discussion:**

This study explored the perceptions of medical students regarding their teaching-learning experiences, and comparing those from high resource colleges (HRCs) and low-resource colleges (LRCs). The data, gathered from 1,024 respondents across 10 medical colleges, shed light on differences in compliance with teaching-learning (TL) schedules, preferred teaching methods, attendance, and the overall quality of education. These findings provide valuable insights into how institutional factors and students preferences impact academic outcomes.

**Factors Affecting Compliance with Teaching-Learning Schedules**

Compliance with planned TL schedules varied significantly between pre-clinical, para-clinical, and clinical departments. Pre-clinical subjects demonstrated the highest compliance rates, which may be due to more structured and predictable course content. However, reasons for non-compliance differed between HRCs and LRCs. LRCs cited inadequate infrastructure, faculty, and clinical material as major barriers, highlighting disparities in resources between institutions. These findings resonate with a study by Hamdy et al<sup>[13]</sup>, which emphasized the role of adequate infrastructure in maintaining consistency in academic activities. Conversely, students in HRCs felt that student absenteeism is a significant issue. This Suggests that despite resource availability, student engagement remains a challenge in these institutions.

**Attendance Patterns and Self-reported Data**

A noteworthy discrepancy was observed between self-reported attendance and actual compliance to TL schedules. For instance, 53.69% of students from HRCs reported attendance levels above 80%, compared to 38.09% in LRCs. This difference may reflect varying levels of motivation and academic discipline between the groups. Previous studies have similarly noted that higher-performing students tend to exhibit more regular attendance, which positively influences academic success.<sup>[14]</sup> This indicates that promoting consistent class

attendance could be an area of focus for enhancing performance, especially in LRCs.

**Preferred Teaching-Learning Methods**

Students from both HRCs and LRCs expressed a preference for hybrid learning methods for theoretical concepts, with 71.28% of HRC students and 60.54% of LRC students favouring this approach. Hybrid methods, which combine online and in-person instruction, have been shown to support diverse learning styles and enhance engagement.<sup>[15]</sup>

For learning complex concepts, students across both groups favoured online videos, group study, self-directed learning (SDL), and hands-on training. The popularity of interactive and visual aids like animations, 3D images, and augmented reality (AR) suggests a shift towards more immersive learning experiences. Such preferences mirror the findings of a previous which reported that technology-enhanced learning tools significantly aid in understanding difficult medical concepts.<sup>[16]</sup> Medical schools, especially LRCs, could benefit from integrating such resources to improve students' comprehension and engagement.

**Quality of Teaching-Learning Environment**

A stark difference was noted in the perceived quality of the TL environment between HRCs and LRCs. While 56.22% of HRC students rated their TL quality as excellent or very good, only 20.64% of LRC students did so. This difference underscores the role of institutional support and resource allocation in shaping students' academic experiences. The high proportion of LRC students reporting average or poor quality (42.13%) points to gaps in teaching methods and infrastructure. These findings are consistent with studies by Haris et al<sup>[12]</sup> and Bauzon et al<sup>[17]</sup>, which highlighted how disparities in educational resources can influence student satisfaction and performance.

The suggestions from LRC students predominantly focused on improving infrastructure, such as better TL facilities, libraries, and practical labs. On the other hand, HRC students emphasized the need for more self-directed and small-group learning sessions (SGT) and

guidance in SDL. This variation in feedback suggests that while LPCs need to address basic resource challenges, HRCs can focus on enhancing existing learning methods for greater student autonomy and engagement.

### **Conclusions:**

This study provides a comprehensive view of the perceptions of medical students regarding their teaching-learning experiences, highlighting differences between high- and low-resources colleges. Students in high-resource colleges (HRCs) reported better teaching-learning (TL) experiences, higher attendance, and more compliance with TL schedules compared to low-resource colleges (LRCs). This underscores the role of infrastructure, faculty availability, and institutional resources in shaping positive academic experiences. Both HRC and LRC students preferred hybrid modes of learning. Resource disparities have a profound effect on medical students' academic experiences, shaping everything from their perceptions of teaching quality to their ability to comply with schedules.

### **Limitations and Future Research:**

This study's findings should be interpreted in light of its limitations. The study was conducted among a limited number of colleges affiliated to the MUHS. The study used a convenience sampling method, which could limit the representativeness of the sample population and introduce selection bias. Certain groups of students may have been overrepresented or underrepresented owing to voluntary participation. Low response rate further challenges the generalizability of the results.

Self-reported data may have introduced biases where students might have chosen responses, they deemed favourable rather than their genuine opinions. Factors like students prior exposure to CBME, institutional teaching methodologies, variability in the NEET ranks at admission, parallel means of learning like online or coaching classes, presence versus absence of post-graduate residents assisting in undergraduate teaching, availability of clinical material could be potential sources of bias.

Future research could include a broader range of institutions to assess regional variations in student perceptions. Inclusion of faculty perceptions may be included further. Additionally, longitudinal studies could explore the long-term impact of specific interventions aimed at improving academic performance in different institutional contexts.

### **Declaration:**

Funding: Nil

Conflict of Interest: Nil

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## Family Caregivers' Perspective for Cancer Care in a Tertiary Care Centre of Assam

Sagolsem Marycharan Devi<sup>1</sup>, Tulika Goswami Mahanta<sup>2</sup>

<sup>1</sup>Post-Graduate Student, <sup>2</sup>Professor, Department of Community Medicine, Assam Medical College, Dibrugarh, India

**Correspondence:** Dr. Sagolsem Marycharan Devi, Email: marycharansagolsem@gmail.com,

### Abstract:

**Introduction:** Family caregivers (FC) of patients with cancer has to undergo a lot of difficulties while taking care of the patients especially during advanced stage and often face burnout. **Objective:** To assess cancer patient's caregivers' perspective in a tertiary care centre of Dibrugarh, Assam. **Methods:** A Cross-sectional mixed method study was done among. Sample size was 180. Patients with cancer and their primary caregivers in a Tertiary Cancer Centre of Assam were enrolled between May-November 2024. Pretested and predesigned questionnaire was used to collect data from caregivers of cancer patients. Zarit Burden Interview (ZBI) format was used for assessing burden of caregivers. In depth interview of 20 caregivers (till saturation level) was done and the data collected was used for qualitative study. Analysis was done using SPSS 25 and Atlas TI. **Result:** A total of 155 participated in the study. Mean age of the caregivers was  $42.26 \pm 11.84$  years and mean Zarit Burden score of caregivers was  $36.44 \pm 9.65$ . Majority (103, 67%) caregivers reported mild-to-moderate burden, while 41 caregivers (26%) reported moderate-to-severe burden. Financial constrain, lack of social and emotional support, communication challenges emerged as major themes in qualitative study. **Conclusion:** Financial and emotional strain, dependency, anxiety and stress need to be addressed with holistic implementation of community-based interventions such as different welfare scheme, strengthened support system and communication interventions.

**Keywords:** Cancer, Caregiver Burden, Family caregiver, Mixed method study, Zarit Burden

### Introduction:

Cancer is growing as a major cause of morbidity and mortality worldwide including India.<sup>[1]</sup> As per the Global Cancer Observatory (GLOBOCAN) estimates, the total number of incident cancer cases in the year 2020 were 19.3 million worldwide with India ranking third after China and USA. GLOBOCAN predicted that cancer cases in India would increase to 2.08 million, accounting for a rise of 57.5 per cent in 2040 from 2020.<sup>[2]</sup> India's largest cancer incidence is found in the North-Eastern (NE) area, which is also plagued by a higher prevalence of risk factors and a lack of effective cancer treatment

facilities.<sup>[3]</sup> With advances in cancer treatments, the course and prognosis of cancer have changed, so the patients diagnosed with advanced cancer can live for a relatively long period.<sup>[4]</sup> Family members and other unpaid caregivers are expected to increase as the number of patients with advanced cancer rises and their prognosis improves.<sup>[5]</sup> Family members and caregivers are also affected by cancer and cancer treatment, not just the patients.<sup>[6]</sup>

Informal or family caregivers are defined as those who provide essential support and medical care to persons with cancer, disability, injury, or chronic

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condition in home and community-based settings. They are family members, friends, or neighbours that provide unpaid care for patients; they may lack the emotional readiness for caregiving and have little to no official training in it. By meeting patients' needs both inside and outside of the hospital, family caregivers play a crucial role in today's healthcare system. Informal caregivers for cancer patients may help with daily living activities (e.g., dressing, bathing, and feeding) and instrumental activities of daily living (e.g., cooking, cleaning, and managing finances) as well as managing the patient's medications, arranging medical visits, and keeping friends and family informed.<sup>[7]</sup>

Caregivers of cancer patients providing higher levels of support are more likely to report negative outcomes, less likely to be effective partners in the patient's care, and are more likely to postpone their own health care needs.<sup>[8]</sup> As caregivers are sometimes required to provide care which is beyond their personal resources or capacity, they are more likely to have poor wellbeing, financial challenges, and psychological consequences such as burden, anxiety, depression, and distress.<sup>[9]</sup> With progression of disease, patients dependency on their FCs increases.<sup>[7,10]</sup> Therefore this study was planned to assess the burden of caregivers of cancer patients attending the Dibrugarh Cancer Centre by using Zarit Burden Interview format.<sup>[11]</sup>

### Methods:

An observational cross-sectional study with mixed method design was conducted in a tertiary care hospital of Dibrugarh, Assam during May-Nov 2024.

**For quantitative study:** Consenting primary family caregivers of patients with cancer were interviewed using Zarit Burden Interview (ZBI).<sup>[11]</sup> Consecutive sampling was used and those not being able to communicate due to language barrier were excluded.

**Sample size:** Sample size calculation was done based on previous study by Mishra et al.<sup>[1]</sup> where, proportion of caregivers with mild to moderate burden was 70.22%. Hence, considering 95% confidence interval and assuming 10% non-response rate, the required sample size becomes 180.

**Ethical approval:** Obtained from Institutional Ethics Committee (Human) of Assam Medical College, Dibrugarh, Assam and written informed consent of all participants were taken.

**Data collection:** Pretested and predesigned questionnaire was used to collect data from caregivers of cancer patients.

**Study tool:** To assess the burden of the caregivers, Zarit Burden Interview (ZBI) format was used. The scale consists of 22 items. Each item on the interview was a statement which the caregiver was asked to endorse using a "5-point scale". Response options were "0 (Never)", "1 (Rarely)", "2 (Sometimes)", "3 (Quite frequently)", "4 (Nearly always)". Scoring key was "0-20 = little or no burden", "21-40 = mild to moderate burden", "41-60 = moderate to severe burden" and "61-88 = severe burden". The ZBI-22 is a widely used and well validated test in numerous previous studies, with a Cronbach's  $\alpha$  of 0.92 in the original scale.<sup>[12]</sup> English version translation of ZBI was used for the study. ZBI was self-administered. However, patients who were unable to read or write were interviewed by the first author.

**For qualitative study:** Those caregivers identified as having moderate to severe and severe burden from the ZBI scores of the quantitative study were selected for qualitative study. Data were collected through in-depth semi-structured and face-to-face interviews. A total of 20 interviews were conducted in total, till data saturation was achieved.

**Data analysis:** The information so collected was fed into a computer using SPSS 25 version. Uni-variate analysis was carried out. Qualitative study results were analysed using Atlas Ti.

### Results:

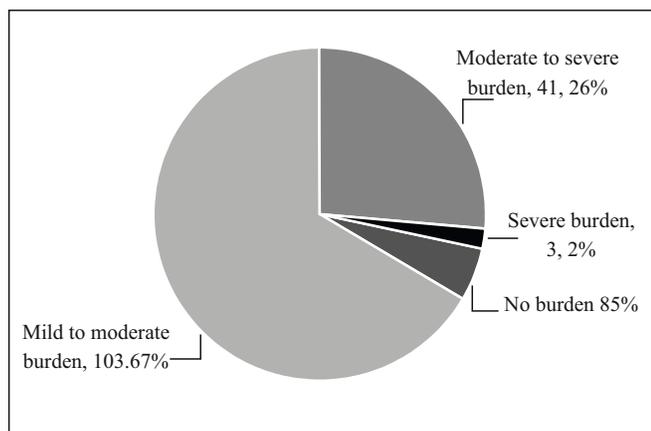
A total of 155 caregivers of patients were included with response rate of 86%; comprising of 67 (43.2%) males and 88 (56.8%) females. Reasons for non-response was not consenting and language barrier as in Northeast India many languages and dialect was used and all comes to this tertiary care center for health care. Average age was 42 years, ranging from 18 to 65 years. Majority of caregivers (116, 74.8%) were married and 72

(46.5%) were living in joint families, Hindu (147,95%) by religion, residing in rural areas (110,71%) with socioeconomic class III or IV as per BG Prasad classification. The average age of patients was  $51.60 \pm 11.22$  years and majority were female by gender (98,63.2%). Mean duration of cancer of the patients since diagnosis was  $10.59 \pm 10.76$  months.

The most common cancers among the sampled patients were breast cancer (78, 50.3%), colon cancer (30, 19.4%), gall bladder cancer (20, 12.9%) and stomach cancer (14, 9%). Other cancers like oral cancer, leukaemia etc. were also found.

**Quantitative part:** Burden among family caregivers was calculated using Zarit Burden Interview (ZBI) format. Little or no burden was reported in 8 (5%) caregivers while 103 (67%) caregivers reported mild to moderate burden and 41 (26%) caregivers reported moderate to severe burden. Severe burden was found only in 3 (2%) caregivers. Mean burden scores as assessed by ZBI was  $36.44 \pm 9.65$  (median=37). On univariate analysis, no statistically significant association of burden on caregivers with caregivers' (and patients') characteristics was seen.

**Figure 1: Caregivers burden based on Zarit Burden Interview score (ZBI) (n= 155)**



**From qualitative study:** Data collected from the in-depth interview conducted with twenty participants were analyzed. Data collection done till saturation level attained. Core themes that emerged were: Emotional and Psychological Effect, Effect on Personal Life, Coping Strategies and Barriers and Challenges

## Theme 1: Emotional and Psychological Effect

### Sub-themes:

- **Financial Strain:** Caregivers reported financial burden due to medical expenses and loss of employment opportunities. These add to the financial woes which according to the caregivers is a cause of concern.

“I have already spent most of my savings on her treatment and now I am afraid that I might not be able to afford her further treatment.” - 47 years old husband.

- **Burnout and Constant Care Demands:** Many caregivers experience exhaustion from 24/7 caregiving responsibilities. They express that the constant nature of care giving responsibilities cause physical as well as psychological exhaustion among them which take a toll on their overall health.

“Ever since he has been diagnosed with cancer, I have been constantly taking care of him. I am tired all the time and rarely get to sleep.” - 40 years old female

- **Emotional Toll of Dependency:** The emotional burden of providing care for a completely dependent individual was a recurring concern as mentioned by the caregivers.

- **Anxiety and Stress:** Participants expressed concerns about the stress of managing daily routines. These as mentioned earlier, takes a toll on not only their personal life but also on their health. Due to uncertainty of the disease and unpreparedness of how to deal with the disease, the caregivers develop symptoms such as shock, panic, fear, helplessness, denial, feeling overwhelmed, losing hope and anxiety.

“I dont know why he got this disease. Is God punishing me? I feel so helpless and dont know who will take care of my children now.” - 50 years old wife.

## Theme 2: Effect on Personal Life

### Sub-themes:

- **Social Isolation:** Caregivers experienced restricted social interactions and inability to attend family

events as they have to provide constant care to the patients.

“I rarely go out ever since he got cancer as somebody has to be with him and give him constant care all the time.” - 40 years old female

- **Relationship Strain:** Marital and familial relationships were affected due to care giving responsibilities as mentioned by the participants.

“I dont get enough time to take care of my school going children. And sometimes, I get irritated and take my anger out on my children.” - 35 years old female

- **Limited Personal Freedom:** Many caregivers reported reduced autonomy and inability to engage in personal hobbies or career growth due to the constant nature of caregiving responsibilities.

“I am a diabetic patient and now I am devoted to taking care of my husband. So, I am not being able to do my routine checkup as I dont get time.” - 65 yrs old woman

**Theme 3: Barriers and Challenges**

**Sub-themes:**

- **Financial Struggles:** Inability to afford professional care giving support or medical

treatments was mentioned by the participants.

“I want to take her to bigger cities for better treatment, but I cant afford it.” - 50 years old husband

- **Lack of External Support:** Limited assistance from extended family or social services was quoted as a barrier / challenge by the participants.

“I am the only one who takes care of my father. My siblings always have some excuse or the other and never come to visit him or help me out. It is exhausting.” - 33 years old male

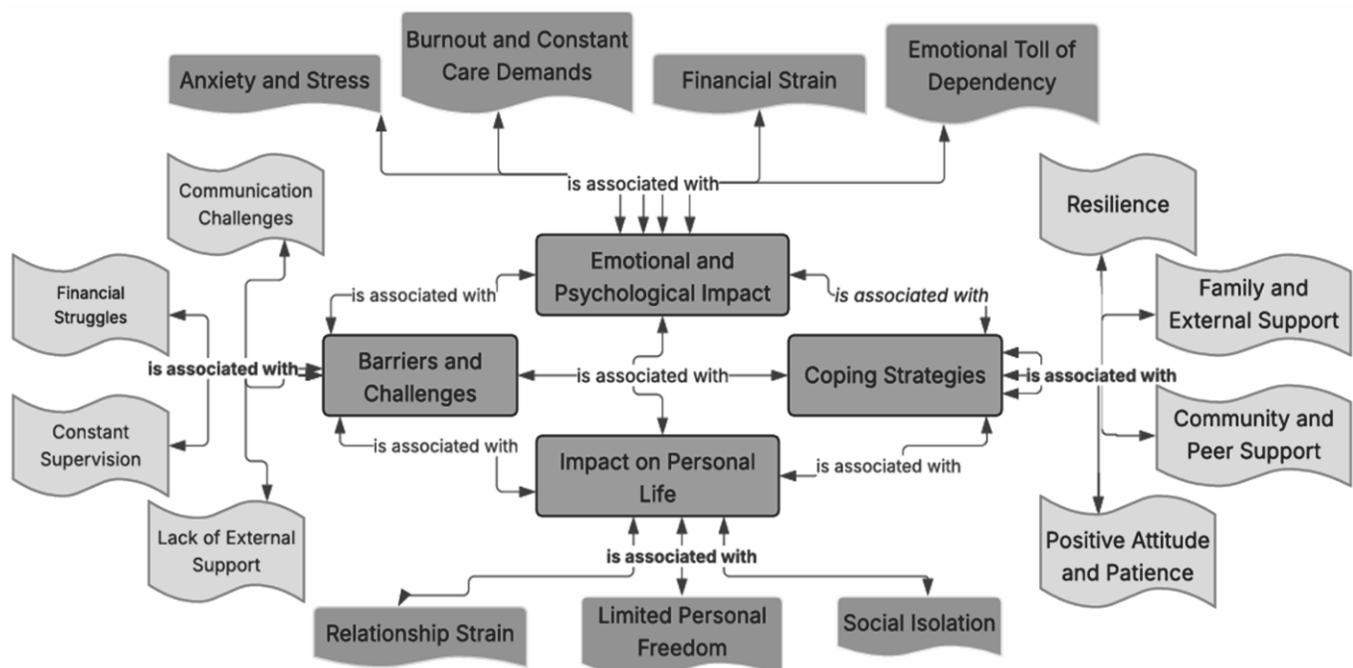
**Theme 4: Coping Strategies and Support**

**Sub-themes:**

**Positive Attitude and Patience:** The caregivers relied on emotional resilience and a positive mindset which according to them helped them to carry on with their responsibilities and endure the hardships of constant caregiving.

“At the time of his diagnosis, I was so hopeless. But as the time progressed, our bond has become stronger and I am content with the fact that I am able to take care of him in this difficulty time of his life.” - 50 years old woman.

**Figure 2: Network Diagram depicting various themes and sub-themes**



- **Family and External Support:** Assistance from relatives and paid caregivers provided some relief to the caregivers. It also provided coping mechanism to them to deal with the stress.

“Sometimes, my relatives help me out with household chores like cleaning, washing etc. Their support is a great relief to me from being stressed and overburdened.” - 35 years old woman.

### **Discussion:**

Findings from quantitative study documented mild to moderate burden in 67% FCs, while moderate to severe burden was found in 26% indicating the need to address this issue at both facility and community level. This correlates with the study done in Iranian caregivers by Mirsoleymani et al.<sup>[13]</sup> where a significant percentage (48.1%) of caregivers reported high burden. In a study done by Kondeti et al.<sup>[10]</sup> found that 51.65% FCs experienced moderate caregiving burden, 44.07% experienced high caregiving burden, and only 4.26% of FCs experienced mild caregivers burden.<sup>[10]</sup> Likhmana et al.<sup>[14]</sup> in a study conducted in Delhi reported 56.5% caregivers with no or minimal burden, 37.5% caregivers with mild to moderate burden and only 1% caregivers reported severe burden.<sup>[12]</sup>

One of the main philosophies of palliative and hospice care is taking care of the patient and family as a single unit and addressing the needs of both parties to globally address their overall well-being and quality of life as a family unit. Caregivers face increased difficulties as the patient’s cancer progresses into the terminal stage. They are thus under more stress, which has a negative impact on their physical, mental, emotional, and spiritual well-being. As the patient approaches the end of their life, becomes more dependent on them, and becomes more functionally handicapped, the demands placed on the caretakers increase, causing them to experience greater emotional distress.<sup>[9]</sup>

Meta-analysis by Northouse et al.<sup>[13]</sup> found that, psycho educational, skills enhancement (coping mechanism, communication, and problem-solving skills), and therapeutic counselling are three types of interventions that are usually offered to caregivers. Self-

help care supportive interventions have several advantages for caregivers, including making caregivers competent to select what, how, and when they give care at optimum level.

