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Understanding Awareness of Diabetes Complications in Disadvantaged Communities in India: An Indian Perspective

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Background

Diabetes mellitus has becomes a significant public health issue. It causes a serious threat on health in India, especially among the people who are socioeconomically challenged and living under the condition of poverty, lack toaccess healthcarefacility, and also have less literacy levels. According to the International Diabetes Federation (2021), approximately 9 crore Indian are having diabetes, and this number significantly increase by 2050. Empirical results from the previous studies such as the ICMR-INDIAB Study (2017–2023) and NFHS-5 (2019–21) suggested that there is asignificant gapswhich leads the awareness of diabetes complications, especially among theresidents of urban slums populations and socioeconomically weak communities. Lack of sufficient knowledge on neuropathy, retinopathy and cardiovascular risks are part of the reasons behind delayed treatment and diagnosis. Awareness levels are thus vital to be comprehended so as to implement community-based, inclusive prevention methods and curtail preventable complications of diabetes in vulnerable groups.

Objective

The research includes the analysis of awareness levels among the low socioeconomic population in India in diabetes mellitus complications, thisresearch uses national survey information, including, the ICMR-INDIAB survey and NFHS-5, and the results also constitute study of a community-based comparative survey among 200 participants selected through lowincome level urban communities.

Methodology

This research is based on community based cross-sectionaland also a comparative research was done among 200 participants (100 diabetic and 100 non-diabetic) insocioeconomically disadvantaged areas of Bahraich, district of Uttar Pradesh. The response wasreceived using a pre-tested semi-structured set of questions through directly askingquestion from the residents of those areas by door to door visit. The response received from the respondent of the area are statistical analysis was performed using SPSS software. Statistical analysis wasalso done by the help of Chi-square test which is a statistical method used to determine if there is a major

difference between observed value and expected values of frequencies in categorical variables and the two-proportion Z-test, which is compares proportions from two independent, random samples to determine if they differ significantly andthe p-value < 0.05 considered significant at the 0.05 level.

Result

The sample having 200 participants (100 diabetic and 100 non-diabetes) was used in the research where it was selected as an urban low socioeconomic community of Bahraich city. Samples were comparable as there was no statistical difference in gender selection ($\chi 2 = 0.51$, p =0.47),. The awareness among diabetic and non-diabetic study group on the complications of diabetes was 42% and 41%, respectively. Chi-square test revealed no significant relationship between awareness level and diabetes status ($\chi 2 = 0.00$, df = 1 and p = 1.0). This indicates that the presence only of diabetes does not increase the level of awareness about its complications; but rather, socioeconomic status, low education and less access to health information are responsible for knowledge.

Key words: diabetes mellitus, awareness of complications, low socioeconomic status, health literacy, NFHS-5, ICMR-INDIAB, India

Introduction

Diabetes mellitus has been considered as one of the biggest health concern among Indian people especially those in low socioeconomic status (low-SES) backgrounds. Low levels of education, finances as well as low access to health care expose these populations to increased risks of late diagnosis and complications. The studies, almost 9 crore adults who are living in India are having diabetes and the disease burden rise significantly in the next few decades.[1]

India is having one of the highest burdens of diabetes mellitus in the world. Instead of being primarily as a disease that urban residents of the upper socioeconomic classes used to face, a number of recent estimates suggests that in 2024, approximately 89.8 millions of adults were diabetic, and this rate (one of the main ones) is predicted to reach roughly 156.7 million by 2050 (Vose, 2020). To such citizens, who lack much formal education, are paid on a daily basis and have severe obstacles to accessing healthcare services, living with diabetes is a challenge. Considering the disease in low-SES groups, it often starts to manifest long before these people realize that something is wrong and requires attention, and before it transforms into very serious complications, such as nerve damage (neuropathy), eye diseases and blindness (retinopathy), kidney failure (nephropathy), and heart-related consequences. It reflects inequalities that are more profound to society. Low education levels tend to imply achievement of reduced health literacy and lack of money compel families to use it on sustenance and food instead of frequent treatment or examination. To add to that, most cultural stereotypes, such as the assumption that diabetes can only be caused by consuming excessive amounts of sugar, tend to complicate the process of an individual adhering to a long-term care. The awareness levels can be understood to identify the key gaps in knowledge and assist in designing realistic, locally appropriate programs to prevent and better manage the disease among individuals that need it most.