In the present study qualitative study result showed that high financial burden, lack of support system, coping strategy leading to burn out among caregivers. This needs to be addressed by provision of different welfare scheme by Government of India. In India, cost of treatment has been a significant barrier to accessing cancer care and PM-JAY has resulted in significant reduction in out-of-pocket expenditure and financial constrains.<sup>[14]</sup> FCs play an essential role in ensuring health care to cancer patients especially during advanced stage, thus impacting the patients course of disease progression, survival, and quality of life. This often results in psychological burden on both patients and FCs. Thana et al.<sup>[15]</sup> found that caregivers physical health, psychological factors, financial status, social isolation, and family or social support were frequently reported burden factors.

As it was a hospital-based study there is every possibility of those not coming to the hospital and not getting care not being included in this study. Time constraints for in-depth interview in hospital setting and absence of main care giver accompanying the patient to the hospital were the main weakness of our study. But every effort was given to extract rich information from the caregivers. Future community based operational research can be planned to know the effectiveness of different interventions.

### **Conclusion:**

Most of the caregivers had mild to moderate burden, which needs to be addressed. Many rely on family caregivers for their care and management in this country as both cancer incidence and life expectancy is increasing in India. Therefore, strengthening family caregivers both in home and hospitals, linking facilities and home-based care by evidence-based communication interventions should be a priority in health planning and management.

### **Recommendation:**

Family caregivers financial and emotional strain,

stress and anxiety needs to be addressed with better care and support integrating in our health care delivery model with public private partnership, so that emerging burden on family caregivers can be addressed. Death literacy and bereavement care also needs to be integrated to support FCs. Implementation research to assess the effectiveness of different interventions needs to be tried with local innovations.

This issue should be prioritized while preparing district health action plan with integrating social welfare Department and different community-based organizations.

#### **Declaration:**

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Conflict of Interest: Nil

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## Association Between Prior Tuberculosis History and Treatment Outcomes in Drug-Resistant Tuberculosis Patients Receiving Bedaquiline-Based Therapy: Prospective Observational Study From Western India

Ruchita Sakaria<sup>1</sup>, Bina Modi<sup>2</sup>, Anjana MS<sup>3</sup>, Bharti Korla<sup>4</sup>, Kamlesh Vithalani<sup>5</sup>

<sup>1</sup>Senior Resident, <sup>2</sup>Assistant Professor, <sup>3</sup>Junior Resident, <sup>5</sup>Professor and Head, Department of TB and Chest diseases, <sup>4</sup>Associate Professor, Department of Community Medicine, P.D.U. Government Medical College, Rajkot, Gujarat, India

**Correspondence:** Dr. Bharti Korla, Email: drbhartikoria@gmail.com

### Abstract:

**Introduction:** Drug-resistant tuberculosis (DR-TB) poses a significant public health challenge in India. While treatment success in DR-TB cases remains limited, bedaquiline-based oral longer regimens have shown promising results in select studies. **Objective:** This study aimed to evaluate whether a patient's prior TB status influences treatment outcomes under a bedaquiline-based regimen and to assess other previous TB-related variables affecting current DR-TB outcomes. **Methods:** A prospective observational study was conducted at a tertiary care center in Rajkot, Gujarat, between April 2023 and September 2024. Fifty DR-TB patients on bedaquiline-based oral longer regimens were selected using purposive sampling. Data on previous TB treatment, clinical and demographic variables were collected. Treatment outcomes were categorized as cured, treatment completed, defaulted, died, or failed. Statistical analysis using Chi-square and Cramer's V was conducted to assess associations. **Results:** Of the 50 patients, 74% were underweight and from lower socioeconomic backgrounds, and 58% were female. Patients with a history of cured drug-sensitive TB (DS-TB) demonstrated the highest favourable outcomes. In contrast, those with prior treatment failure or no TB history had poorer outcomes. However, the association between prior TB status and current DR-TB outcomes was not statistically significant (Chi-square = 20.99,  $p > 0.05$ ; Cramer's V = 0.3), indicating a weak correlation. **Conclusion:** Although cured DSTB history appears to improve outcomes, previous TB status alone does not significantly predict DR-TB treatment success. A comprehensive approach addressing adherence, resistance, comorbidities, nutrition, and social factors is crucial for better outcomes.

**Keywords:** Bedaquiline, Drug-resistant tuberculosis, Previous TB history, Predictive factors, Treatment outcome.

### Introduction:

India is disproportionately affected by tuberculosis (TB), which continues to be a serious global public health concern. About 27% of all TB cases worldwide occurred in India in 2019, highlighting the urgent need for efficient management techniques.<sup>[1]</sup> Control efforts

have been made more difficult by the advent of drug-resistant TB (DR-TB), which has resulted in longer treatment durations, more side effects, and less than ideal results.<sup>[2,3]</sup>

A new diarylquinoline called bedaquiline has been developed to improve the effectiveness of treatment for

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DR-TB sufferers.<sup>[1]</sup> Research has indicated that regimens incorporating bedaquiline can attain up to 83% culture conversion rates in just six months.<sup>[1]</sup> Even with these developments, DR-TB treatment results are still not ideal. According to a retrospective study conducted in Maharashtra, the treatment effectiveness rate was only 29%, and the death and lost to follow-up rates were high.<sup>[4]</sup> To successfully customize interventions and enhance patient management, it is imperative to identify determinants of therapy results.<sup>[1,3]</sup>

The results of current treatment may be predicted by prior TB history. The effectiveness of further treatments may be impacted by the presence of resistant strains of TB or impaired lung function in patients who have previously received therapy for the disease.<sup>[1,2]</sup> However, there is a dearth of information regarding how previous TB status affects the results of current DR-TB treatment, especially when using regimens that involve bedaquiline.<sup>[3]</sup>

The purpose of this observational study is to determine whether a patient's past TB treatment history can influence their present treatment results when they are receiving bedaquiline-based therapy for DR-TB in Western India. To improve DR-TB management, clinical decision-making and policy development may benefit from an understanding of this link.

#### Methods:

A prospective observational study was conducted among 50 patients of DR-TB on bedaquiline oral longer regimen on the outdoor and indoor patients at the department of pulmonary medicine, tertiary care teaching institute in Rajkot city, Gujarat. Study duration was from April 2023 to September 2024.

**Sample size:** A total of 50 patients with drug-resistant tuberculosis (DR-TB) receiving the bedaquiline-based oral longer regimen were included in this study. Participants of both genders were selected according to predefined inclusion and exclusion criteria. Patients were recruited from both the inpatient ward as well as the outpatient department of Respiratory Medicine. Written informed consent was obtained from all participants prior to inclusion in the study. The sample size of 50 was determined based on feasibility considerations within the study duration and patient flow

at the study site. Although a formal power calculation was not performed, this sample was considered adequate for exploratory observational analysis to identify patterns and potential predictors of treatment outcomes.

**Ethics committee approval:** this study was approved by the institutional ethics committee (human) of government medical college and hospital Rajkot.

The criteria used for the enrolment of the patients in this study are given below.

**Inclusion criteria:** All Drug-Resistant Tuberculosis patients having a) Rifampicin resistance. b) Both Rifampicin and Isoniazid resistance with / without resistant to any of / all Fluoroquinolones. c) Any / all second line injectable drug resistance.

**Exclusion criteria:** 1) Patients on Bedaquiline Shorter Oral Regimen, 2) Patients having a) Mono-H resistance tuberculosis. b) XDR (extensive drug resistance tuberculosis)

**Study tool:** A pre-tested, pre-structured proforma was used for data collection. It was piloted prior to the study to identify and correct any issues. To enhance comprehension and response accuracy, the proforma was translated into the local vernacular language.

**Study Method:** A prospective observational study was conducted on 50 DR-TB patients on Bedaquiline oral longer regimen. For each patient, apart from baseline physical, radiological, and biochemical parameters, associated risk factors, additional data on previous antituberculosis treatment, comorbidities, and contact history were also collected via patient interview. For BMI classification, current Asian classification was used and for socioeconomic class cut off of each class of B. G. Prasad classification was used.<sup>[5,6]</sup>

The treatment outcome measurement was considered as follow: Cured/treatment completed/loss to follow-up/died/defaulted.<sup>[4]</sup> Apart from this, adverse drug reactions were noted. All the demographic and clinical data collected was recorded in proformas, which were later entered into Microsoft Excel. All care has been taken to fill complete data at the time of data collection. After ensuring the completeness of the data, analysis was done and descriptive statistics are applied. All statistical analyses were performed using the Jamovi 2.4.11 software. This study is also compared with other

standard equivalent studies. Numbers, percentages, chi-square and Cramer's V used to analyse the data.

**Results:**

This prospective observational study was conducted on 50 DR-TB patients on Bedaquiline oral longer regimen. The majority of patients (32, 64%) were between the ages of 21 and 40 years, indicating that drug-resistant TB predominantly affects individuals in their most productive age group. Females accounted for a slightly higher proportion (29, 58%) of the cases compared to males. A concerning 74% of participants belonged to the lower socioeconomic class, highlighting the diseases association with poverty. Nutritional status was poor among most patients, with 50% being severely underweight and an additional 24% classified as underweight. Only 22% had a normal BMI, and no participants were obese. (Table 1)

Adherence levels were generally greater among those with Current TB across all activities when comparing respiratory hygiene practices between patients with Previous TB and Current TB (n=50 in each group). Washing hands after coughing or sneezing was the most common habit, as reported by 88% of people with current TB and 80% of people with previous TB. Forty percent of the Previous TB group and forty-two percent of the Current TB group covered their mouths when coughing or sneezing. In the same way, 36% and 40% of the groups reported safely disposing of their sputum, while 46% and 50% reported using masks. Statistical analysis using the Chi-square test revealed that none of the differences between the two groups were statistically significant, despite these observed disparities. (Table 2)

From Table 3, it was observed that patients with DSTB cured had highest cure rate, total 11 patients

recovered from DR-TB. From DSTB treatment failure patients mixed outcome has been observed like six of them cured and some were treatment failure. DR-TB treatment failure had shown poor outcome of death in one patient. Patients with no previous history of TB had mixed outcome as seen in Table 3. DSTB defaulters had shown better outcome showed four cured patients. Overall, previously cured DSTB patients showing better outcome as compared to defaulters and failure cases which further tested for significance association.

To find association of previous history of TB and outcome of current MDR-TB, authors have applied chi-

**Table 1: Demographic characteristics of study participants (n=50)**

Variable	Number of Patients	Percentage (%)
Age (in years)		
< 20	3	6
21-30	15	30
31-40	17	34
41-50	6	12
51-60	6	12
> 60	3	6
Gender		
Male	21	42
Female	29	58
Body Mass Index		
<16.5 (Severely underweight)	25	50
<18.5 (Underweight)	12	24
18.5-24.9 (Normal weight)	11	22
25-29.9 (Overweight)	2	4
>30 (Obese)	0	0
Socioeconomic Class		
Lower class	37	74
Middle class	9	18
Upper class	4	8

**Table 2: Comparison of Respiratory Hygiene Practices Between Patients With Previous and Current TB (n= 50)**

Respiratory Hygiene Practice	Previous TB	Current TB	P value
Covers mouth when coughing/sneezing	20 (40%)	21 (42%)	1.000
Disposes sputum safely	18 (36%)	20 (40%)	0.837
Washes hands after cough/sneeze	40 (80%)	44 (88%)	0.413
Wears mask regularly	23 (46%)	25 (50%)	0.841

**Table 3: Association Between Previous TB History and Current DR-TB Treatment Outcomes (n = 50)**

Previous TB History	Cured n (%)	Defaulted n (%)	Died During Treatment n (%)	Treatment Failure n (%)	$\chi^2$	Cramér's V
DR-TB Defaulter	1 (2%)	1 (2%)	0 (0%)	0 (0%)	13.59	0.302
DR-TB Failure	0 (0%)	0 (0%)	1 (2%)	0 (0%)	p=0.482	
DS-TB Cured	11 (22%)	3 (6%)	5 (10%)	1 (2%)		
DS-TB Defaulter	4 (8%)	1 (2%)	0 (0%)	1 (2%)		
DS-TB Failure	6 (12%)	1 (2%)	0 (0%)	1 (2%)		
No TB History	4 (8%)	3 (6%)	5 (10%)	1 (2%)		

**Table 4: Association of Key Previous TB Variables with Current DR-TB Treatment Outcome (n = 50)**

Previous TB Variable	Favorable Outcome	Unfavorable Outcome	Chi-Square ( $\chi^2$ )	p-value
Previous TB Type			1.18	0.556
DSTB	24 (48.0%)	10 (20.0%)		
DR-TB	2 (4.0%)	1 (2.0%)		
None	7 (14.0%)	6 (12.0%)		
Interval Since Last TB			1.14	0.566
<1 year	12 (24.0%)	4 (8.0%)		
1-2 years	10 (20.0%)	5 (10.0%)		
>2 years	11 (22.0%)	8 (16.0%)		
Adherence in Previous TB			5.00	0.082
Good	21 (42.0%)	9 (18.0%)		
Irregular	6 (12.0%)	4 (8.0%)		
Defaulted	3 (6.0%)	7 (14.0%)		
Drug Resistance History			2.57	0.277
MDR	14 (28.0%)	5 (10.0%)		
Pre-XDR	3 (6.0%)	2 (4.0%)		
None	13 (26.0%)	13 (26.0%)		

square test and Cramers V test. As shown in table 3, chi-square test was found no statistically insignificant with chi square value= 13.69, df=15, P=0.482. Cramers V measures the association between two nominal or categorical variable in the range of 0-1. Based on Study finding Cramers V was 0.3 showing a moderate association between previous TB history and current MDR TB outcome. This indicates that although a patient's prior TB history has some predictive value, it is not a highly reliable indicator of how well they would respond to current disease and treatment.

The result of current therapy is somewhat influenced by prior TB history; nonetheless but other significant

variables have more impact on TB treatment outcome. So relying only on previous TB history or previous TB outcome is not a good predictor of current TB outcome, but taking consideration of previous treatment behaviour of the patients would help to improve current TB outcome.

Analysis of the association between key previous TB-related variables and current DR-TB treatment outcomes revealed that none of the variables showed a statistically significant correlation. The type of previous TB (drug-sensitive TB, drug-resistant TB, or no history of TB) was not significantly associated with treatment outcome ( $\chi^2 = 1.18$ ,  $p = 0.556$ ), although patients with

prior drug-sensitive TB appeared to have a higher proportion of favorable outcomes. Similarly, the interval since the last TB episode did not significantly influence treatment outcomes ( $\chi^2 = 1.14$ ,  $p = 0.566$ ), with favorable outcomes distributed fairly evenly across all time intervals assessed (<1 year, 1–2 years, and >2 years).

Previous treatment adherence showed a trend toward significance ( $\chi^2 = 5.00$ ,  $p = 0.082$ ), indicating that patients who had good adherence in their prior TB treatment were more likely to achieve favorable outcomes, while those who had defaulted experienced more unfavorable results. Although this finding did not meet the conventional threshold for statistical significance, it suggested a possible influence of past adherence on DR-TB outcomes. Lastly, no statistically significant association was observed between history of drug resistance (MDR, pre-XDR, or none) and current treatment outcomes ( $\chi^2 = 2.57$ ,  $p = 0.277$ ), implying that prior drug resistance status alone did not determine the success or failure of the ongoing treatment. (Table 4)

#### **Discussion:**

This study aimed to determine whether a patient's previous TB status could serve as a reliable predictor of treatment outcomes in current MDR-TB cases managed with a bedaquiline-based oral longer regimen. Socio-demographic profile of the study participants suggested a clear link between undernutrition, low socioeconomic status, and the prevalence of drug-resistant TB in this population. This could have important implications for targeted healthcare strategies.

The results related to previous TB history and treatment outcome demonstrated a weak to moderate association; however, this association was not statistically significant (Chi-square = 13.59,  $p > 0.05$ ; Cramér's V = 0.302). These findings align with earlier research from India and South Africa, which indicated that while prior TB history may influence outcomes, it is not a sole determinant of treatment success in DR-TB settings.<sup>[7]</sup>

In the present study, patients with a history of cured drug-sensitive TB (DSTB) had the highest cure rates (70%), suggesting that prior successful treatment may confer behavioral or biological advantages, such as

improved adherence or lower bacillary burden. Similar patterns were observed in a retrospective study in Ethiopia, where patients with prior TB cure had significantly better MDR-TB outcomes compared to those with a history of treatment failure.<sup>[8]</sup> Conversely, DSTB failure and DR-TB failure groups showed mixed or poor outcomes, supporting the idea that repeat treatment failure may reflect deeper resistance, poor compliance, or systemic treatment gaps.<sup>[9]</sup>

Interestingly, patients with no prior TB history did not consistently achieve better outcomes. In this subgroup, 46% experienced unfavorable outcomes (death or failure), indicating that being treatment-naïve does not guarantee treatment success. This finding echoes the WHO global TB reports, which emphasize the multifactorial nature of DR-TB outcomes, highlighting how baseline nutritional status, immune function, and access to care can impact results irrespective of prior TB exposure.<sup>[10]</sup>

Although previous treatment behavior (e.g., default or failure) may signal higher risk of non-response, it cannot be used in isolation for prognostication. Multiple studies support this, noting that factors like drug resistance pattern, HIV status, anemia, and diabetes often play more critical roles in MDR-TB outcomes than TB history alone.<sup>[11,12]</sup> For example, a study from Mumbai found that adherence, comorbidity burden, and socioeconomic instability were stronger predictors of unfavorable outcomes than any previous TB indicator.<sup>[13]</sup>

Given these complexities, a more holistic approach to DR-TB management is warranted. Comprehensive patient assessments including history of prior TB, comorbidities, nutritional status, resistance profile, and socio-behavioral risk can enhance prediction models and individualize care. Moreover, future research should explore the role of genetic and immunological markers in treatment response, which may further refine patient risk stratification.<sup>[14]</sup> Incorporating digital adherence tools and patient-centered support systems could also be instrumental in improving long-term DR-TB control strategies.<sup>[15]</sup>

#### **Limitations:**

This study was limited by a small sample size, which

may affect the generalizability of the findings. Recall bias might affect the findings pertaining to respiratory hygiene practices during previous episodes of TB.

### Conclusion:

This study assessed whether previous TB history could predict current DR-TB treatment outcomes under a bedaquiline-based longer oral regimen. While a weak to moderate association was observed, statistical analysis revealed no significant correlation ( $\chi^2 = 13.59, p > 0.05$ ; Cramér's  $V = 0.302$ ). Patients with a history of successfully treated drug-sensitive TB (DSTB) demonstrated better outcomes, with 11 out of 20 achieving cure, suggesting that prior treatment success may influence future prognosis. However, outcomes among patients with previous treatment failure, default, or no TB history were mixed. These findings indicate that prior TB history alone is not a strong predictor of DR-TB treatment success. The complexity of outcomes reflects the multifactorial nature of TB management, including biological, behavioral, and systemic factors. Therefore, an individualized, holistic approach remains essential in DR-TB care.

### Recommendations:

Programmatic TB control efforts should integrate prior treatment history as one component of patient risk profiling, especially in identifying those who may need closer follow-up or adherence support. Special attention should be given to patients with a history of treatment failure or irregular adherence, as they may face higher risk of poor outcomes. Nutritional assessment and support should be incorporated early, considering the high proportion of underweight patients. Strengthening behavioral counselling, drug-resistance surveillance, and early sputum monitoring can help mitigate the effects of past treatment challenges.

### Declaration:

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Conflict of Interest: Nil

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## A Newly Introduced Millet-based Take Home Ration: Utilization, Strength & Challenges in Ahmedabad Municipal Corporation, Gujarat

Kunj Gajjar<sup>1</sup>, Mital Barad<sup>1</sup>, Sonal M. Shah<sup>2</sup>, Aparajita Shukla<sup>3</sup>, Bhavin Joshi<sup>4</sup>

<sup>1</sup>Resident Doctor, <sup>2</sup>Associate Professor, <sup>3</sup>Professor and Head, Department of Community Medicine, Smt. NHL Municipal Medical College, Ahmedabad, Gujarat, India

<sup>4</sup>Additional Medical Officer of Health, Ahmedabad Municipal Corporation, Ahmedabad, Gujarat, India

**Correspondence:** Dr. Kunj Gajjar, Email: drkunjgajjar1996@gmail.com

### Abstract:

**Introduction:** The Government of India is promoting millet-based nutrition through Integrated Child Development Services (ICDS) and POSHAN Abhiyaan. In December 2023, two ICDS blocks of Ahmedabad Municipal Corporation (AMC) implemented a pilot project to provide a millet-based Take Home Ration (THR).

**Objectives:** 1. To evaluate the utilization and barriers in utilization of a millet-based Take Home Ration (THR) compared to the standard Take Home Ration (THR) among beneficiaries. 2. To identify strength and challenges in effective implementation of millet-based Take Home Ration (THR)

**Methods:** A cross-sectional analytical study was conducted across 60 Anganwadi Centres (AWCs), with 30 each from millet-based THR and standard THR blocks. Using WHO cluster sampling and Probability Proportional to Size methodology, a total of 1,627 beneficiaries were surveyed—comprising children aged 6 months to 3 years ( $n_1=1178$ ), pregnant women ( $n_2=220$ ), and lactating mothers ( $n_3=229$ ). Data were collected in April 2024, four months post-implementation, using a structured, pilot-tested questionnaire. **Results:** Utilization of millet-based THR was lower ( $n=749$ , 92%) compared to standard THR ( $n=773$ , 95%), with a significant gap among children (91.8% vs. 95.9%,  $p=0.003$ ). However, the frequency of consumption per week ( $3.4\pm 2.05$  vs.  $2.3\pm 1.33$  times,  $p<0.001$ ) and monthly packet usage ( $5.05\pm 1.9$  vs.  $4.5\pm 2$  packet,  $p<0.001$ ) were significantly higher in the millet-based group. Barriers to utilization included disliking the taste (53%) and appearance (47%). Awareness of the change in THR composition was limited (53%), and recipe demonstrations were not conducted. **Conclusion:** Millet-based THR was well tolerated with no adverse effects. However, effective implementation requires improved taste, community sensitization and training of Anganwadi workers.

**Keywords:** Challenges, Comparative study, ICDS, Millets, Nutrition, Take Home Ration

### Introduction:

The role of supplemental nutrition within the framework of Integrated Child Development Services (ICDS) has recently been re-emphasized by the National Nutrition Mission (NNM), also known as POSHAN Abhiyaan (Prime Ministers Overarching Scheme for

Holistic Nourishment). In Gujarat, Take Home Ration (THR) includes fortified premixes, wheat and pulse-based energy foods (such as Bal Shakti for children, Matru Shakti for pregnant and lactating mothers and Purna Shakti for adolescent girls), as well as fortified milk, groundnut oil, and Satva (double-fortified salt with iron and iodine).<sup>[1]</sup>

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Millets are being incorporated into the THR system to improve the nutritional profile of the beneficiaries.<sup>[2]</sup> Millets are high in iron, which can help avoid anemia and is necessary for the synthesis of red blood cells, includes vitamin C as well, which enhance the absorption of iron. It has antioxidants, dietary fiber; it lowers intestinal inflammation, calms the digestive tract, and encourages regular bowel motions. Because they are naturally gluten-free, they are a fantastic substitute for wheat and other grains that contain gluten for those who have celiac disease or gluten intolerance. It lowers the risk of type 2 diabetes, enhances insulin sensitivity, and controls blood sugar levels. Lowers the risk of heart disease, controls blood pressure, and lowers cholesterol.<sup>[3]</sup> As per NITI Aayogs report on best practices in promoting millets in diets, a number of states including Madhya Pradesh, Chandigarh, Chhattisgarh, Odisha, Tamil Nadu, and Telangana have undertaken initiatives to include millets in ICDS.<sup>[4]</sup>

Ahmedabad Municipal Corporation (AMC), Gujarat has innovatively introduced millet-based THR in 2 ICDS blocks from December 2023. The millet-based THR replaces wheat with the millets. The pilot project aimed to broad base food basket, guarantee the availability of more nutrient-dense local food, and create a decentralized food model. No literature found regarding any community-based study on millet-based THR. Hence this study was designed to generate evidence on utilization with reasons for non-utilization of millet-based THR as compared to standard THR. Efforts are also made to identify strength and challenges in effective implementation of millet-based THR. This study is collaborative effort between ICDS department and Community Medicine department.

#### Methods:

Millet-based THR in Ahmedabad Municipal Corporation (AMC), Gujarat has been introduced since December 2023 in 2 ICDS blocks out of total 17 ICDS blocks on pilot bases.

#### Study Area and Study Population:

A cross-sectional analytical study was conducted which included 2 ICDS blocks of AMC where millet-based THR has been introduced (intervention group) and 2 adjacent blocks where standard THR was provided (non-intervention group). Anganwadi Centre (AWC) was considered as primary sampling unit from which study population comprised of 2 categories/strata of beneficiary: (1) children of 6 months to 3 years age and (2) pregnant women and lactating mothers were selected.

#### Sample Size and Sampling Technique:

A sample size of 726 beneficiaries per group (~25 beneficiaries per AWC) was calculated using the formula  $Z^2pq/l^2$ , with THR utilization rate among children of 35% in urban India<sup>[5]</sup> and an allowable error of 15%, multiplied by a design effect of 2 and adding 10% for stratification.

Study population was selected by applying Probability Proportional to Size sampling method. List of AWCs along with list of beneficiaries of selected 4 ICDS blocks were procured from ICDS department of AMC. The final sample size for the study was determined by considering the proportion of beneficiaries from each category (proportion of children=78% and proportion of pregnant and lactating mothers=22%), which included 19 children aged 6 months to 3 years & 6 pregnant women and lactating mothers from each AWCs. AWC having registered beneficiaries less than the required sample size from both strata were excluded from the list. After this, 30 AWCs from intervention group and 30 AWCs from non-intervention group were selected by applying WHO's cluster sampling method.<sup>[6]</sup> Thus, study population from total 60 AWCs were selected for the study.

The proforma and written guideline for field investigators (FIs) were developed by researchers, pilot-tested, and refined by faculty of Community Medicine department & Program Officers of ICDS department of

AMC. The proforma includes questions on demographic details, utilization of THR, awareness about changes in THR content, information about the advantages of millet-based THR, services provided by AWW (counselling about millet-based THR, advantages, recipe discussion/demonstration), suggestions on THR to increase utilization, etc. To identify strength, beneficiaries were asked about the frequency and regularity of THR related services. To identify challenges, reasons for non-utilization were asked. Although it was not our objective to identify opportunities and weaknesses in implementation, some opportunities and weaknesses of the program were perceived during the data collection while interacting with the community members. Mukhya Sevika from blocks other than the selected blocks were the FIs. Two days training program was conducted by researchers included study tool discussion, sensitization for importance of data and practical field training. All FIs were given field investigation booklet. Home visits of selected beneficiaries were carried out by trained FIs. To maintain the quality of data collection, entire process of data collection was supervised by researchers.

**Selection of Beneficiaries in the Field:**

Once the AWC selected, the selection of beneficiaries done by conducting house to house visits in a single direction from the AWC and inquiring for children aged 6 months to 3 years, pregnant women and lactating mother. Field telly list was made for the overall counting of the particular AWCs beneficiaries. When there was more than one beneficiary in the single house, only one beneficiary was selected randomly. In some of the area, beneficiaries did not answer all questions of the questionnaire, thus additional beneficiaries were taken from same AWC. Resulted final sample size of 1627, out of which 814 in intervention group and 813 non-intervention group.

Data collection was done in April 2024, four months post-implementation of millet-based THR. Statistical analysis included normality testing using the

Kolmogorov-Smirnov test, Chi-square test for qualitative data, unpaired t-test for quantitative data, and proportion of utilization and number of packets used per month were analysed as the indicators.

**Results:**

A total of 1627 participants were included in this study, out of which 814 in millet-based THR group and 813 in standard THR group. The study participants are shown in Table1.

As shown in Table 2, there was similar utilization rate in millet-based THR and standard THR in the pregnant women and lactating mother categories whereas significantly lower rate of utilization (92%) in children of 6 months to 3 years age in the millet-based THR as compared to standard THR (96%). Two-third of the study population were children. The pooled utilization was significantly higher in the standard THR group (95%) compared to the millet-based THR group (92%).

**Table 1: Distribution of beneficiaries by category in Millet-based and Standard THR groups**

Category	Millet-based THR	Standard THR
6 months - 3 years children	584 (71.7%)	594 (73.1%)
Pregnant women	114 (14%)	106 (13%)
Lactating mothers	116 (14.3%)	113 (13.9%)
<b>Total</b>	<b>814 (100%)</b>	<b>813 (100%)</b>

**Table 2: Comparison of utilization of Millet-based and Standard THR among ICDS beneficiaries**

Beneficiaries	Utilizing Millet-based THR	Utilizing Standard THR	p-value*
6 months - 3 years children	536 (91.8%)	570 (95.9%)	0.003
Pregnant women	107 (93.9%)	97 (91.5%)	0.5
Lactating mothers	106 (91.4%)	106 (93.8%)	0.6
<b>Total</b>	<b>749 (92%)</b>	<b>773 (95%)</b>	<b>0.01</b>

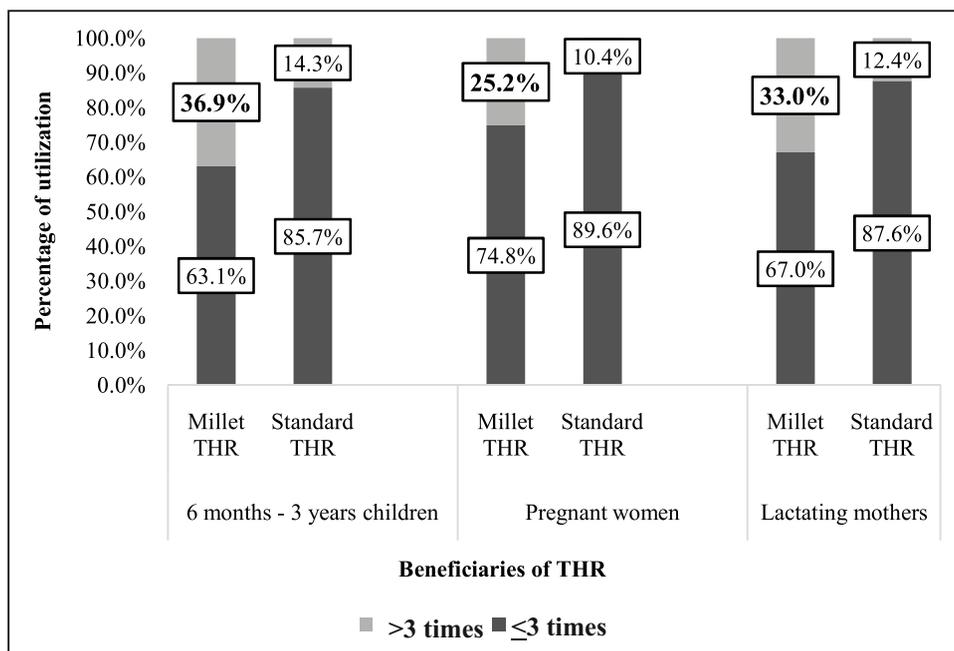
\*Chi square test, df=1

**Table 3: Comparison of frequency and quantity of THR utilization among Millet-based and Standard THR among ICDS beneficiaries**

Utilization	Millet-based THR (n=749)	Standard THR (n=773)	p-value*
Frequency of THR meal in last week	3.4 ± 2.05 times/week	2.3 ± 1.33 times/week	<0.001
No. of THR packets used in previous month	5.05 ± 1.9 packets	4.5 ± 2 packets	<0.001

\*Unpaired t-test

**Figure 1: Distribution of beneficiaries by weekly frequency of THR utilization for millet-based and standard THR**



All beneficiaries were asked about number of packets consumed during previous months and the frequency of consumption of THR meal in last week. As shown in Table 3 and Figure 1, beneficiaries in the millet-based THR group reported significantly higher frequency of THR meal consumption in the previous week (3.4 ± 2.05 times/week) compared to the standard THR group (2.3 ± 1.33 times/week). Additionally, the number of THR packets used in the previous month was also significantly higher in the millet-based THR group (5.05 ± 1.9 packets) compared to the standard THR group (4.5 ± 2 packets).

**Figure 2: Reason for non-utilizing THR among beneficiaries of both groups**

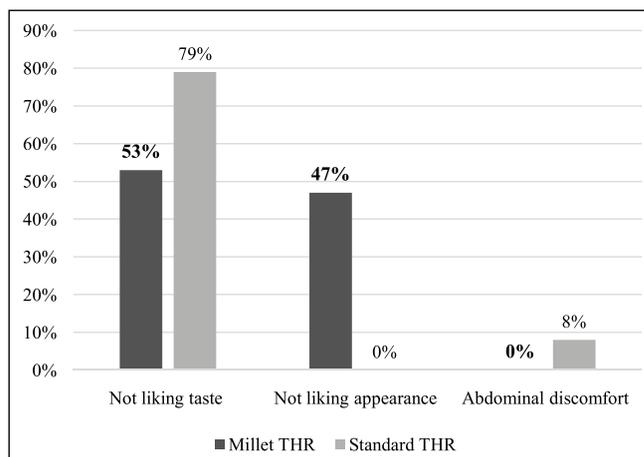


Figure 3: Overall rating of Millet-based THR by beneficiaries (n=749)

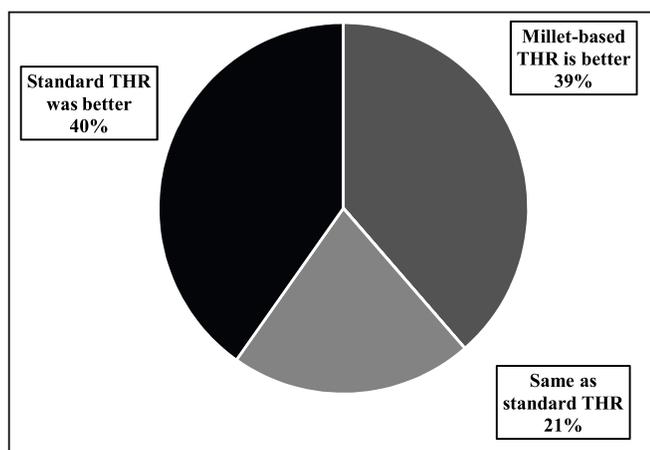


Figure 2 shows reason for non-utilizing THR. Out of total beneficiaries, 65 beneficiaries from millet-based THR group and 40 beneficiaries from standard THR group were not utilizing THR.

Figure 3 represents the overall rating given by beneficiaries utilizing millet-based THR. Around 60% of beneficiaries found millet-based THR better or same as standard THR.

Only 53% beneficiaries knew that standard THR was replaced by millet-based THR. Lack of knowledge about the content (47%) could potentially impact compliance and effective utilization of the THR.

Majority of the beneficiaries (98% from millet-based THR & 95% from standard THR) found cooking method of THR easy. None of the beneficiaries were shown any recipe manual by Anganwadi worker.

#### Suggestion for Millet-based THR by beneficiary

In this study, 74.6% of respondents expressed a preference for millet rations over individual THR packets. Around 14.9% of respondents suggested enhancing the taste of millet-based THR, while 8.6% of respondents proposed providing previous THR formulations alongside millet-based THR to facilitate adaptation. Only 1.9% suggested for offering both millet-based THR and standard THR options, allowing beneficiaries to choose based on their preferences.

#### Discussion:

The study compares utilization of a newly introduced millet-based THR with the regular THR among ICDS beneficiaries in a megacity of Gujarat. The overall utilization rate of millet-based THR (92%) was significantly lower than that of the standard THR (95%). The study from Sisodiya A et al<sup>[7]</sup> and Sabat S et al<sup>[8]</sup> showed 66% and 78.3% utilization of standard THR respectively. This finding suggests that among children, acceptance of millet-based THR was comparatively lower than the standard THR. This observation warrants further exploration into the factors influencing acceptance of the millet-based formulation, such as taste and appearance. In contrast, the utilization rates among pregnant women and lactating mothers were comparable between the two groups.

However, despite the lower overall utilization rate, the frequency and quantity of THR consumption differed significantly between the two groups. Table 3 and Figure 1 indicate that while the initial utilization rate of millet-based THR might be lower, those who utilized it, consumed it more frequently and in greater quantities. This could imply a potentially higher level of satisfaction or adherence among consistent utilizers of the millet-based THR group.

The reasons for non-utilization of millet-based THR were primarily attributed to disliking the taste (53%) and appearance (47%) as shown in Figure 2. Although the number of non-utilizers due to taste was lower in the millet-based THR group compared to the standard THR group, this difference was not statistically significant. The study from Sabat S et al<sup>[8]</sup> and Harikrishna BN et al<sup>[9]</sup> also shows 53.8% and 38.9% beneficiaries not liking taste of standard THR respectively. Appearance of millet-based THR recipes (dark coloured) seems to be major concern for utilization, efforts to sensitize beneficiaries to adopt the color of millet-based THR could potentially increase utilization. Notably, no beneficiaries in the millet-based THR group reported any

side effects, whereas 8% of standard THR non-utilizers discontinued use due to abdominal discomfort. This observation aligns with the digestive benefits of millets. The naturally rich in dietary fiber, resistant starch, alkaline and gluten-free millets prevent constipation, reduce bloating, reduce acidity and improve overall digestion.

Furthermore, the study revealed that only 53% of beneficiaries were aware of the replacement of standard THR with millet-based THR, and 47% lacked knowledge about its content. This lack of awareness could significantly hinder compliance and effective utilization. If beneficiaries don't understand the nutritional benefits or the recommended usage, they might be less likely to consume it consistently. Educational interventions should focus on explaining the ingredients, nutritional value and purpose of the millet-based THR. The lack of knowledge could also lead to misconceptions or misinformation about the millet-based THR, which could negatively impact its acceptance and utilization. Majority of the beneficiaries (98% for millet-based THR and 95% for standard THR) rated cooking THR was easy. However, none of the beneficiaries reported receiving recipe manuals from Anganwadi workers, highlighting a potential gap in the dissemination of information and practical guidance.

### **Strengths**

- Introduced in settled system
- Well tolerated by users
- Innovative shift towards using locally sourced, nutrient-rich foods
- Efficient logistics and supply chain

### **Weaknesses**

- Lack of differentiation in packaging
- Lack of awareness of replacement of THR
- Training aspect of AWWs & beneficiaries not taken care of
- Inadequate sensitization of beneficiaries regarding the benefit of millet

### **Opportunities**

- Capacity building & sensitization workshops
- Experience sharing of different recipes from THR by beneficiary
- Targeted intervention for non-utilization
- Scaling up of millet-based interventions

### **Challenges**

- Taste preferences
- Migrant population until universal implementation
- Lack of willingness of AWW to teach by demonstration

### **Limitations:**

Information is based on respondent's point of view only, which may have recall bias.

### **Conclusion:**

The introduction of millet-based Take Home Ration (THR) showed promising results in terms of meal frequency and packet utilization compared to standard THR. However, overall utilization was slightly lower, mainly due to taste preferences and visual appearance. The results indicate that millet-based THR is well accepted and no negative effects were noted, supports millet's potential advantages as a nutrient-dense substitute. No differentiation in packaging between millet-based THR and standard THR, lack of awareness regarding change in THR and sensitization of community regarding its advantage were identified as gap in effective utilization.

### **Recommendation:**

The packaging for millet-based THR should be different than standard THR along with awareness regarding change and content of THR with its advantage. Acceptance can be increased by intervention like conducting cooking competition by using millet-based THR amongst underserved population of AWC and preparing recipe book. Various recipes sharing across the AWC/blocks.

Need to integrate training on interpersonal communication and counselling techniques into the AWW training curriculum to enhance their soft skills such as communication, time management, positivity, and teamwork. Improve implementation by good quality supervision and monitoring of communication & counseling activity of AWW.

**Declaration:**

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Conflict of Interest: Nil

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## Knowledge and Utilization of Antenatal and Postnatal Services in an Urban area of South-East Delhi: A Cross-Sectional Study

Sehla Tabassum<sup>1</sup>, Shyambhavee<sup>2</sup>, Kartikey Yadav<sup>2</sup>, Korbili Gautami<sup>1</sup>

<sup>1</sup>Masters in Public Health student, <sup>2</sup>Assistant Professor, Department of Community Medicine, Hamdard Institute of Medical Sciences and Research, New Delhi, India

**Correspondence:** Dr. Shyambhavee, Email: shyambhavee@gmail.com

### Abstract:

**Introduction:** Poorer pregnancy outcomes are linked to inadequate antenatal care (ANC) and Postnatal care (PNC). Thus, adequate knowledge and utilization of these services among expectant mothers becomes the key to achieving healthy pregnancy outcomes. **Objective:** To assess the knowledge and utilization of ANC and PNC services among women who delivered in last 1 year residing in an Urban area of South-East Delhi. **Methods:** This was a cross-sectional study conducted among 150 women who delivered within the last one year residing in an urban area of South-East Delhi. Data collection between April 2024 to July 2024 was done with the help of pre-designed, validated, structured questionnaire using simple random sampling. Statistical analysis was done using SPSS which included computation of proportions and univariate analysis, which was done using chi-square test. **Results:** Good knowledge regarding basic ANC, Janani Suraksha yojana (JSY) and Pradhan Mantri Matru Vandana Yojana (PMMVY), Janani Shishu Suraksha Karyakram (JSSK), Anganwadi services and Home-based Newborn Care (HBNC) was reported by 140 (93.3%), 55 (36.7%), 127 (84.7%), 104 (69.3%), and 113 (75.3%) of the study participants, respectively. Good utilization of the services including basic ANC, JSSY and PMMVY, JSSK, Anganwadi services and HBNC was reported by 139 (92.7%), 13 (8.7%), 94 (62.7%), 104 (55.3%), and 113 (75.3%) of the study participants, respectively. **Conclusion:** The study reported good knowledge and utilization of basic ANC services. However, significant gaps were reported for the services provided under JSY, PMMY followed by JSSK, Anganwadi services and HBNC

**Keywords:** Maternal health, Postnatal care, Prenatal care

### Introduction:

India has seen a significant decline in the maternal mortality from 130 (2014-26) to 93 (2019-21) over the past few years.<sup>[1]</sup> Providing quality healthcare during antenatal and postnatal period is the key towards achieving this consistent decline in the maternal mortality. In order to attain the set target of less than 70 maternal death per 1000 live births by United Nations Sustainable Development Goal (SDG), the government

of India has evolved the Reproductive, Maternal and Child health program with a plethora of newer innovations in providing optimal maternal and child care, ever since the launch of National Rural Health Mission (NRHM), in the year 2005.<sup>[2]</sup>

Antenatal care (ANC), covers the spectrum of medical care including early pregnancy confirmation, tracking and better facilitation of delivery services.<sup>[3]</sup> The Janani Suraksha Yojana (JSY) and Pradhan Mantri

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Matru Vandana Yojana (PMMVY) was launched by the government of India to address the out-of-pocket expenditure in assessing pregnancy related care and promote institutional delivery.<sup>[4]</sup> Jananni Shishu Suraksha Karykram (JSSK), Anganwadi services and Home-based newborn care (HBNC) are few of the other program under the umbrella of Reproductive, Maternal, Neonatal and Child health program to facilitate utilization of antenatal and postnatal care services. JSSK was lunched providing free entitlements including cashless delivery, drug, diagnostics, diet, transport and referral.<sup>[5]</sup> Maternal support through Anganwadi services include provision of supplementary nutrition, immunization, health-check-ups and referral services to the pregnant and lactating female.<sup>[6]</sup> Home visits are provided by ASHA to assess newborn and provide counselling regarding postpartum care (including recognition of postpartum complications, referral, and counselling regarding appropriate contraceptive).<sup>[7]</sup>

Although the utilization of antenatal health care services has increased over time as per the findings from the National Family Health Survey (NFHS).<sup>[8]</sup> However, lacune still exist in its utilization, even after the decade long implementation of the Reproductive, Maternal, Neonatal, Child Health Programme in the country.<sup>[9,10]</sup> Lack of knowledge regarding the importance of ANC and PNC among the beneficiaries expands the knowledge-utilization gap. Thus, arise the need to assess its burden and devise tailored strategies to address the same. Thus, the present study aims to study the knowledge and utilization of antenatal (ANC) and postnatal care (PNC) services among women residing in an urban area of South-East Delhi.

## Methods:

**Study design and participants:** This cross-sectional study was carried out from May 2024 to July 2024 among 150 consenting women of reproductive age who delivered in the last 1 year having children between 6 weeks to 12 months of age, residing in an urban area South-East Delhi. Women in their postnatal period were excluded from the study. According to NFHS-5 report for Delhi, the proportion of mothers who had at-least 4 ante-natal care visits were 77%.<sup>[8]</sup> Considering this as a

proxy to ANC service utilization, and taking 95% confidence interval and 10% relative error, the sample size was calculated as 114. Taking the non-response rate as 10%, a minimum sample size was calculated to be 130. Thus, a sample of 150 participants was taken for the study.

**Data Collection:** Sampling frame was made using data from the 17 Anganwadis catering to the field practice area of Urban Health Training Centre (UHTC) and the antenatal clinic of UHTC. Duplicate entries were deleted. Women were selected using simple random sampling, using a computer-generated random number list. Selected participants were contacted at their home. The selected participant was interviewed face to face, after obtaining a written informed consent. The study was conducted from April to July 2024. Both knowledge and utilization were assessed in seven domains including basic ANC services, JSY, JSSK, PMMVY, Integrated Child Development Scheme (ICDS) and HBNC. Each domain for knowledge was given “Good” category when all the questions were answered correctly, and “Incomplete” category when any of the questions was answered incorrectly. The domain scoring for utilization was given “Good” category when all the services were Utilized and “Incomplete” if any service was not utilized.

**Study instrument:** A self-designed, pre-tested, validated, structured questionnaire was used to assess the knowledge and utilization of the ANC and PNC services among the study participants. The questionnaire consisted of three sections including socio-demographic details, Knowledge regarding ANC and PNC services and Utilization of ANC and PNC services.

**Statistical analysis:** MS Excel was used to compile and clean the data, while SPSS software (version 26.0) was used for analysis. Frequency, mean, median, standard deviation, and percentage are examples of descriptive statistics that were used to characterize the sociodemographic and economic aspects of the research population. The relationship between socio-demographic profile and knowledge and utilization of ANC and PNC services was assessed using Chi-square test (or Fisher’s exact test if available).

**Ethical considerations:** Ethical approval was obtained from the Institutional Ethics Committee (HIMSR/IEC/00189/2024) of Hamdard Institute of Medical Sciences and Research before the start of the study. A written informed consent was taken from the participants of the study after explaining the purpose of the study in their local language.

**Results:**

The study covered 150 individuals who resided in the field practice areas UHTC of a medical college located in South-East Delhi and had children between 6 weeks to 12 months of age. The average age of the individuals was  $26.8 \pm 4.3$  years, with the majority (56.7%) falling into the 25-35 age group. The average age at marriage was  $21.23 \pm 3.98$  years. Table 1 shows sociodemographic details of the study participants.

The rates of ANC knowledge and utilization services were approximately similar. 8.7% of participants reported making efficient utilization of JSY and PMMVY, although 36.7% of participants showed a good knowledge of these programs. The knowledge utilization gap was maximum for the services provided under JSY, PMMY followed by JSSK, Anganwadi services and HBNC. (Table 2)

Knowledge regarding basic ANC was significantly higher among those who had education up to primary level (p-value <0.01) and those belonging to Middle class or above in socioeconomic class (p-value 0.02). The knowledge of ICDS service was significantly higher among those who had middle school or above certificate as compared to those who had education up to primary

(p-value= 0.006). The knowledge of HBNC was significantly higher among those whose husband has education of middle school or above (p-value= 0.03), and Hindus (p-value=0.03). (Table 3)

**Table 1: Socio-demographic profile of the study participants (n=150)**

Socio-demographic characteristics	Frequency (%)
Age (in years)	
<25	54 (36.0)
25-35	85 (56.7)
>35	11(7.3)
Age at marriage (in years)	
<25	128 (85.4)
25-35	20 (13.3)
>35	2 (1.3)
Age of last child (in months)	
< 6	57 (38.0)
> 6	93 (62.0)
Education of Participants	
Middle school or above	96 (64.0)
Up to primary	54 (36.0)
Employment of Participants	
Employed	9 (6.0)
Unemployed	141 (94.0)
Education of husband	
Middle school or above	113 (75.3)
Up to primary	37 (24.7)
Religion	
Hindu	102 (68.0)
Muslim	48 (32.0)
Socio- economic status*	
Upper and Middle	70 (46.7)
Lower	80 (53.3)

Note. \*As per the modified Kuppuswamy scale, 2023

**Table 2: Knowledge and utilization of ANC and PNC services across various program domains among the study participants services. (n=150)**

Domain	Knowledge		Utilization	
	Good	Incomplete	Good	Incomplete
Basic ANC	140 (93.3%)	10 (6.7%)	139 (92.7%)	11 (7.3%)
JSSY&PMMVY	55 (36.7%)	95 (63.3%)	13 (8.7%)	137 (91.3%)
JSSK	127 (84.7%)	23 (15.3%)	94 (62.7%)	56 (37.3%)
Anganwadi	104 (69.3%)	46 (30.7%)	83 (55.3%)	67 (44.7%)
HBNC	113 (75.3%)	37 (24.7%)	98 (65.3%)	52 (34.7%)

**Table 3: Association between adequate knowledge of ANC and PNC services and their socio demographic characteristics. (n=150)**

Socio-demographic status	Basic ANC		JSY and PMMVY		JSSK		ICDS		HBNC	
	n (%)	p-value	n (%)	p-value	n (%)	p-value	n (%)	p-value	n (%)	p-value
Age (in years)										
<25 (n=54)	50 (92.6%)	0.747*	23 (42.6%)	0.259	49 (90.7%)	0.122	41 (75.9%)	0.189	42 (77.8%)	0.602
≥25 (n=96)	90 (93.8%)		32 (33.3%)		78 (81.3%)		63 (65.6%)		71 (74.0%)	
Age at marriage										
<25 (n=128)	119 (93%)	1.00*	50 (39.1%)	0.142	110 (85.9%)	0.336	91 (71.1%)	0.259	99 (77.3%)	0.168
≥25 (n=22)	21 (95.5%)		5 (22.7%)		17 (77.3%)		13 (59.1%)		14 (63.6%)	
Education of Participant										
Middle school or above (n=96)	86 (89.6%)	0.01*	37 (38.5%)	0.525	83 (86.5%)	0.417	74 (77.1%)	0.006*	77 (80.2%)	0.065
Up to primary (n=54)	54 (100%)		18 (33.3%)		44 (81.5%)		30 (55.6%)		36 (66.7%)	
Employment of Participant										
Employed (n=9)	9 (100%)	1.00*	5 (55.6%)	0.289*	8 (88.9%)	1.000	4 (44.4%)	0.133	6 (66.7%)	0.690
Unemployed (n=141)	131 (92.29%)		50 (35.5%)		119 (84.4%)		100 (70.9%)		107 (75.9%)	
Education of husband										
Middle school or above (n=113)	105 (92.9%)	1.00*	41 (36.3%)	0.864	96 (85%)	0.864	81 (71.7%)	0.276	90 (79.6%)	0.032*
Up to primary (n=37)	35 (94.6%)		14 (37.8%)		31 (83.8%)		23 (62.2%)		23 (62.2%)	
Religion										
Hindu (n=102)	98 (96.1%)	0.07*	37 (36.3%)	0.884	85 (83.3%)	0.509	75 (73.5%)	0.104	82 (80.4%)	0.036*
Muslim (n=48)	42 (87.5%)		18 (37.5%)		42 (87.5%)		29 (60.4%)		31 (64.6%)	
Socio- economic										
Upper and Middle (n=70)	69 (98.6%)	0.02*	27 (38.6%)	0.651	57 (81.4%)	0.303	44 (62.9%)	0.108	49 (70%)	0.156
Lower (n=80)	71 (88.8%)		28 (35.0%)		70 (87.5%)		60 (75.0%)		64 (80%)	

Note. \*Fisher exact test

**Table 4: Association between adequate utilization of ANC and PNC services and their socio demographic characteristics. (n=150)**

Socio-demographic status	Basic ANC		JSY and PMMVY		JSSK		ICDS		HBNC	
	n (%)	p-value	n (%)	p-value	n (%)	p-value	n (%)	p-value	n (%)	p-value
Age (in years)										
<25 (n=54)	51 (94.4%)	0.747	6 (11.1%)	0.547	37 (68.5%)	0.266	36 (66.7%)	0.036	34 (63.0%)	0.647
≥25 (n=96)	88 (91.7%)		7 (7.3%)		57 (59.4%)		47 (49%)		64 (66.7%)	
Age at marriage										
<25 (n=128)	117 (91.4%)	0.369	12 (9.4%)	0.693	85 (66.4%)	0.022	75 (58.6%)	0.053	86 (67.2%)	0.250
≥25 (n=22)	22 (100%)		1 (4.5%)		9 (40.9%)		8 (36.4%)		12 (54.5%)	
Education of Participant										
Middle school or above (n=96)	87 (90.6%)	0.329	7 (7.3%)	0.547	68 (70.8%)	0.006	63 (65.6%)	0.001*	67 (69.8%)	0.126
Up to primary (n=54)	52 (96.3%)		6 (11.1%)		26 (48.1%)		20 (37.0%)		31 (57.4%)	
Employment of Participant										
Employed (n=9)	9 (100.0%)	1.000	0 (0.0%)	1.000	3 (33.3%)	0.079*	0 (0.0%)	0.001*	2 (22.2%)	0.009*
Unemployed (n=141)	130 (92.2%)		13 (9.2%)		91 (64.5%)		83 (58.9%)		96 (68.1%)	
Education of husband										
Middle school or above (n=113)	104 (92.0%)	1.000	11 (9.7%)	0.521	72 (63.7%)	0.642	64 (56.6%)	0.575	78 (69.0%)	0.097
Up to primary (n=37)	35 (94.6%)		2 (5.4%)		22 (59.5%)		19 (51.4%)		20 (54.1%)	
Religion										
Hindu (n=102)	95 (93.1%)	0.745	12 (11.8%)	0.062	65 (63.7%)	0.696	61 (59.8%)	0.108	72 (70.6%)	0.049
Muslim (n=48)	44 (91.7%)		1 (2.1%)		29 (60.4%)		22 (45.8%)		26 (54.2%)	
Socio- economic										
Upper and Middle (n=70)	65 (92.9%)	0.933	7 (10.0%)	0.587	40 (57.1%)	0.191	33 (47.1%)	0.059	44 (62.9%)	0.551
Lower (n=80)	74 (92.5%)		6 (7.5%)		54 (67.5%)		50 (62.5%)		54 (67.5%)	

Note. \*Fisher exact test

Utilization of Anganwadi services was significantly higher among younger age women (p-value=0.03 and among those with higher education level (p-value=0.001), and unemployed women (p-value=0.001). Utilization of HBNC services was significantly higher among Hindu (p-value=0.04) and unemployed women (p-value=0.001). Utilization of JSSK services was significantly higher among those who has earlier age at marriage (p-value=0.02) and with higher education level (p-value=0.006). (Table 4)

### **Discussion:**

The findings of this study shed light on the knowledge and utilization of ANC and PNC services among women who had their delivery in last 1 year residing in urban area of Southeast Delhi. The mean age of participants was 26.8±4.3year and majority fall in the age group of 25-35 years (56.7%).

According to the present study, 93.3% of participants know enough about ANC services. This was comparable with the findings of Kaur A et al.<sup>[11]</sup>, who found that a significant portion of participants had early registration as well as regular ANC visits. Nonetheless, Rustagi R et al.<sup>[9]</sup> reported lower knowledge levels (12.5%) regarding ANC services. The differences between the study findings could be attributed to differences in the operational definition of basic ANC care, used in different studies. Only 36.7% of participants in the present study had good knowledge regarding services under JSY and PMMVY. Similarly, Khesh S et al.<sup>[12]</sup> also reported services good knowledge of services under JSY by only 40.3% of the participants. However, Manna N et al.<sup>[13]</sup> found even lower knowledge levels (9.3%), which can be related to inadequate accessibility and lack of awareness of these services among the participants in their study. Majority (84.7%) of participants in the present study had good knowledge of JSSK, which was higher than the study done by Chandrakar A et al.<sup>[14]</sup> (1.42%) and Rupani M et al.<sup>[15]</sup> (54%). This difference in the study findings could be attributed to differences in the health seeking behaviour, accessibility to health services, and their socio-demographic profile. Almost 70% of the study participants had good knowledge regarding Anganwadi

services. Concordant findings were also reported in the study by Bhagat VM et al.<sup>[16]</sup>, and Kadam S et al.<sup>[17]</sup>. Nearly three-fourth of participants had good understanding of HBNC services in the present study. Higher education level of the husband could be one of the factors behind good knowledge of HBNC among their spouse, which was also observed in our study.

High utilization of basic ANC services indicates strong accessibility to medical care in our study. On the other hand, only 8.7% of JSY and PMMVY services were used which could be due to poor linkage of the peripheral health functionaries and the beneficiaries. The results of Nawale AY et al.<sup>[18]</sup>, who showed a 77% use rate for PMMVY benefits, are in sharp contrast to findings of the present study. A higher percentage of younger and more educated women (62.7%) used JSSK services in the present study. Kaur H. et al.<sup>[19]</sup> also reported good utilization of free delivery services, drugs, diagnostics, diet and transport services under JSSK. A total of 55.3% of participants made use of Anganwadi services, with younger and more educated women using them more frequently in the present study. The study findings were in concordance with the findings of the study conducted by Paul S et al.<sup>[20]</sup>, conducted in Delhi. A study conducted by Bhagat VM et al.<sup>[16]</sup> showed that, out of total 140 study participants, 89.29% utilized one or more services by the AWC. A study conducted by Rehman HM et al.<sup>[21]</sup> in rural Lucknow showed that only 4.7% had good utilization of Anganwadi services, 58.6% had average utilization and 36.6% had poor utilization. Higher utilization of Anganwadi services during pregnancy including supplementary nutrition, health education, immunization and health check-ups, was reported by Harikrishna BN et al.<sup>[22]</sup> in a study conducted in rural Telangana. These inadequacies in the utilization practices of Anganwadi services across majority of the studies could be attributed to poor linkages of the peripheral health functionaries including ASHAs and Anganwadi workers, with the beneficiaries. HBNC service utilization was reported among 65.3% of participants in our study. In contrast, significantly lower use was found by Rane TM et al.<sup>[23]</sup> The variability in the study findings could be due to differences in the

geographic distribution of the study participants. Also, a possible reason behind higher utilization among the unemployed could be the availability of the mother in the post-partum period.

### Conclusion:

The study reported good knowledge and utilization of basic ANC services. However, significant gaps were reported for the services provided under JSY, PMMY followed by JSSK, Anganwadi services and HBNC Improving the health outcomes for mothers and children depends on addressing these knowledge-utilization gaps with specific interventions.

### Recommendation:

The knowledge gap identified for the maternal programs including JSY, PMMVY, Anganwadi services could be addressed by conducting educational campaigns regarding the available services at local level. Awareness regarding the maternal health care programs can also be improved with the help utilization of mass media as tool.

### Limitations:

As the study population was limited only to the field practice area of a tertiary care hospital, the study may lack external validity. While the study looked at different factors like age, education, job status, and socioeconomic class, it didn't cover other factors like cultural beliefs, family support, accessibility to healthcare facilities, and the attitudes of healthcare providers.

### Declaration:

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Conflict of Interest: Nil

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## Burden of Oral Precancerous Lesions and Associated Factors among Truck Drivers in Kolkata, West Bengal

Mohammed Adil Hussain M<sup>1</sup>, Aditi Ajit Jaiswal<sup>1</sup>, Meganathan E<sup>1</sup>, Arun G<sup>1</sup>, Lamabam Harit Singh<sup>2</sup>, Bobby Paul<sup>3</sup>

<sup>1</sup>Junior Resident, <sup>3</sup>Professor and Head, Department of Preventive and Social Medicine, All India Institute of Hygiene and Public Health, Kolkata, India

<sup>2</sup>Junior Resident, Department of Epidemiology, All India Institute of Hygiene and Public Health, Kolkata, India

**Correspondence:** Dr. Mohammed Adil Hussain M, Email: dradelhusyn@gmail.com

### Abstract:

**Introduction:** India accounts for a significant share of global smokeless tobacco users. Tobacco consumption, both smoking and chewing, is associated with oral mucosal lesions that may progress to cancer. Truck drivers are a vulnerable group due to occupational stress and high-risk habits. **Objectives:** To estimate the prevalence of oral precancerous lesions among truck drivers in Kolkata and identify associated factors. **Methods:** A cross-sectional study was conducted among 171 truck drivers selected by systematic random sampling from December 2022 to February 2023. Data were collected using a pretested interview schedule followed by oral examination. Data were analysed using SPSS version 24. **Results:** The median age was 37 (IQR 30, 55) years. All participants were male; 157 (91.8%) belonged to lower and middle socioeconomic classes. Tobacco use was reported in 68.4%, alcohol use in 69 (40.4%), and 24 (14.0%) had oral precancerous lesions, with leucoplakia being most common. Multivariable logistic regression identified poor oral hygiene (aOR = 6.29;  $p = 0.001$ ), younger age (aOR = 0.012;  $p = 0.001$ ), tobacco use (aOR = 24.12;  $p = 0.003$ ), and years of truck driving (aOR = 1.41;  $p < 0.0001$ ) as significant predictors. **Conclusion:** The study found a 14.6% prevalence of oral precancerous lesions, significantly associated with tobacco use, poor oral hygiene, younger age, and longer driving duration. Targeted workplace screening, oral health education, and cessation support are recommended for early detection and prevention among high-risk occupational groups.

**Keywords:** Oral Potentially Malignant Disorders; Truck drivers; Tobacco Use; Oral Hygiene

### Introduction:

Oral precancerous lesions represent a significant public health concern globally, as they serve as potential indicators of malignant transformation and an increased risk of oral cancer.<sup>[1]</sup> The burden of these lesions varies among different populations, with certain occupational groups being particularly susceptible due to their unique occupational hazards and lifestyle factors.<sup>[2]</sup> Truck drivers form a significant occupational group in Kolkata,

West Bengal, facing numerous challenges and exposed to multiple risk factors that can influence the development of oral precancerous lesions.<sup>[3]</sup>

Kolkata, as a bustling metropolis and a major transportation hub in West Bengal, witnesses a high volume of goods transported daily by truck drivers. These drivers encounter traffic congestion, endure unpredictable long working hours, and frequently face stressful conditions while driving. Additionally, they

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often engage in habits such as tobacco and alcohol use, which are well-established risk factors for oral precancerous lesions.<sup>[4,5]</sup> The study is critical, particularly concerning the mobile population of truck drivers who are constantly on the move, making it challenging for them to access community screenings and health checkups in their home areas. Limited research investigates the specific burden of oral precancerous lesions among truck drivers in Kolkata and the factors associated with their occurrence.

Epidemiological investigations show that smoking, periodontal disease, and oral cancer are closely related.<sup>[5]</sup> According to The Global Adult Tobacco Survey 2 (2016-2017), the three largest states of Uttar Pradesh, West Bengal, and Maharashtra have the highest number of tobacco users and together account for more than one-third (38%) of the tobacco users in India. 32.7 million in West Bengal are current tobacco users, that accounts for 33.7% of the entire population.<sup>[6]</sup>

Understanding the burden and associated factors of oral precancerous lesions among truck drivers in Kolkata is crucial for several reasons. Firstly, it provides valuable insights into the oral health status of this specific occupational group, thereby aiding in the development of targeted preventive measures and intervention strategies.<sup>[7]</sup> Secondly, elucidating the factors associated with the development of oral precancerous lesions in this population can help identify high-risk groups and inform the implementation of appropriate health promotion initiatives.<sup>[8]</sup> Moreover, investigating the burden and associated factors of oral precancerous lesions in Kolkata's truck drivers can contribute to the existing body of knowledge on occupational health and highlight the need for tailored interventions to mitigate the impact of occupational hazards on oral health.

Therefore, this study aims to assess the burden of oral precancerous lesions and investigate the associated factors among truck drivers in Kolkata, West Bengal. By examining the prevalence, types, and clinical characteristics of oral precancerous lesions, as well as analysing the potential influence of occupational and lifestyle factors, we seek to enhance our understanding

of the oral health challenges faced by this specific occupational group and contribute to the formulation of targeted preventive strategies.

## Methods:

### Study Setting and Design

This was a descriptive cross-sectional study conducted from November 2022 to March 2023 in a single large logistics company that operates multiple warehouses across Kolkata, including locations in Dankuni, Dunlop, and Howrah. The company was selected through convenience sampling based on prior institutional collaboration and feasibility of access, as it permitted onsite health research activities and had a sizeable population of full-time truck drivers.

### Study Population and Sampling Technique

Truck drivers above the age of 18 years and working in the field of driving for more than a period of one year and were working full-time were included in the study. Those who were acutely ill and were unwilling to participate were excluded.

Taking the prevalence of 42.24% by Bhattacharjee T et al.<sup>[9]</sup> with a 95% confidence interval and absolute error (L) = 7.5%, the minimum sample size achieved was 171 participants.

The study utilized a systematic random sampling method to select participants from the pool of currently employed truck drivers within the logistics company. Among the 250 eligible truck drivers available on-site, a sampling interval (k) was determined by dividing the total number of eligible drivers (N = 250) at the warehouse by the desired sample size (n = 171).

$$k = n/N = 171/250 \approx 1.46$$

Since selecting every first driver would over sample, and every second driver would under sample, every alternate driver (k = 2) was approached initially to meet the sample requirement. During actual recruitment, non-respondents and refusals were replaced by the next eligible driver on the list, ensuring the final sample size of 171 was achieved. The sampling interval was adjusted to accommodate non-response while maintaining the systematic nature of selection.

### **Study Tools and Technique**

Screening for oral precancerous lesions was conducted following a systematic approach. Written informed consent was obtained from each participant prior to data collection. A comprehensive medical history was recorded, assessing risk factors such as tobacco and alcohol use. A detailed oral examination was carried out using a fluorescent lamp, which included inspection of the lips, buccal mucosa, tongue, floor of the mouth, and palate. Diagnostic aids were utilised when necessary. Any suspicious lesions identified during the examination were documented and photographed for reference. Participants with clinically suspicious findings were referred for specialist evaluation, and follow-up appointments were arranged to ensure appropriate management. Strict data management protocols were implemented to maintain accuracy and confidentiality.

Oral hygiene status and related practices were also assessed. Clinical examination included evaluation of plaque, calculus, gingival health, dental caries, oral mucosa, and halitosis. The Simplified Oral Hygiene Index (OHI-S) was applied to provide a standardised measurement of oral cleanliness.<sup>[10]</sup> Additionally, participants completed a structured questionnaire covering oral hygiene habits, types of dental products used, and dietary practices. The combined data from clinical and questionnaire assessments were analysed to explore associations between oral hygiene practices and oral health outcomes.

For the purpose of this study, oral precancerous lesions were defined as per the World Health Organization (WHO) classification, including leukoplakia, erythroplakia, and oral submucous fibrosis.<sup>[1]</sup> Burden of oral precancerous lesions was assessed by determining both prevalence and severity, based on clinical characteristics such as lesion size, colour, and features suggestive of dysplasia.<sup>[11,12]</sup>

Oral health was defined in accordance with the WHO as a state of the mouth, teeth, and orofacial

structures that enables individuals to eat, speak, and socialise without discomfort or disease, supporting overall well-being and self-confidence.<sup>[13]</sup>

### **Data Analysis**

Quantitative data was analysed using Microsoft Excel 2019 and Statistical Package for Social Sciences software (Version 24). Descriptive statistics for the predictor variables and the outcome variables were shown by frequency table, median, and interquartile range. Data were represented by tables, charts, and figures. Factors were tested for significance ( $p$ -value  $< 0.05$ ) at 95% confidence interval in a univariate regression model after excluding multicollinearity. The final multivariable logistic regression model was performed, including all the biologically plausible and significant predictor variables in the respective univariate analysis.

### **Ethical Approval**

The study was approved by the Institutional Ethics Committee (IEC/AIHH&PH/2022/29) and was conducted in accordance with the ethical standards of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to data collection. Confidentiality and anonymity were maintained throughout the study.

### **Results:**

A total of 171 male truck drivers participated in the study. The median age was 37 years (interquartile range: 30–55 years), and the median duration of truck driving experience was 17 years. Most participants were Hindu ( $n = 96$ , 56.1%), followed by Muslims ( $n = 42$ , 24.6%), and others ( $n = 33$ , 19.3%). Regarding educational status, 32 (18.7%) were illiterate, and 119 (69.5%) had completed formal education up to the primary level. Socioeconomic status was assessed using the Modified BG Prasad Scale (2022), with 157 (91.7%) participants classified under lower and middle classes, suggesting limited economic resources and healthcare access. The detailed sociodemographic profile is presented in Table 1.

**Table 1: Sociodemographic characteristics of the study participants (Nn= 171)**

Category	Frequency (n)	Percentage (%)
Gender		
Male	171	100.0
Age (in years)		
Median (IQR)	37 (3055)	-
Religion		
Hindu	96	56.1
Muslim	42	24.6
Others	33	19.3
Education		
Illiterate	32	18.7
Up to Primary Level	119	69.5
Above Primary	20	11.7
Truck Driving Experience (years)		
Median (IQR)	17 (11-18)	-
Socioeconomic Class (Modified BG Prasad)		
Lower	102	59.6
Middle	55	32.1
Upper	14	8.3

\* Others included Jain, Christian etc.

**Oral Precancerous Lesions**

Out of the 171 participants, 24 individuals (14.0%) were diagnosed with one or more oral precancerous lesions. Among these, the most common lesion was leucoplakia, observed in 12 participants (7.0%). Other types of oral precancerous lesions included actinic cheilosis in 6 participants (3.5%), submucous fibrosis in

**Table 2: Type and Site of Oral Precancerous Lesions among study participants (n = 171)**

	Frequency (n)	Percentage (%)
Lesion Type (n=24)*		
Leukoplakia	12	7.0%
Actinic cheilosis	6	3.5%
Oral submucous fibrosis	3	1.8%
Erythroplakia	2	1.2%
Lichen planus	1	0.6%
Site Affected (n=26)*		
Buccal mucosa	14	8.2%
Tongue	5	2.9%
Lower lip	4	2.3%
Palate	2	1.2%
Gingiva	1	0.6%

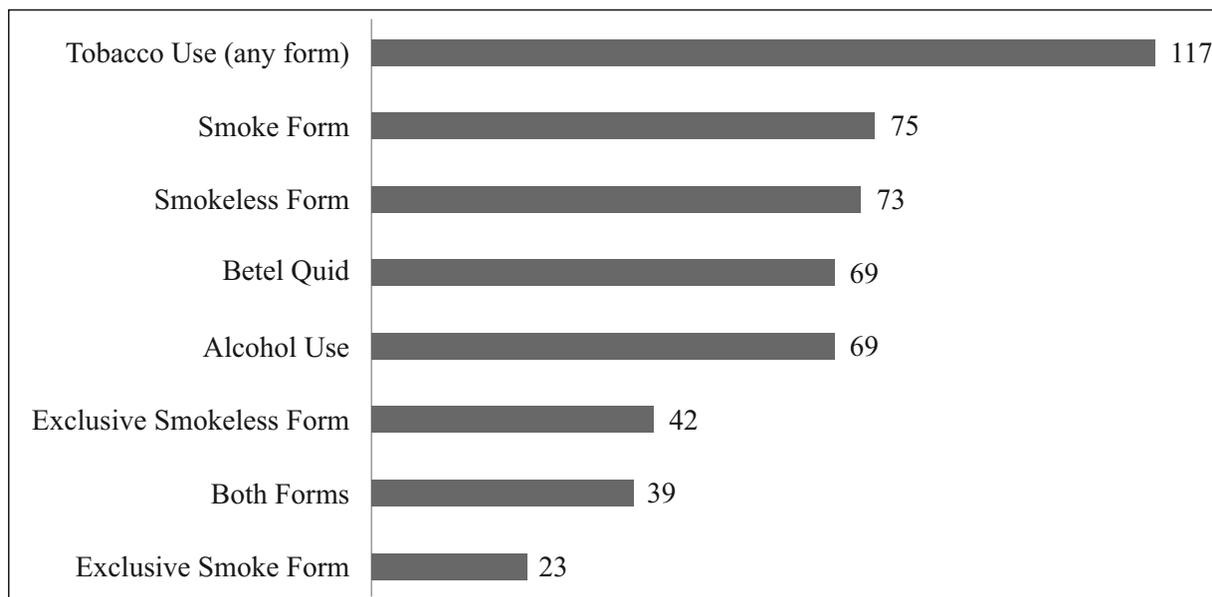
Note: Some participants had more than one lesion or site involved. Hence, totals may exceed 100%.

3 participants (1.8%), erythroplakia in 2 participants (1.2%), and lichen planus in 1 participant (0.6%). The remaining 147 participants (86.0%) did not present with any detectable oral precancerous lesions.

**Determinants of Oral Precancerous Lesions**

Substance use was highly prevalent among the truck drivers. A total of 117 participants (68.4%) reported using tobacco in any form. Among them, 75 (43.9%) consumed smoke forms such as bidi or cigarettes, while 73 (42.7%) used smokeless forms like gutkha or khaini.

**Figure 1: Substance Use Patters among study Participants (n = 171)**



**Table 3: Distribution of Oral Hygiene Indicators and Practices among study participants (n = 171)**

Oral Hygiene Variable	Frequency (n)	Percentage (%)
Oral Hygiene Index (OHI-S)		
Good	45	26.3
Fair	72	42.1
Poor	54	31.6
Brushing Frequency		
Once daily	112	65.5
Twice daily	42	24.6
Irregular	17	9.9
Brushing Instrument		
Toothbrush	137	80.1
Finger	26	15.2
Neem stick	8	4.7
Toothpaste Type Used		
Fluoridated	109	63.7
Non-fluoridated	41	24.0
Unknown	21	12.3
Use of Traditional Substances		
Yes	36	21.1
No	135	78.9

Dual use of both forms was reported by 39 participants (22.8%). Exclusive use of smoked tobacco was observed in 23 (13.5%), and exclusive use of smokeless tobacco in 42 (24.6%). Additionally, alcohol and betel quid consumption were each reported by 69 participants (40.4%).

**Oral Hygiene Indicators and Practices**

Oral hygiene status and related practices were evaluated among all 171 truck drivers. As shown in Table 3, 45 participants (26.3%) had good oral hygiene, 72 participants (42.1%) had fair hygiene, and 54 participants (31.6%) were assessed with poor oral hygiene based on the Simplified Oral Hygiene Index (OHI-S).

Brushing frequency was reported as once daily by 112 participants (65.5%), twice daily by 42 participants (24.6%), and irregular by 17 participants (9.9%). Regarding brushing instruments, 137 participants (80.1%) used a toothbrush, 26 participants (15.2%) used

**Table 4: Multivariable logistic regression showing association of different factors with Prevalence of Oral Precancerous lesions among study participants (n = 171)**

Variable	Adjusted OR (95% CI)	p-value
Age of Truck Driver	0.012 (0.01 0.149)	0.001
Socioeconomic Status		
Upper class	ref	-
Middle class	1.512 (0.258 8.858)	0.647
Lower class	0.740 (0.150 3.662)	0.712
Truck Driving Years	1.419 (1.181 1.706)	<0.0001
Tobacco Consumption		
Absent (Ref)	ref	-
Present	24.123 (2.885 201.734)	0.003
Betel Quid Consumption		
Absent (Ref)	ref	-
Present	3.609 (1.029 12.654)	0.055
Alcohol Consumption		
Absent	ref	-
Present	0.030 (0.003 0.281)	0.200
Oral Hygiene		
Present	ref	-
Absent	6.289 (2.079 19.022)	0.001
Oral Hygiene Practice		
Good practice	ref	-
Poor practice	6.240 (1.370 13.090)	0.129

their fingers, and 8 participants (4.7%) used neem sticks or similar traditional materials.

Fluoridated toothpaste was used by 109 participants (63.7%), non-fluoridated toothpaste by 41 participants (24.0%), and 21 participants (12.3%) were unaware of the type of toothpaste they used. Additionally, 36 participants (21.1%) reported using traditional substances such as charcoal or ash for oral cleaning, while 135 participants (78.9%) denied such practices.

These findings indicate that a significant proportion of truck drivers engage in suboptimal oral hygiene practices, which may contribute to the development of oral precancerous lesions.

#### **Factors associated with Oral Precancerous Lesions**

Binary univariate logistic regression was done for all the factors. The predictor variables which came significant in univariate analysis at p-value <0.25, were put in the final multivariable logistic model. Results are shown in Table 4.

#### **Discussion:**

The findings of this study shed light on several crucial factors potentially influencing a specific outcome among truck drivers. The investigation encompassed a range of variables, including age, socioeconomic status, truck driving experience, tobacco consumption, betel quid consumption, alcohol consumption, oral hygiene, and oral hygiene practice. The analysis yielded significant insights into the associations between these factors and the outcome of interest.

In West Bengal, the proportion of men aged 15 years and above who use any kind of tobacco is 48.1% according to the National Family Health Survey - 5 2019-20.<sup>[14]</sup> Tobacco consumption displayed a significant relationship with the outcome. Truck drivers who reported tobacco consumption exhibited significantly higher odds of experiencing the outcome. This finding underscores the well-established health risks associated with tobacco use and emphasises the importance of smoking cessation programmes and tobacco control measures targeted specifically at this occupational group.

The results of this study also suggest that oral hygiene is a significant determinant of oral precancerous lesions among truck drivers. People with poor oral hygiene were more likely to develop oral precancerous lesions than people with good oral hygiene. This finding is consistent with previous studies by Gupta et al.<sup>[15]</sup>, 2017, and Balaram et al.<sup>[16]</sup>, 2002, that have shown a link between poor oral hygiene and oral precancerous lesions.

The finding that oral hygiene practices suggested that the association between oral hygiene practices and oral precancerous lesions is not strong enough to be considered significant. This could be due to a number of factors, such as the way that oral hygiene practices were measured in this study. It is also possible that other factors, such as smoking or diet, play a more important role in the development of oral precancerous lesions.

Age emerged as a determinant for oral precancerous lesions. The data showed that older truck drivers were significantly less likely to suffer from oral precancerous lesions compared to their younger counterparts. Similar findings were found in a study conducted by Shetty et al.<sup>[3]</sup> among cab drivers in Bengaluru City, Karnataka. This finding underscores the importance of considering age as a relevant factor in understanding and addressing the issue at hand. It also raises questions about potential age-related factors, such as experience, health behaviours, or physiological differences, that might contribute to this observed association.

The borderline significance observed for betel quid consumption warrants attention, as it suggests a potential role in influencing the outcome. Likewise, the protective trend associated with alcohol consumption, although not statistically significant, raises questions about the moderation of alcohol's effects on health outcomes among this population. Further research with larger sample sizes may provide more clarity on these relationships.

#### **Conclusion:**

The study found that 14.0% (24 out of 171) of truck drivers in Kolkata had oral precancerous lesions, with

leukoplakia being the most common type. Tobacco consumption was reported by 68.4% of participants and emerged as a strong predictor for oral lesions (aOR = 24.12). Poor oral hygiene (aOR = 6.29) and longer duration of truck driving (aOR = 1.41 per year) were also independently associated with lesion occurrence. Conversely, increasing age was associated with a lower likelihood of having lesions (aOR = 0.012).

Although betel quid and alcohol consumption did not reach statistical significance in the multivariable model, they showed potential trends worth further investigation. These findings underscore the importance of integrating tobacco cessation, oral hygiene promotion, and routine oral screening into occupational health programs for truck drivers in urban logistics sectors.

#### **Limitations:**

It is essential to acknowledge the study's limitations, such as its cross-sectional design and the specific geographic location of the study. Further research is needed to establish causal relationships and generalise the findings to other truck driver populations.

#### **Recommendations:**

Based on the study findings showing a 14% prevalence of oral precancerous lesions and strong associations with tobacco use, poor oral hygiene, and longer occupational duration, targeted interventions are recommended. Workplace-based oral screening should be introduced at transport hubs to enable early identification and referral. Tobacco cessation programmes tailored for truck drivers are essential, given the high usage rate and strong link with lesion presence. Oral hygiene education and the distribution of low-cost, travel-friendly hygiene kits should be incorporated into outreach activities, as poor oral hygiene was an independent risk factor. Additionally, focused interventions should target younger drivers and those with longer driving experience, who were found to be at higher risk.

Establish workplace-based oral screening programmes within transport hubs and logistics

companies where truck drivers are stationed. Early identification of precancerous lesions at the workplace can facilitate timely referral and management, especially considering that drivers may have limited access to routine healthcare services.

Incorporate oral hygiene education and low-cost preventive tools (e.g., travel-friendly oral hygiene kits) into routine health outreach for drivers.

Target younger drivers and those with longer driving experience, both of whom were found to be at greater risk in the study. Peer-led sessions and behaviour change interventions may be particularly effective for these groups.

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## Prevalence, Patterns and Predictors of Physical Inactivity in a Rural area of Goa: A Community Based Cross Sectional Study

Ronald Robin<sup>1</sup>, Vanita G Pinto Da Silva<sup>2</sup>

<sup>1</sup>Postgraduate Student, <sup>2</sup>Associate Professor, Department of Community Medicine, Goa Medical College and Hospital, Bambolim, Goa, India

**Correspondence:** Ronald Robin, Email: krrobin10@gmail.com

### Abstract:

**Introduction:** Physical inactivity significantly raises the risk of death from noncommunicable diseases and about one-third of adults fall short of recommended activity levels. In India, inactivity has surged from 22.3% in 2000 to 49.4% in 2022, prompting urgent action. This alarming trend underscores the urgent need for research to better understand and address the growing burden of inactivity and its health consequences. **Objective:** To estimate the prevalence of physical inactivity among adults residing in rural area of Goa and to study the factors associated with it. **Methods:** A Community based cross sectional study was conducted amongst individuals  $\geq 18$  years residing in field practice area of Rural health & training centre, Mandur, Goa. A semi structured questionnaire with Global Physical Activity Questionnaire (GPAQ) was used to collect data. At a proportion of 22%, 95% confidence interval and 5% absolute error the sample size was 300. Systematic random sampling was employed. **Results:** Out of 300 study participants, 158 (52.7%) were females and 142 (47.3%) were males. Prevalence of physical inactivity in the study population was 113 (37.7%). Age ( $p=0.021$ ), Sex ( $p=0.012$ ), Education ( $p=0.014$ ), Occupation ( $p=0.024$ ), Smoking ( $p=0.001$ ), Alcohol ( $p=0.001$ ) and Comorbidities ( $p=0.001$ ) were found to be significantly associated with physical inactivity. **Conclusion:** This study highlights that many adults in rural Goa lead inactive lifestyles, which can impact their health in the long run. To tackle this issue, policymakers should focus on creating more opportunities for physical activity and strengthen community health programs to promote overall well-being.

**Keywords:** Lifestyle, Physical inactivity, Rural Population

### Introduction:

The World Health Organization (WHO) defines physical activity as any body movement requiring energy, including leisure, work, transport, and household tasks. Regular activity improves health, while inactivity raises the risk of noncommunicable diseases (NCDs) and mortality by 20-30%. Globally, 31% of adults (1.8 billion people) fail to meet the recommended 150 minutes of weekly moderate-intensity activity - a 5%

increase since 2010. If trends persist, 35% may be inactive by 2030. Additionally, 80% of adolescents lack sufficient activity, with women being less active than men. WHO aims to reduce inactivity by 10% by 2025 and 15% by 2030 to mitigate rising healthcare costs, projected at \$300 billion by 2030.<sup>[1]</sup>

Physical inactivity is a major risk factor for noncommunicable diseases (NCDs) in India. Despite awareness efforts, inactivity among adults has

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significantly increased from 22.4% in 2000 to 45.4% in recent years, with projections suggesting it could reach 55% by 2030.<sup>[2]</sup> A significant gender gap exists, with 52.6% of women and 38.4% of men being physically inactive.

Several factors influence physical activity levels, including gender, socioeconomic status, financial limitations, and physical discomfort. To improve overall health and well-being, the World Health Organization (WHO) recommends at least 150 minutes of moderate-intensity physical activity per week. Recognizing the need for action, the Indian government launched the “Fit India Movement” in 2019 to encourage a more active lifestyle nationwide. However, despite these initiatives, inactivity continues to rise, highlighting the urgent need for more targeted and sustainable interventions to promote physical activity across all population groups.<sup>[2,3]</sup>

Despite its prevalence, data on physical inactivity amongst adults residing in Goa remains limited prompting the need for this study.

### Methods:

This community-based cross-sectional study was carried out over three months, from December 2024 to February 2025, in the field practice area of the Rural Health and Training Centre (RHTC) in Mandur, Goa. The study covered the villages of Mandur, Azossim, and Neura. Adults aged 18 years and above who were permanent residents and willingly provided informed consent were included in the study. However, individuals who were pregnant, acutely ill, physically disabled, or unavailable at home for three consecutive visits were excluded.

### Sample Size and Sampling Strategy

A sample size of 300 was determined using the formula  $n = Z(1-\alpha) pq/d^2$ , based on an estimated 22% prevalence of physical inactivity<sup>[4]</sup> with a 5% margin of error. The study area comprised 1,588 households with a total population of 5,812. Participants were selected using systematic random sampling, with a sampling interval ( $K$ ) of 5, obtained by dividing the total number of households (1,588) by the target sample size (300). The first household was chosen randomly within the initial interval, and every fifth household thereafter was

included. In cases where multiple eligible individuals were present in a household, one participant was selected at random through a simple lottery method.

### Ethical Considerations

The study received ethical approval from the Goa Medical College Ethics Committee (GMC IEC/2024/347). Before data collection, written informed consent was obtained from all participants, ensuring voluntary participation and maintaining confidentiality.

### Data Collection

Sociodemographic details, including age, religion, education level, and occupation, were collected through face-to-face interviews using a structured and pre-tested questionnaire. Educational status was classified according to the Modified Kuppaswamy Socioeconomic Scale (2024)<sup>[5]</sup>, while socioeconomic status was determined using the Updated BG Prasads Classification (2024).<sup>[5]</sup> Physical inactivity was assessed using the Global Physical Activity Questionnaire (GPAQ).

Global Physical Activity Questionnaire (GPAQ): The GPAQ, developed by the World Health Organization (WHO) for monitoring physical activity patterns, consists of 16 questions assessing activity levels across three domains - work, transportation, and leisure- as well as sedentary behaviour. Data were analysed by calculating the total minutes per week spent on moderate and vigorous physical activities within three domains. (1) Work-related activity: Includes tasks such as paid or unpaid labor, studying, household chores, farming, fishing, hunting, and job-seeking, (2) Transport-related activity: Covers walking, cycling, and other active modes of commuting, (3) Leisure-time activity: Encompasses sports, exercise, and other recreational activities. To quantify activity intensity, Metabolic Equivalents (METs) were used. Moderate-intensity activities were assigned a value of 4 METs, while vigorous-intensity activities were assigned 8 METs. The total MET-minutes per week were computed by multiplying the MET value by the total minutes spent in each activity category. These values reflect that moderate-intensity activities burn four times the energy of a person at rest, whereas vigorous-intensity activities burn eight times more.<sup>[6]</sup>

**Operational Definition**

Ever-smokers: Ever smokers include both current and former smokers

Current smoker: An adult who has smoked 100 cigarettes in his or her lifetime and who currently smokes cigarettes.

Former smoker: An adult who has smoked at least 100 cigarettes in his or her lifetime but who had quit smoking at the time of interview.

Never smokers: An adult who has never smoked, or who has smoked less than 100 cigarettes in his or her lifetime.<sup>[7]</sup>

Ever users of alcohol: Ever users of alcohol include both current users and former users.

Current alcohol users: Current alcohol users are defined as person who have consumed one or more standard drinks of alcohol at least once during the past 1 year preceding the time of the interview.

Former alcohol users: Former alcohol users are defined as person who have consumed one or more standard drink of alcohol at least once during their lifetime but had not done so for 1 year preceding the survey.

Never users of alcohol: Never users of alcohol are defined as person who have never consumed alcohol in his lifetime.<sup>[8]</sup>

Comorbidities: Any documented hypertension, diabetes, cardiovascular, neurological, chronic obstructive pulmonary disease, musculo-skeletal disorders, urinary incontinence or urinary retention or recurrent gastrointestinal ailments present alone or in combination were considered as comorbidities.

Physically active: As per WHO recommendation to consider a person as physically active, an adults should do at least 75 minutes of vigorous or 150 minutes of moderate physical activity or an equivalent combination of moderate and vigorous physical activity achieving at least 600 MET-minutes throughout a week.

Physically inactive: As per WHO recommendation to consider a person as physically inactive, an adult should do < 75 minutes of vigorous or < 150 minutes of moderate physical activity or an equivalent combination of moderate and vigorous physical activity of < 600 MET-minutes throughout a week.<sup>[9]</sup>

**Statistical analysis**

Data collected was entered in MS excel and data analysis was done using IBM Corp. (2013) IBM SPSS Statistics for Windows, Version 22.0. IBM Corp., Armonk, New York, USA. Chi square test was applied to analyse the data and p value <0.05 was taken as significant.

**Results:**

As depicted in Table 1, the sociodemographic profile of the 300 study participants indicates that the majority of the study participants were 31-45 years

**Table 1 : Sociodemographic profile of study participants (n = 300)**

<b>Variables</b>	<b>Frequency (%)</b>
Age group (in years)	
18-30	92 (30.7)
31-45	112 (37.3)
46-60	68 (22.7)
>60	28 (9.3)
Gender	
Female	158 (52.7)
Male	142 (47.3)
Religion	
Hindu	209 (69.7)
Christian	48 (16)
Muslim	43 (14.3)
Education	
Illiterate	33 (11)
Primary	47 (15.7)
Middle	52 (17.3)
Secondary	86 (28.7)
Higher secondary	57 (19)
Graduate and above	25 (8.3)
Employment status	
Unemployed	98 (32.7)
Employed	202 (67.3)
Marital status	
Unmarried/single/widow/ widower/separated	103 (34.3)
Married	197 (65.7)
Socioeconomic status	
Class 1	32 (10.7)
Class 2	124 (41.3)
Class 3	95 (31.7)
Class 4	39 (13)
Class 5	10 (3.3)

(37.3%), with smaller groups in the 46-60 years (22.7%) and >60 years (9.3%) age groups. The mean age of the study participants was 38.3 ± 9.62 years. Majority of study participants [158 (52.7%)] were females. Educational attainment varied, with majority of study participants 86 (28.7%) completing secondary education, while 33 (11%) were illiterate. Regarding employment status, most participants were employed 202 (67.3%). Majority of study participants 197 (65.7%) were married while 103 (34.3%) were unmarried. Socioeconomic status distribution according to modified BG Prasad scale 2024, indicated that nearly half 124. (41.3%) of the participants belonged to Class 2 and 10 (3.3%) belonged to Class 5 socioeconomic status.

As shown in Table 2, statistically significant association was found between Physical inactivity and age, sex, education, occupation, comorbidities, smoking

and alcohol consumption. Adults ≥ 45 years were at 1.79 times higher risk of physical inactivity, Females were at 1.83 times higher risk of physical inactivity, literates were at 3 times higher risk of physical inactivity, Alcohol consumption was associated with a 4.28 times higher risk of physical inactivity and presence of comorbidities was associated with 17.9 times higher risk of physical inactivity.

Binary logistic regression for Physical inactivity (Table 3) identified age ≥45 years (OR = 2.15), Female gender (OR = 2.9501), being literate (OR = 2.11), alcohol use (OR = 2.45), and presence of comorbidities (OR = 20.09) as significant independent risk factors for physical inactivity. The regression model was statistically significant ( $\chi^2 = 142, P < 0.001$ ), explaining 51.4% of the variance (Nagelkerke  $R^2 = 0.514$ ), with a prediction accuracy of 81.7%.

**Table 2: Association of selected factors with physical inactivity amongst adults residing in rural Goa (n=300)**

Variable	Physical Activity		$\chi^2$	OR(95% CI)	p value
	Inactive, n (%)	Active, n (%)			
Age (in years)					
≥ 45	44 (47.3)	49 (52.7)	5.34	1.79 (1.090-2.958)	0.021
<45	69 (33.3)	138 (66.7)			
Gender					
Female	70 (44.3)	88 (55.7)	6.26	1.83 (1.137-2.948)	0.012
Male	43 (30.3)	99 (69.7)			
Education					
Literate	107 (40.1)	160 (59.9)	6.00	3.00 (1.201-7.535)	0.014
Illiterate	6 (18.2)	27 (81.8)			
Occupation					
Unemployed	28 (28.6)	70 (71.4)	5.13	0.55 (0.327-0.925)	0.024
Employed	85 (42.1)	117 (57.9)			
Marital status					
Unmarried	36 (35)	67 (65)	0.493	0.837 (0.510-1.375)	0.483
Married	77 (39.1)	120 (60.9)			
Alcohol status					
Alcoholic	59 (60.8)	38 (39.2)	32.7	4.28 (2.565-7.155)	0.001
Non-alcoholic	54 (26.6)	149 (73.4)			
Smoking status					
Smoker	17 (19.8)	69 (80.2)	16.5	0.302 (0.167-0.549)	0.001
Non smoker	96 (44.9)	118 (55.1)			
Comorbidities					
Yes	82 (77.4)	24 (22.6)	110	17.9 (9.905-32.581)	0.001
No	31 (16)	163 (84)			

**Table 3: Binary logistic regression model on the association of selected risk factors and Physical inactivity among adults residing in Rural Goa (n = 300)**

Variables in the model	AOR	95% CI for AOR		p value
		Lower	Upper	
≥ 45 years	2.1595	1.104	4.222	0.024
Female	2.9501	1.498	5.808	0.002
Literate	2.1176	0.645	6.950	0.216
Alcohol use	2.4513	1.279	4.696	0.007
Presence of comorbidities	20.0921	10.175	39.672	0.001
Constant	0.028			0.000

**Discussion:**

In this study involving 300 participants, majority of the study participants 204 (68%) were aged between 18 and 44 years. This trend aligns with findings from Ramamoorthy et al.<sup>[10]</sup>, where 69.6% of the study participants were in the age group of 18-44 years. Similarly, 65.9% of the study participants were in the age group of 18-44 years in a study done by Newtonraj et al.<sup>[4]</sup> in rural Kancheepuram. This suggests a recurring pattern in age distribution across similar studies. Similarly, Newtonraj et al.<sup>[4]</sup> observed a predominance of female participants in their study conducted in rural Kancheepuram, a trend that mirrors the current findings. Additionally, 69.7% of study participants were identified as Hindu, a proportion consistent with the results reported by Aslesh et al.<sup>[11]</sup> in a study conducted in rural Kerala where 70.8% of the study participants were Hindu by religion indicating that the religious composition in present study reflects broader demographic trends observed in similar research. Literacy levels were high with majority of study participants 267 (89%) being literate, a pattern observed in study by Sharma et al.<sup>[9]</sup> done in rural Chandigarh where 80.4% of the study participants were literate. Moreover, marital status trends were similar, with the majority of participants being married, as reported in study done by Newtonraj et al.<sup>[4]</sup> in rural Kancheepuram. A study done by Ramamoorthy et al.<sup>[10]</sup> using findings from National Noncommunicable Disease Monitoring Survey reported that 79.7% of the study participants were married which was higher than the current finding and this difference may be due to the difference in sample size and the study by Ramamoorthy et al being a nationwide survey.

The prevalence of physical inactivity in current study was 37.7% and it closely aligns with 36.7% of physical inactivity reported in a national cross-sectional survey conducted in India.<sup>[12]</sup> A study by Devamani et al.<sup>[13]</sup> done in Vellore reported that 40.6% of the study participants were physically inactive. However, the prevalence of physical inactivity in present study was lower than that reported by Mohanty et al.<sup>[14]</sup> in Odisha where 71.9% of the study participants were physically inactive. A study by Newtonraj et al.<sup>[15]</sup> done in Urban Puducherry reported that 49.7% of the study participants were physically inactive. This difference is likely because these studies were conducted in urban settings, where physical inactivity tends to be higher.

In this study, there was significant associations between physical inactivity and factors such as sex, education, comorbidities, older age, and alcohol consumption. A study by Sharma et al.<sup>[9]</sup> done in rural Chandigarh reported that females were 1.9 times at higher risk of physical inactivity and literates were 1.8 times at higher risk of physical inactivity which is almost similar to the current findings. A study by Devamani et al.<sup>[13]</sup> in rural Vellore reported that women, literates and alcohol users were at higher risk of physical inactivity which aligns with the findings of the current study. Mohanty et al.<sup>[14]</sup> in his study conducted in Bhubaneshwar, Odisha reported that participants with chronic disease were at higher risk of physical inactivity similar to the current study.

**Conclusion and Recommendation:**

In this study, prevalence of physical inactivity among adults in rural Goa was found to be 37.7% which poses significant long-term health risks, including

obesity, diabetes, and cardiovascular diseases. Age > 45 years, females, literates, alcohol users and presence of comorbidities were found to be significantly associated with physical inactivity. Based on the study findings, it is recommended to strengthen community-based health education programs that encourage regular physical activity, especially among high-risk groups such as older adults, females and those with comorbidities. Health workers should be trained to provide guidance and motivation, and group activities or awareness sessions can be organized to focus on physical activity within rural communities. Policymakers have to take an all-encompassing approach that supports active lives by means of better infrastructure, community involvement, and focused health campaigns.

#### Limitations:

This study has several limitations. Its cross-sectional design limits causal inference, providing only a snapshot of physical inactivity. Reliance on self-reported data via the Global Physical Activity Questionnaire (GPAQ) may introduce recall bias. Findings may not be generalizable beyond rural Goa due to regional differences. Factors such as diet, mental health, and specific occupational activity were not fully assessed. Future research should use longitudinal designs and broader sampling to address these issues.

#### Declaration:

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Conflict of Interest: Nil

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## Prevalence and Factors Affecting Mental Health among Older Adults: A Cross-Sectional Study in Rural South Karnataka

Sivapria KA<sup>1</sup>, Kalesh PS<sup>2</sup>

<sup>1</sup>Assistant Professor, Community Medicine Department, PK DAS Institute of Medical Sciences Hospital and Medical College, Vaniamkulam, Kerala, India

<sup>2</sup>Assistant Professor, Department of Anesthesia, Kerala Medical College, Kerala, India.

**Correspondence:** Dr. Sivapria KA, Email: sivapriaka@gmail.com

### Abstract:

**Introduction:** Ageing is a lifelong process of growing up and growing old. It begins at conception and ends with death. It is important to take into account the various physical and mental health issues that older adults experience. **Objective:** To determine the prevalence and factors affecting mental health among older adults. **Method:** A cross-sectional study was conducted between January to June 2022 in the rural field practice area of tertiary care hospital in South Karnataka. Complete Enumeration method was used, total of 780 participant were interviewed using a semi-structured proforma. Mental health was assessed using General Health Questionnaire-12 (GHQ-12) which is a short, self-administered questionnaire. Descriptive statistics were calculated using the mean, standard deviation, and proportion. To assess the relationship between risk factors, the chi square test was employed. **Results:** Using the GHQ-12 scoring, 50.4% of the older adults had mild distress & 18.6% of the older adults had severe distress. The factors affecting mental health were increase in age (p value<0.001), females (p value<0.01), poor occupational status (p value<0.001), poor socioeconomic status (p value<0.05), locomotor disability (p value<0.001) and those who suffered physical/mental abuse (p value<0.001). **Conclusion:** The mental health of older adults is at stake. It was observed that stress was seen with increasing age, females, unemployment, lower socioeconomic status, broken family, hypertension, lack of social support, disability, and abuse.

**Keywords:** General Health Questionnaire-12, Mental Health, Older adults, Risk factors

### Introduction:

The operational definition of health is “A condition or quality of the human organism expressing the adequate functioning of the organism in given conditions, genetic or environmental.” A person is said to be in a state of health if they are able to express all of their distinct potential within their surroundings and are in good bodily, mental, social, and spiritual health. Each person is situated on a graded scale or continuous

spectrum (continuum) spanning from wellness and optimal functioning in every element of one’s life, at one end, to sickness resulting in death, at the other. Both health and illness are dynamic processes.<sup>[1]</sup>

Ageing is the process by which older individuals become a proportionally larger share of the total population. Age 60 is generally set as the threshold of old age since it is at this period of life that the rates for sickness and death begin to show a marked increase over

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those of the earlier years. There are currently 1 billion people in the world who are 60 years of age or older, and this number is expected to rise to 1.4 billion by 2030 and 2.1 billion by 2050.<sup>[2]</sup> The population is growing at an unprecedented rate, and this trend is expected to pick up speed in the upcoming decades, especially in developing nations.<sup>[3]</sup>

Hearing loss, cataracts & refractive errors, back & neck pain and osteoarthritis, chronic obstructive pulmonary disease, diabetes, depression, and dementia are common ailments among elderly people. People are more prone to have multiple ailments at once as they get older. The rise of various complex health conditions known as geriatric syndromes is another feature of older age. They include weakness, urine incontinence, stumbles, delirium, and pressure ulcers, and they are frequently the result of other underlying conditions.<sup>[4]</sup>

Very few studies have been done, especially in rural Karnataka regarding general health among older adults, which is of public health importance. Hence this study is being conducted to determine the prevalence and factors affecting general health among those aged 60 years and above and factors affecting them.

### Methods:

This cross-sectional study was carried out in rural, south Karnataka between January to June 2022. The study subjects were older adults aged  $\geq 60$  years.

### Inclusion and Exclusion criteria

Elderly male & female persons aged 60 years and above who were residing in rural field practise area for more than one year & were willing to give informed consent. The 9 elderly were excluded as they were unable to respond either due to being very ill, or having speech & communication problems, preventing normal conversation.

**Sampling Method:** All older adults both males & females aged 60 years and above in the area were enlisted. Out of 789 residents, 780 participants were selected based on the inclusion and exclusion criteria.

**Data collection tool:** Consecutive enrollment of participants was done by house-to-house visit in the rural field practice area of tertiary care hospital, South Karnataka. Data was collected using a pretested semi structured questionnaire. The households of the older persons were visited by trained investigator; after explaining the purpose of the research and getting informed consent, the elderly were interviewed separately for about half an hour in their residence. The interview was done by the researchers in the vernacular language, Kannada. The questionnaire consisted of 3 parts.

The first part collected the socio-demographic data, like, age, literacy, economic condition, family members, type of family including broken family<sup>[8]</sup> etc. The second part was the General Health Questionnaire-12 (GHQ-12) which is a short, self-administered questionnaire used to screen for common mental disorders and assess overall mental well-being. The original GHQ-12 in English version was translated into Kannada language using the translation and backtranslation method by independent bilingual experts, and both the original and the backtranslated English version were compared. Finally, with the help of third reviewer in the reconciliation meeting, consensus version was developed. Using likert scale, score of 0-15 indicates no distress, 16-24 indicates mild distress, and  $> 25$  indicates severe distress.<sup>[6]</sup> Thus Psychological distress was assessed using GHQ-12. The third part collected data about co-morbidities (diabetes, heart disease, etc.), duration, severity and its effect on mental status both recently and in the past. Social pathologies (lack of social support, physical / mental abuse, etc.) affecting the mental status of the participants were also assessed using a 4-point likert scale.

**Data analysis:** The study was conducted after obtaining approval from the ethics committee & IEC certificate number is MIMS/IEC/2021/492. Data was entered and analysed using Statistical package SPSS version 20. Descriptive analysis was expressed in proportions. Chi square test was used to find association. A p value of

<0.05 is considered statistically significant. Multivariable binary logistic regressions were used to evaluate the association between various factors.

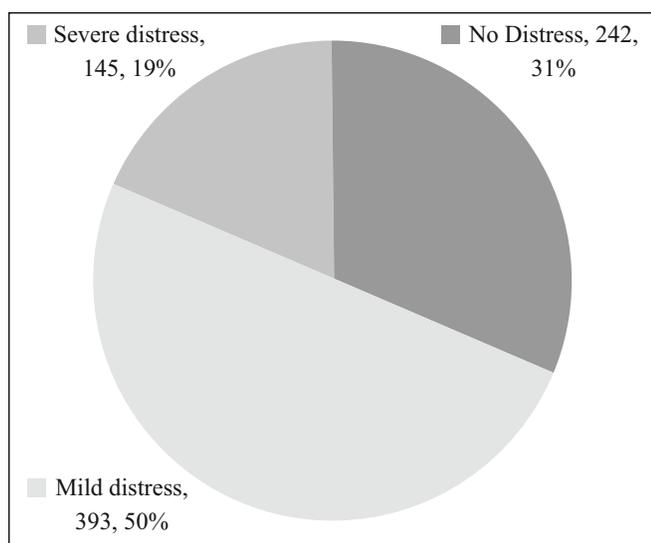
**Results:**

In the present study, out of 780 study subjects, 510 (65.4%) were in the age group of 60- 69 years, followed by 177 (22.7%) who were in the age group of 70-79 years. The mean and standard deviation (SD) of age was  $67.2 \pm 7.267$  years. Out of 780 study subjects, 444 (56.9%) were men and 336 (43.1%) were women.

Out of 780 older persons, 393 (50.4%) had mild distress. Severe distress was seen among 145 (18.6%) of older persons.

Pertaining to age groups, 57 (11.2%) of the 510 older persons aged 60-69 years had severe distress and 232

**Figure 1: Distribution of older persons according to GHQ-12 score (n=780)**



(45.5%) had mild distress. Among 54 (30.5%) of the 177 older persons aged 70-79 years 54 had severe distress and 110 (62.1%) of them had mild distress. Among 32 (35.6%) of the 90 older persons aged between 80-89 years had severe distress and 50 (55.6%) of them had mild distress. Among those aged 90-99 years, 2 (66.7%) had severe distress and 1 (33.3%) had mild distress. An increasing trend of severe distress was noted with increasing age. The differences in the proportion of different levels of distress in the different age groups were statistically significant (p value <0.001)

Pertaining to sex, out of 444 elderly men, 49 (11.0%) of the men had severe distress and 220 (49.5%) had mild distress. Out of 336 elderly females, 96 (28.6%) had severe distress and 173 (51.5%) had mild distress. The proportion of elderly women having severe distress was more than compared to the proportion of elderly men having severe distress. The differences in the proportion of different levels of distress in the different gender groups were statistically significant. (p value: <0.001)

Among illiterates, out of 506 older persons 123 (24.3%) had severe distress and 242 (47.8%) had mild distress. 9 (14.5%) of the 62 who studied till primary school had severe distress and 38 (61.3%) had mild distress. 7 (4.4%) of the 160 high school educated older persons had severe distress and 93 (58.1%) had mild distress. Out of the of the 52-college educated older persons 6 (11.5%) had severe distress and 20 (38.5%) had mild distress.

The proportion of elderly who were illiterates had more severe distress compared to other educational groups. The differences in the proportion of levels of distress in the different literacy groups was significant (p value: <0.001)

Relating to occupation of the older persons as per International Classification of Occupations<sup>[7]</sup>, 53 (32.7%) of those unemployed had severe distress and 93 (57.4%) had mild distress. Among the older persons, 32 (8.9%) of those engaged in unskilled work had severe distress and 163 (45.4%) had mild distress. Among the older persons engaged in semiskilled work, none had severe distress and 25 (67.6%) of the semiskilled workers had mild distress. Among the study participants who were engaged in skilled work , none had severe distress and 2 (40.0%) had mild distress. Among the study participants who were professionals, none had severe distress and 4 (57.1%) had mild distress. Among the older persons who were homemakers, 60 (28.6%) of them had severe distress and 106 (50.5%) had mild distress. The proportion of older persons who were unemployed and homemakers had more severe distress compared to other occupational groups. The differences

in the proportion of levels of distress in the different occupational groups was significant (p value: <0.001)

In reference to socioeconomic class (Modified B G Prasad Classification April 2023), out of 8 study participants belonging to class III, none had severe distress 2 (25.0%) had mild distress.

Out of 336 elderly belonging to Class IV, 57 (17.0%) had severe distress and 175 (52.1%) had mild distress. Out of 304 study participants belonging to Class V, 88 (20.2%) had severe distress and 216 (49.5%) had mild distress. An increasing trend of severe distress was noted with Class IV & Class V. The differences in the

proportion of levels of distress in the different socioeconomic groups were not significant (p value: 0.06)

Considering types of family, out of 252 older persons belonging to nuclear family living with their spouse 31 (12.3%) had severe distress and 118 (46.8%) had mild distress. Out of 356 older persons belonging to three generation family living with their children and grandchildren 79 (22.2%) had severe distress and 166 (46.6%) had mild distress. Out of 65 older persons belonging to joint family, none had severe distress and 49 (75.4%) had mild distress. Out of 77 older persons belonging to broken family where they did not have their

**Table 1: Proportion of distress in older persons according to their sociodemographic characteristics (n=780)**

Variables	Severe distress n (%)	Mild distress n (%)	No distress n (%)	Chi-Square	P value
Age group					
60-69	57 (11.2)	232 (45.5)	221 (43.3)	137.8*	<0.001
70-79	54 (30.5)	110 (62.1)	13 (7.3)		
80-89	32 (35.6)	50 (55.6)	8 (8.9)		
90-99	02 (66.7)	01 (33.3)	0 (0)		
Sex					
Males	49 (11.0)	220 (49.5)	175 (39.4)	55.1	<0.001
Females	96 (28.6)	173 (51.5)	67 (19.9)		
Education					
Illiterate	123 (24.3)	242 (47.8)	141 (27.9)	44.4	<0.001
Primary	9 (14.5)	38 (61.3)	15 (24.2)		
High school	7 (4.4)	93 (58.1)	60 (37.5)		
College	6 (11.5)	20 (38.5)	26 (50.0)		
Occupation					
Unemployed	53 (32.7)	93 (57.4)	16 (9.9)	118.3*	<0.001
Unskilled	32 (8.9)	163 (45.4)	164 (45.7)		
Semiskilled	0 (0)	25 (67.6)	12 (32.4)		
Skilled	0 (0)	2 (40.0)	3 (60.0)		
Professional	0 (0)	4 (57.1)	3 (42.9)		
Homemaker	60 (28.6)	106 (50.5)	44 (21.0)		
Socioeconomic Scale					
III	0 (0)	2 (25.0)	6 (75.0)	7.2*	0.06
IV	57 (17.0)	175 (52.1)	104 (31.0)		
V	88 (20.2)	216 (49.5)	132 (30.3)		
Type of family					
Nuclear	31 (12.3)	118 (46.8)	103 (40.9)	64.0	<0.001
Three generation	79 (22.2)	166 (46.6)	111 (31.2)		
Joint	0 (0)	49 (75.4)	16 (24.6)		
Broken	35 (32.7)	60 (56.1)	12 (11.2)		
<b>Total</b>	<b>145 (18.6)</b>	<b>393 (50.4)</b>	<b>242 (31.0)</b>		

Note. \*Fischer's Exact Test used

spouse and lived alone or with other household members, 35 (32.7%) had severe distress and 60 (56.1%) had mild distress. The proportion of older persons who were living in broken family had more severe distress compared to other types of family. The differences in the proportion of levels of distress in the different family groups were significant (p value: <0.001) (Table 1).

Among elderly diabetics, 35 (17.5%) had severe distress and 111 (55.5%) had mild distress. The differences in the proportion of different levels of distress regarding diabetes was statistically not significant (p value: 0.226).

Among elderly hypertensives, 56 (22.0%) had severe distress and 144 (56.5%) had mild distress. The

proportion of elderly hypertensives having severe distress was more than the proportion of normotensives having severe distress. The differences in the proportion of different levels of distress regarding hypertension was statistically significant (p value: <0.001).

Among those elderly who were suffering from heart disease 3 (11.1%) had severe distress and 19 (70.4%) had mild distress. The differences in the proportion of different levels of distress regarding heart disease were statistically not significant (p value: 0.107).

Among those with locomotor disability, 46 (38.7%) had severe distress and 68 (57.1%) had mild distress. The

**Table 2: Proportion of distress levels in study participants with and without different co-morbidities (n=780)**

Variables	Severe distress n (%)	Mild distress n (%)	No distress n (%)	Chi-Square	P value
Diabetes Mellitus					
Absent	110 (19.0)	282 (48.6)	188 (32.4)	2.974	0.226
Present	35 (17.5)	111 (55.5)	54 (27.0)		
Hypertension					
Absent	89 (17.0)	249 (47.4)	188 (32.4)	16.539	<0.001
Present	56 (22.0)	144 (56.5)	54 (27.0)		
Health Disease					
Absent	142 (18.9)	374 (49.7)	237 (31.5)	4.011*	0.107
Present	3 (11.1)	19 (70.4)	5 (18.5)		
Locomotor Disability					
Absent	99 (15.0)	325 (49.2)	237 (35.9)	73.176	<0.001
Present	46 (38.7)	68 (57.1)	5 (4.2)		
<b>Total</b>	145 (18.6)	393 (50.4)	242 (31.0)		

Note. \*Fischer's Exact Test used

**Table 3: Distress levels in study participants according to socio-economic support (n=780)**

Variables	Severe distress n (%)	Mild distress n (%)	Normal n (%)	Chi-Square	P value
Financial Condition					
Stable	13 (7.7)	97 (57.7)	58 (34.5)	18.9	<0.001
Not stable	132 (21.6)	296 (48.4)	184 (30.1)		
Physical/ Mental abuse					
Absent	113 (15.7)	373 (51.7)	235 (32.6)	43.1	<0.001
Present	32 (54.2)	20 (33.9)	7 (11.9)		
Social Support					
Present	115 (15.9)	368 (51.0)	239 (33.1)	42.2	<0.001*
Absent	30 (51.7)	25 (43.1)	3 (5.2)		
<b>Total</b>	145 (18.6)	393 (50.4)	242 (31.0)		

Note. \*Fischer's Exact Test used

**Table 4: Factors affecting distress among study participants (n=780)**

Variable	OR	95%CI	P Value	aOR	95% CI	P value
Age group (years)						
60-69	1					
70-79	9.647	5.341-17.425	< 0.01	6.993	3.611-13.545	< 0.001
80-89	7.838	3.714-16.540	< 0.01	2.692	1.104-6.567	0.03
90-99	-	0.000	0.99	-	0.000	0.99
Sex						
Males	1					
Females	2.612	1.881-3.627	< 0.01	2.790	1.624-4.791	< 0.001
Education						
Illiterate	1					
Primary	1.210	0.656-2.234	0.54	1.720	0.824-3.587	0.14
High school	0.644	0.443-0.936	0.02	1.331	0.833-2.126	0.23
College	0.386	0.217-0.688	< 0.01	0.534	0.241-1.186	0.12
Occupation						
Unemployed	1					
Unskilled	0.130	0.075-0.227	< 0.01	0.454	0.221-0.931	0.03
Semiskilled	0.228	0.097-0.540	< 0.01	0.999	0.353-2.822	0.99
Skilled	0.073	0.011-0.470	< 0.01	2.394	0.187-30.662	0.50
Professional	0.146	0.030-0.712	0.017	4.132	0.453-37.717	0.20
Homemaker	0.413	0.224-0.764	< 0.01	0.555	0.234-1.316	0.18
Socioeconomic Scale						
Class III	1					
Class IV	6.692	1.328-33.713	0.02	18.961	1.504-239.113	0.02
Class V	6.909	1.377-34.679	< 0.01	15.814	1.222-204.686	0.03
Type of family						
Nuclear	1					
Three generation	1.526	1.090-2.137	<0.014	0.879	0.579-1.334	0.54
Joint	2.117	1.141-3.926	0.017	0.989	0.479-2.046	0.97
Broken	5.473	2.854-10.492	< 0.01	2.261	1.048-4.879	0.03
Diabetes						
Non-diabetic	1					
Diabetic	1.297	0.907-1.854	0.154	1.150	0.732-1.807	0.54
Heart disease						
No heart disease	1					
Heart disease	2.021	0.756-5.402	0.16	1.847	0.608-5.610	0.27
Hypertension						
Normotensive	1					
Hypertensive	2.012	1.421-2.849	< 0.01	1.403	0.913-2.156	0.12
Locomotor disability						
Absent	1					
Present	12.744	5.132-31.646	< 0.01	7.161	2.600-19.722	< 0.01
Financial instability						
Absent	1					
Present	1.226	0.854-1.761	0.26	1.596	1.015-2.509	0.04
Lack of social support						
Absent	1					
Present	9.072	2.809-29.297	< 0.01	3.601	0.998-13.049	0.05
Physical/ Mental abuse						
Absent	1					
Present	3.592	1.607-8.029	< 0.01	1.493	0.572-3.897	0.41

Note. Cox & Snell R square- 0.260; Nagelkerke R Square-0.366, \*Binary logistic regression

proportion of those with severe distress having locomotor disability was more than the proportion of those without locomotor disability. The differences in the proportion of different levels of distress regarding locomotor disability were statistically significant. (p value: <0.001) (Table 2)

Among the elderly who faced financial crisis 132 (21.6%) had severe distress and 296 (48.4%) had mild distress. The proportion of elderly with severe distress having financial instability was more than the proportion of those without financial instability. The differences in the proportion of different levels of distress regarding financial instability were statistically significant. (p value: <0.001)

Among the older persons, 32 (54.2%) who faced physical/mental abuse had severe distress and 20 (33.9%) had mild distress. The proportion of study participants with severe distress having physical/ mental abuse was more than the proportion of study participants without physical/ mental abuse. The differences in the proportion of different levels of distress regarding physical/mental abuse was statistically significant. (p value: <0.001)

Out of those whom had lack of social support 30 (51.7%) had severe distress and 25 (43.1%) had mild distress. An increasing proportion of severe distress was noted in study participants with lack of social support as compared to other study participants who had social support. The differences in the proportion of different levels of distress regarding lack of social support were statistically significant. (p value: <0.001) (Table 3)

Factors affecting General health among the 780 study participants showed significant association with those aged 70-79 years (OR: 9.647, 95% CI: 5.341-17.425), 80-89 years (OR: 7.838, 95% CI: 3.714-16.540), females (OR: 2.612, 95% CI: 1.881-3.627), college education (OR: 0.386, 95% CI: 0.217-0.688), unskilled labourers (OR: 0.130, 95% CI: 0.075-0.227), semiskilled labourers (OR: 0.228, 95% CI: 0.097-0.540), skilled labourers (OR: 0.073, 95% CI: 0.011-0.470)

homemakers (OR: 0.413, 95% CI: 0.224-0.764), Class V socio economic status (OR: 6.909, 95% CI: 1.377-34.679), hypertensive study participants (OR: 2.012, 95% CI: 1.421-2.849) those with locomotor disability (OR: 12.744, 95% CI: 5.132-31.646), those with lack of social support (OR: 9.072, 95% CI: 2.809-29.297), those who had undergone physical/ mental abuse (OR: 3.592, 95% CI: 1.607-8.029).

However, in Binomial logistic regression showed significant association with study participants aged 70-79 years (aOR: 6.993, 95% CI: 3.611-13.545), females (aOR: 2.790, 95% CI: 1.624-4.791), those with locomotor disability (aOR: 7.161, 95% CI: 2.600-19.722). (Table 4)

#### **Discussion:**

In the present study, to assess the mental health of the elderly population, General Health Questionnaire (GHQ-12) using the Likert scoring method (0-1-2-3) was used.<sup>[6]</sup> GHQ 12 categorized 393 (50.4%) participants having mild distress while 145 (18.6 %) of them were having severe distress.

Independent factors contributing to the risk of poor general health were evaluated by logistic regression model. It was observed that increasing age, females, occupation, lower socioeconomic status, broken family, hypertension, lack of social support, locomotor disability, and physical/mental abuse were independent risk factors of distress in the present study.

After having adjusted for other factors, the odds of study subjects with poor general health were seen among those aged 70-79 years was 6.9 times more as compared to those aged 60-69 years; the odds of study subjects were 2.7 times more for females as compared to males and 7.1 times more for study subjects with locomotor disability.

Various community-based studies using GHQ-12 in the elderly it was found that among 50%-55% of the elderly screened were recognized to be psychologically distressed. Female sex, illiteracy, and multiple comorbidities were the factors that were associated with

higher cutoff scores on GHQ-12 proposed here and psychiatric morbidity thereof.<sup>[9-11]</sup> These findings are similar to the present study.

Various research studies indicate that 10% of those over 60 have limited physical mobility, and 10% are hospitalised at any given moment. These percentages increase as people age. More than half of people over 70 have one or more chronic illnesses. The chronic conditions typically include cancer, coronary heart disease, and high blood pressure. It is projected that NCD-related disability will increase and contribute to a higher proportion of overall national disability, in step with the greying of the population.<sup>[12-15]</sup> In the present study also it is seen that there is deterioration of health with increasing age and chronic conditions like hypertension is showing statistically significant difference.

Population based study done on the health of the elderly found that women are poorer and suffer more morbidity than men in old age, although their death rates are lower. Further, older women in India report poorer self-reported health and experience greater immobility compared with men. In the present study also it is noted that health and wellbeing among men is better than among women.<sup>[16,17]</sup>

Study by World Health Organization's on Global Ageing and adult health Indian survey found that inequalities in economic factors contributed to health inequalities among older individuals in India. A Sample Survey conducted in the rural areas of the Varanasi district of Uttar Pradesh, explains that illiteracy and poverty are found to have their own impact on health during aging. Economic inequalities were largest for functional impairment and disability. Data from the 60th round of the National Sample Survey (NSS) suggests that poor health status is more concentrated among the socioeconomically disadvantaged older population. In the present study also elderly belonging to lower socioeconomic status had poor health.<sup>[18-21]</sup>

A study done by using the India Human Development Survey found that the lowest rates of short-

term sickness are found among older persons who live in multigenerational households. The greatest health benefits are experienced by those who live with their spouse, adult children, and young grandkids. In the present study also it is seen that elderly living with family is having better health as compared to those living in broken family.<sup>[22]</sup>

A study by Marion et al.<sup>[23]</sup>, found that the average age at death and the average age at disability onset are the main points of contention. A healthy elder population would benefit from a shorter period of dependency before death if there is a chance to delay the onset of disability. A cross-sectional national community-dwelling survey in India in 2017-2018 found that lack of social support & loneliness is associated with poor physical health, poor mental health and health risk behaviour (physical inactivity), emphasising the need to consider loneliness in various physical and mental health contexts among the elderly. In the present study also it is seen that locomotor disability and lack of social support results in poor health.<sup>[24]</sup>

Various cross-sectional studies found that abuse against the elderly is recognized as a fundamental challenge to elderly health in India. 11%-15% of sixty-year-olds have experienced at least one type of elderly abuse and it affects their health.<sup>[25-27]</sup>

#### **Limitations:**

Characteristics of this sample may not represent the broader elderly population in different regions or contexts. Also, the study cannot track the progression of health issues or interventions over the long term.

#### **Conclusion:**

As per GHQ-12, in 393 (50.4%) older persons had mild distress while 145 (18.6%) had severe distress. It was observed that stress was seen with increasing age, females, unemployment, lower socioeconomic status, broken family, hypertension, lack of social support, disability, and abuse. Research on health in older persons is not a national priority despite the fact that these are common among the population, with related

comorbidities, greater rates of impairment and symptom severity, and higher health care use and expenditures. In addition to financing and programmatic priorities that do not prioritise older persons, age-related difficulties complicate clinical research in the geriatric population. Late-life clinical researchers will be able to carry out more clinically significant projects and improve the use of evidence-based medicine if these modifiable hurdles are identified and innovative, scalable solutions with widespread adoption are developed.

**Declaration:**

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Conflict of Interest: Nil

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## Dyslipidemia and Hypertension Among Type 2 Diabetics at a Tertiary Care Hospital of South Gujarat, India

Jash Kotak<sup>1</sup>, Kirtida Tandel<sup>2</sup>, Mithil Kotak<sup>3</sup>, Diwakar Sharma<sup>4</sup>

<sup>1</sup>Medical Officer, GMERS Medical College, Valsad, India

<sup>2</sup>Professor and Head, Department of Pharmacology, GMERS Medical College, Valsad, India

<sup>3</sup>Indian Institute of Science Education and Research (IISER), Pune, India

<sup>4</sup>Statistician, Department of Preventive and Social Medicine, GMERS Medical College, Valsad, India

**Correspondence:** Dr. Jash Kotak; Email: drjashkotak@gmail.com

### Abstract:

**Introduction:** The number of diabetes cases are rising globally along with comorbidities like hypertension and dyslipidemia. **Objectives:** To estimate the prevalence of dyslipidemia and hypertension in type 2 diabetes (T2DM) patients of Valsad, Gujarat, India. **Methods:** This is a cross-sectional study of total 62 blood samples of T2DM patients selected by convenience sampling which analysed fasting blood sugar (FBS), postprandial blood sugar (PP2BS), cholesterol, triglyceride (TG) and high-density lipoprotein (HDL) using standard methods at a tertiary care hospital of Valsad. Low density lipoprotein (LDL) and very low-density lipoprotein (VLDL) were also estimated using Martin-Hopkins and Friedewald equations respectively. **Results:** In the study participants, 11.29% had neither hypertension (HTN) nor dyslipidemia, 64.52% had HTN, 77.42% had dyslipidemia and 53.22% patients had HTN and dyslipidemia along with diabetes. **Conclusion:** Results suggest a high prevalence of dyslipidemia and HTN in study subjects. Early screening and administration of lipid-lowering agents are required in these patients.

**Keywords:** Blood sugar, Diabetes, Dyslipidemia, Hypertension, Lipid profile

### Introduction:

Diabetes mellitus is a group of metabolic disorders characterized by chronic hyperglycemia with disturbances in carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both.<sup>[1]</sup> The chronic hyperglycemia is associated with microvascular and macrovascular complications including coronary artery disease (CAD), retinopathy, nephropathy and neuropathy. The number of diabetic patients is increasing worldwide, including in India where cases reached 74 million in 2021,<sup>[2]</sup> and are

expected to reach 93 million by 2030 and 125 million by 2045. The World Health Organization (WHO) projects that diabetes will be the seventh leading cause of death in 2030,<sup>[3]</sup> with the number of worldwide diabetics reaching 643 million from the current estimate of 537 million.<sup>[2]</sup>

Lipid metabolism disorders are more frequent in diabetic patients and it is aggravated by the presence of hyperglycemia and insulin resistance. One study showed that the prevalence of dyslipidemia in diabetes mellitus patients is 95%.<sup>[4]</sup> Even in non-diabetics, FBS

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concentration and glycated haemoglobin (HbA1c) are associated with the risk of vascular disease.<sup>[5]</sup>

Out of more than 75,000 individuals having T2DM in the Swedish National diabetes register, 37% to 38% had untreated hypertriglyceridemia.<sup>[6]</sup> Higher levels of fasting TG are associated with higher levels of glucose, HbA1c, insulin and mortality risk.<sup>[7]</sup> Improved glycemic control decreases circulating VLDL and increases LDL catabolism by reduced glycation and upregulation of LDL receptors, thus reducing cholesterol and TG levels and having a favourable effect on lipoprotein levels.<sup>[8]</sup>

Like dyslipidemia, HTN is also a common disease that coexists with diabetes at a greater frequency;<sup>[9]</sup> it is more than thrice as frequent in those with diabetes than in those without. The reasons for the development of HTN in diabetics are inappropriate activation of renin-angiotensin-aldosterone system and sympathetic nervous system, endothelial dysfunction due to excessive reactive oxygen species production and mitochondrial dysfunction, inflammatory cytokines which impair insulin metabolic signalling and reduce insulin mediated nitric oxide production, increased circulating extracellular vesicles and their micro RNAs, and upregulation of sodium-glucose cotransporter 2 causing increased glucose reabsorption from proximal tubule.<sup>[10]</sup>

The impact of diabetes, dyslipidemia and HTN is thought to be additive in their contribution towards CVD events.<sup>[11]</sup> Thus, the combination of any of these diseases should be taken more seriously. It is also concerning that the combination of these three diseases has been rising.<sup>[12]</sup> India has the largest number of diabetes cases after China and this will continue to rise in the coming decades. Early detection and proper management of dyslipidemia in diabetic patients will help in the prevention of related complications. There is very little data available on the prevalence of dyslipidemia and diabetes from the Indian subcontinent, that available being mainly from the South Indian urban population and some from the North Indian urban population.<sup>[13,14]</sup> At

present, there is a need for regional studies investigating diabetic dyslipidemia. Such studies in diabetic patients of South Gujarat could not be found. Therefore, the present study is an attempt to bridge this gap with the aim to detect the prevalence and pattern of dyslipidemia among diabetics in a district of South Gujarat.

#### Methods:

It was a cross-sectional study of 2 months which included 62 known or newly diagnosed T2DM cases selected by convenience sampling, attending medicine outpatient department (OPD) of Gujarat Medical Education and Research Society (GMERS) Hospital at Valsad between July 2022 to September 2022. Institutional Human Ethics Committee clearance was obtained prior to the initiation of the study. Study participants were enrolled according to inclusion criteria and informed consent (verbal and written) was obtained from them before documentation. Detailed history was taken, and clinical examination was done for all enrolled patients. Anthropometric measurements (weight, height, waist circumference, hip circumference) were taken using standard methods. Blood pressure was measured with a mercury sphygmomanometer in a sitting position after 5 minutes of rest. A fasting blood sample was collected for serum lipid profile and FBS investigation after 10 hours of an overnight fast. Again, patients were called after 2 hours of lunch for PP2BS analysis. Serum cholesterol, serum TG and serum HDL levels were measured by Trinders method, glycerol phosphate oxidase Trinders method and direct enzymatic method respectively. The laboratory tests and their sample collection were done at the same hospital and no charges were levied on the participants. Serum LDL was calculated by Martin-Hopkins novel equation using a free, online access, automated Excel-based calculator developed by Johns Hopkins Medicine and serum VLDL was estimated using the Friedewald equation.<sup>[15-17]</sup> Cut-off normal values for individual lipid levels and blood pressure were taken as per the National Cholesterol

Education Program (NCEP) Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) (ATP III).<sup>[18]</sup> American Diabetes Association criteria for the treatment of diabetes (fasting plasma glucose  $\geq 126$  mg/dl or postprandial glucose  $\geq 200$  mg/dl for two consecutive visits i.e., current and previous) were used to divide the patients into controlled and uncontrolled groups.<sup>[1]</sup> Patients having a body mass index (BMI) of more than  $23 \text{ kg/m}^2$  were considered to be overweight by WHO criteria for the Asian population.<sup>[19]</sup> For evaluating the effect of antidiabetic medication patients were divided into three groups viz., newly diagnosed, patients on metformin and patients on metformin with other blood-sugar-lowering agents which included sulfonylureas, voglibose, teneligliptin and insulin. These other agents are collectively referred to as “others” in the treatment group section of Table 1.

#### Inclusion criteria

- Cases of T2DM of either sex who attended the medicine OPD during the study period.

#### Exclusion criteria

- T2DM patients with a history of or diagnosed with CAD, cerebrovascular accidents and other chronic systemic or metabolic disorders during enrolment.

- T2DM patients already taking lipid-lowering drugs or any other drug which can affect plasma lipid levels like oral contraceptive pills, steroids and diuretics.

#### Statistical analysis

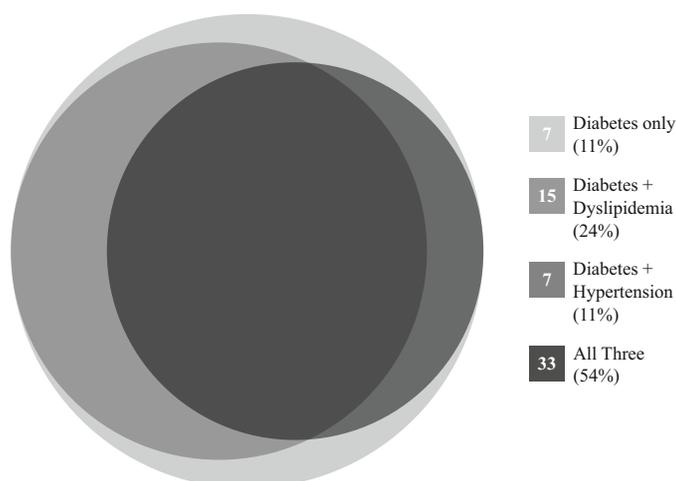
Raw data calculation and statistical analysis by LibreCalc Version: 7.3.4.2 (Windows x64) / Libre Office Community.

The p-value was calculated using one-way analysis of variance (ANOVA). The results were presented as mean  $\pm$  standard error. Statistical significance was considered at the level of  $p < 0.05$ .

#### Results:

The prevalence of dyslipidemia in the studied diabetic population was 77.42% (n = 48) and the prevalence of HTN was 64.52% (n = 40) (Figure 1). The mean age of the study population was  $54.02 \pm 10.78$  years (male:  $54.94 \pm 11.2$  and female:  $52.82 \pm 10.29$ ). The mean duration from the first diagnosis of diabetes for the study patients was  $6.83 \pm 5.96$  years. (Table 1). The mean BMI of the study population was  $24.86 \pm 6.24 \text{ kg/m}^2$  (male:  $24.17 \pm 5.16$  and female:  $25.76 \pm 7.42$ ). The mean systolic blood pressure of all patients was  $124.45 \pm 16.32$  mmHg and diastolic was  $79.22 \pm 10.3$  mmHg. The mean systolic blood pressure of hypertensive patients was  $131.9 \pm 13.14$  mmHg and diastolic was  $82.35 \pm 11.06$  mmHg.

Figure 1. Venn diagram of dyslipidemic and hypertensive diabetics (n = 62)



**Table 1: Characteristics of Study Participants (n = 62)**

Characteristic	Number of patients n (%)	Dyslipidemia n (%)	Hypertension n (%)
Age (years)			
≤45	14 (22.58)	10 (71.43)	7 (50)
46-60	31 (50)	24 (77.42)	20 (64.52)
>60	17 (27.42)	14 (82.35)	13 (76.47)
Gender			
Male	35 (56.45)	25 (71.43)	25 (71.43)
Female	27 (43.55)	23 (85.19)	15 (55.56)
Locality			
Urban	40 (64.52)	30 (76.92)	26 (65)
Rural	22 (35.48)	18 (78.26)	14 (63.64)
Control of diabetes			
Controlled	16 (25.81)	10 (62.50)	12 (75)
Uncontrolled	46 (74.19)	38 (82.61)	28 (60.87)
Obesity			
Overweight (BMI ≥23)	39 (62.90)	30 (76.92)	26 (66.67)
Non-overweight (BMI<23)	23 (37.10)	18 (78.26)	14 (60.87)
Hypertension			
Hypertensive (≥130/85)	40 (64.52)	33 (82.50)	
Normotensive (<130/85)	22 (35.48)	15 (68.18)	
Dyslipidemia			
Dyslipidemic	48 (77.42)		33 (68.75)
Nondyslipidemic	14 (22.58)		7 (50)
Duration of diabetes (years)			
<2	18 (29.03)	14 (77.78)	12 (66.67)
≥5	15 (24.19)	12 (80.00)	11 (73.33)
≥10	14 (22.58)	10 (71.43)	7 (50)
≥10	15 (24.19)	12 (80.00)	10 (66.67)
Treatment group			
Newly diagnosed	15 (24.19)	11 (73.33)	10 (66.67)
Metformin	7 (11.29)	5 (71.43)	4 (57.14)
Metformin + others*	40 (64.52)	32 (80)	26 (65)

Note. \*Other includes sulfonylureas, voglibose, teneligliptin and insulin

**Table 2. Serum lipid levels of Diabetic Patients. (n = 62)**

Serum Lipid	Mean ± SD (mg/dl)	Abnormal value (mg/dl)	Deranged lipid level n (%)	Relative residuals from recommended values of dyslipidemic*
Cholesterol	172.44 ± 27.30	>200	10 (16.13)	9.35%
Triglycerides	116.03 ± 25.69	>150	8 (12.90)	9.747%
HDL	43.74 ± 5.75	<40	12 (19.35)	10.8%
LDL	106.79 ± 21.25	>100	42 (67.74)	17.48%
VLDL	23.21 ± 5.14	>32	5 (8.06)	29%

Note. \*Values were calculated by subtracting the average of the corresponding deranged group from recommended values and then finding their percentage relative to the recommended values.

**Discussion:**

The obtained results indicate a very high prevalence of dyslipidemia in the Gujarati diabetic study population, similar to reports from America where they noted an overall prevalence of lipid abnormalities of 70% among diabetic patients.<sup>[20]</sup> A multinational multicentric study of 28 countries from Asia, Europe, Central America, South America and North America, reports that around 30% of diabetics had dyslipidemia.<sup>[21]</sup>

The findings of this study were consistent with those of Pandya H. et al.<sup>[14]</sup> and Borle A. et al.<sup>[22]</sup> who found the prevalence of dyslipidemia to be 82.5% and 86% respectively. A higher prevalence of dyslipidemia was observed due to the fact that many patients had uncontrolled diabetes which was reflected by their elevated blood sugar levels. The most prevalent lipid abnormality in diabetic patients in this study is high LDL, followed by low HDL, hypercholesterolemia and hypertriglyceridemia. These patterns were not quite surprising because of similar trends in previous studies.<sup>[23,24]</sup> There was a slightly greater prevalence of dyslipidemia in females than males which was in agreement with a retrospective study in Kolkata involving 150 diabetic patients and other Indian as well as international studies.<sup>[23-25]</sup> Prevalence of dyslipidemia increased with ageing, though it was not as steep compared to a study of the Nepalese population.<sup>[26]</sup> It was observed that dyslipidemia prevalence in diabetics was almost the same irrespective of its duration.

Similar trends were seen in HTN. According to previous literature, HTN and diabetes are strongly associated with the elderly age group.<sup>[27]</sup> The prevalence of HTN is comparable to a study conducted in Punjab which showed that 60% of diabetics had raised blood pressure.<sup>[28]</sup> The prevalence of HTN in diabetes found in the present study falls in the range reported by African studies, theirs being 50% to 70%.<sup>[29,30]</sup> According to a systematic review, the rates of HTN among diabetics in Asia were at or above 70% which is close to this study.<sup>[31]</sup> A greater prevalence of HTN is observed in males which

is in concordance with a retrospective cohort involving the original and offspring diabetic subjects from the Framingham Heart Study.<sup>[32]</sup>

Interestingly, comparable dyslipidemia and HTN were seen in both overweight and non-overweight as well as in urban and rural populations.

The lipid profile of the metformin-taking group was expected to be near optimal values, but it was not so. This might be due to less number of patients in the metformin group as compared to other groups. Large sample and baseline values are required for better comparison.

**Conclusion:**

From this study, it can be concluded that dyslipidemia and HTN are prevalent respectively in 77.42% and 64.52% of the diabetics of Valsad. Particularly, those who are older than 60 years of age have lower HDL than younger ages. Therefore, early screening of diabetics for dyslipidemia is highly imperative.

**Limitations:**

Parameters of non-diabetics were not collected due to which comparison with baseline characteristics was not possible. Sample size in this study was quite less. Moreover, patients taking different classes of blood sugar lowering agents were all grouped as one. These findings are not representative of the entire population and hence should not be generalised for South Gujarat as patients were selected by convenience sampling. Despite above mentioned limitations, this study was conducted as per standard protocols to minimise bias.

**Declaration:**

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Conflict of Interest: Nil

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**Hysterectomy Dilemmas in Females with Disabilities: A Multidisciplinary Approach**

**Juhi Deshpande**

Associate Professor, Department of Obstetrics And Gynecology, Baba Kinaram Autonomous State Medical College, Chandauli, India

**Correspondence:** Dr. Juhi Deshpande, Email: juhidesh@yahoo.com

**Abstract:**

Hysterectomy decisions for unmarried, young females with disabilities are complex and multifaceted, requiring a comprehensive approach that balances medical necessity, ethical considerations, and patient autonomy. This study presents a case series of three unmarried, disabled girls requesting hysterectomy, highlighting the challenges encountered in their management and the need for a clear medicolegal framework. The author emphasizes the importance of specialized laws and a dedicated medical board to provide streamlined solutions for these vulnerable women, ensuring their rights and interests are protected.

**Keywords:** Disability, Hysterectomy, Medicolegal framework

**Introduction:**

Hysterectomies in young, unmarried women with disabilities pose complex social, ethical, and medicolegal dilemmas. This report presents three recent cases, highlighting the nuanced decision-making process involved in managing such sensitive and challenging situations.

**Case 1**

In January 2023, a 16-year-old girl with spastic cerebral palsy, who was unmarried and bedridden, experienced irregular menstrual cycles. Due to the challenges in maintaining her menstrual hygiene, her mother requested a hysterectomy. However, after thorough discussions with the family, a medical board recommended alternative medical management, opting for injectable depot medroxyprogesterone acetate instead.

**Case 2**

In August 2023, a 22-year-old woman with severe intellectual disability and type 2 diabetes presented with

primary amenorrhea, abdominal pain, and a palpable mass. Following a diagnosis of a high transverse vaginal septum, the family requested a hysterectomy despite discussions about alternative options. A multidisciplinary medical board, consisting of gynecologists, a psychiatrist, and a hospital administrator, ultimately approved a total abdominal hysterectomy with bilateral salpingectomy. After obtaining informed written consent from her parents, the procedure was performed, resulting in a pain-free post-operative recovery. Notably, the intervention had a positive impact, enabling the young woman to attend a specialized school for individuals with disabilities.

**Case 3**

In October 2023, a 25-year-old visually impaired woman, with a history of transverse vaginal septum and multiple prior interventions, presented with ongoing issues. After consulting with her family, she opted for a hysterectomy. A left hemihysterectomy with left salpingectomy was performed, along with drainage of a left tubo-ovarian abscess. The patient’s post-operative

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recovery was uncomplicated, and she experienced a significant improvement in her quality of life, continuing to work as a teacher for visually impaired children.

### **Discussion:**

#### **Social Concerns**

The management of menstrual hygiene and prevention of unwanted pregnancies pose significant challenges for caregivers of intellectually disabled women, often leading them to consider hysterectomy as a solution. Additionally, the financial burden of hormonal treatments in low-income countries contributes to this preference. However, it is essential to educate caregivers about alternative, non-invasive options such as:

- Depot medroxyprogesterone acetate (DMPA)
- Implants
- Progesterone-releasing intrauterine devices (IUDs)

To ensure informed decision-making, sterilization decisions should involve multidisciplinary consultations, discouraging routine non-therapeutic hysterectomies and prioritizing education on improving menstrual hygiene management.<sup>[1]</sup>

#### **Ethical Considerations**

Performing a hysterectomy on minors with intellectual disabilities raises significant ethical concerns, particularly when it results in permanent sterilization. It is essential to strike a balance between the patient's best interests, autonomy, and reproductive rights.

Notable cases, such as the Shirur home incident, underscore the importance of adhering to due process and upholding human rights. International and Indian legal frameworks, including:

- Universal Declaration of Human Rights
- Mental Healthcare Act (2017)
- Indian Constitution (Article 21)
- Rights of Persons with Disabilities Act (2016)

protect individuals from torture, degrading treatment, and involuntary medical procedures that lead to infertility without free and informed consent.

Medical professionals must exercise caution when approaching such cases, considering delayed decision-making when possible and ensuring that the chosen intervention prioritizes the patient's best interests.

#### **Medicolegal Concerns**

The legal framework governing hysterectomy decisions in developing countries, including India, is often ambiguous. In contrast, countries like the UK, Australia, and South Africa have established distinct legal frameworks. The UK prioritizes individual representation in court to ensure decisions align with the patient's best interests, while Australia requires legal authorization for sterilization procedures, underscoring the need for clear guidelines. South Africa has enacted unambiguous laws permitting hysterectomy in specific situations. Similarly, in the USA, the American College of Obstetricians and Gynecologists (ACOG) recommends thorough assessments for informed consent and consultation with caregivers when patients have limited capacity, while also cautioning against potential family pressure and suggesting hospital ethics committee involvement in complex cases. Unlike these countries, India lacks a clear legal framework and guidelines for addressing these complex issues.<sup>[2,3]</sup>

#### **Conclusion and Future Directions:**

In conclusion, addressing hysterectomy dilemmas in females with disabilities necessitates a tailored, multidisciplinary approach. Establishing clear guidelines and a comprehensive legal framework is crucial to prioritize women's interests while safeguarding their rights.

The public health concerns surrounding hysterectomy decisions for females with disabilities are multifaceted. Ensuring informed consent and respecting reproductive autonomy are crucial, while addressing healthcare disparities and inequalities is also essential. Additionally, supporting caregivers and providing education on alternative options can help alleviate burden and promote better care. A clear medicolegal framework is necessary to guide decision-making and prevent coercion, ultimately prioritizing patient-centred care and promoting equitable treatment for women with disabilities.

To bridge the existing gap, establishing a specialized board or tribunal, known as the “Board for Hysterectomy in Special Circumstances” is crucial. This multidisciplinary body would comprise a diverse range of professionals, including gynaecologists, psychologists, psychiatrists, legal advocates, human rights agencies, caregivers, social workers, experts in intellectual disabilities, and special education professionals. By bringing together these experts, the board would provide comprehensive, one-stop solutions for women with disabilities, prioritizing their rights, interests, and well-being. This collaborative approach would ensure informed decision-making and support, ultimately enhancing the quality of life for women with disabilities.

While it is essential to prevent forced or coerced hysterectomies, adult women seeking the procedure for medical reasons should not be denied solely based on their childbearing status, respecting the principle of reproductive autonomy.

Ultimately, striking a balance between medical necessity, ethical considerations, and patient autonomy is paramount.

**Declaration:**

Funding: Nil

Conflict of Interest: Nil

**References:**

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2. **Rational space use:** As more materials move online, physical space norms should be relaxed. Libraries can be reimagined as dynamic learning zones with digital labs.
3. **Infrastructure and training:** High-speed Wi-Fi across campuses must be a minimum standard. Information literacy how to access, evaluate, and use medical knowledge should be part of student and faculty development.
4. **Funding and monitoring:** Dedicated budgets for e-resources must be allocated. The Medical Assessment and Rating Board (MARB) can incorporate digital library usage into accreditation metrics. Annual reporting of e-resource access, student logins, and journal usage will promote accountability.
5. **Equity and open access:** Shared national platforms (e.g., National Digital Library, One Nation One Subscription) must be extended to all colleges, with special support for under served institutions. Encouraging the use of open-access Indian medical journals and digitizing locally generated educational content can further bridge resource gaps.<sup>[5,6]</sup>

India has the opportunity to leapfrog into a modern, inclusive, and efficient library ecosystem. The technology exists. The infrastructure though uneven is expanding. Government-backed platforms like ERMED show that large-scale digital access is possible. What is needed now is regulatory, clarity and commitment.

The library of the future is not defined by square footage or shelf space. It is defined by its ability to connect students and doctors with accurate, current, and accessible information anytime, anywhere. For medical education to truly modernize, the heartbeat of its knowledge system the library must be rewired for the digital age.

### Conclusion:

Medical education must catch up with the digital world. NMC's paper-heavy rules are outdated. Today's students use tablets; patients Google symptoms. India's future doctors need libraries that blend print and online tools. Evidence proves digital tools widen access, save money, and keep knowledge fresh.<sup>[4,5]</sup> By modernizing its rules, NMC can empower medical students and improve healthcare for all.

### Declaration:

Funding: Nil

Conflict of Interest: Nil

### References:

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## **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

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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.

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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.

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

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**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.

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**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

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**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 study's scope.

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and enclosed in square brackets after punctuation. Example: "... with no evidence of intratubular testicular neoplasia.<sup>[1]</sup>" When there are more than two citation number present in the sequence then cite as a "... with no evidence of intratubular testicular neoplasia.<sup>[1-3]</sup>"

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Editorial (by invitation only)	1500
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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.

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