Study Design and Duration & area

This study was conducted as a community-based cross-sectional comparative study over 3 months to evaluate and compare knowledge of diabetes-related complication among diabetic versus non-diabetic individuals. The study was conducted in an urban slum of low socioeconomic status population in Bahraich district of Uttar Pradesh, India—a region with restricted healthcare access, poor literacy rate and increased chronic disease burden. Diabetes prevalence is rapidly rising & those with developmental disabilities are vulnerable to complications of diabetes due to their limited access to improved healthcare. Higher complications entail higher burden & subsidized treatment on public health sector entailing higher expenditure in health budget. These areas were: Nazirpura, Baksipura, Ghasiyaripura and his neighborhoods that encompass mostly socioeconomically disadvantaged populations.

Study Population

The study population comprises adult individuals living in the selected areas and was divided into two groups:

Diabetic group: This group of participants previously diagnosed with diabetes mellitus and on treatment for at least 6 months

Non-diabetic group: This group of participants without a known diagnosis of diabetes

Sample Size and Sampling Technique

Calculating on the basis of ICMR-INDIAB data prevalence of diabetes Uttar Pradesh is 4.8% and as city population of 186233 the calculated sample size came as 71. (5% error with 95% confidence limit). Sample size was increased to 100 subjects for enhancing the sensitivity of the results. Another compare group was taken with similar characteristics except that the individuals were not suffering from diabetes.

A purposive sampling technique was employed to identify eligible participants by community based surveys. Attempts were made to involve participants from diverse age groups and both genders to improve representation.

Inclusion Criteria

Age ≥ 18 years ≤65 years

Willing to give informed consent

For diabetic group: documented diagnosis of diabetes mellitus and receiving treatment for ≥ 6 months

Exclusion Criteria

Individuals unwilling to participate

Cognitively impaired individuals & unable to respond

Participants with incomplete or inconsistent responses

Data Collection Tool and Procedure

A pre-designed, semi-structured and pre-tested set of questions in which questions regarding health was used to collect data through a door-to-door survey. The set of questionsconsists two sections:

1. Socio demographic characteristics of participants: This group of participants consists according to their age, gender, education, occupation, and social and financial status.

2. Awareness analysis of participants: This group of participants consist according tothereawarenesson common complications of diabetes (e.g.,nephropathy,neuropathy, retinopathy), and dichotomous responses (Yes/No)

The questions asked from the participants and the response received from the residents of these areas are administered through in-person interviews conducted in the local languages and in simple words to ensure clarity so that any type of wrong interpretation of the questions must get avoided. Pilot testing was conducted before the main test to evaluate validity and reliability, and necessary modifications were made before final data collection.

Research variables

Dependent Variables: These variable are based on awareness of diabetes complications (Yes / No).

Independent Variables: These variables Based on diabetic status (diabetic / non-diabetic)

Control variables: Variable based on age, gender, education level, occupation and social and economic status.

Statistical Analysis

The response obtained is considered as data were entered in Microsoft Excel for calculation and analyzed using SPSS software. Chi-square test was also applied to assess the association between diabetes status and awareness. Z-test was also applied to compare proportions between the two groups. A value of $p < 0.05$ was accepted as statistically significant. Results obtained were presented using tables and graphical representations

Social Determinants of Health – Analysis ofFinancial Stability and Related Factors

The social determinants of health (SDH) are the factors from whichit is easy to get analysis about any individual or group people according to that born, how it grow,where it works, where it live and it's age, and the wider forces that shape the conditions of daily life. These important factors play crucial roles on our health and most of our health directly affected by only these non-medical root causes of illness, which also consist of quality of education, access to food which are having satisfactory nutrition values, and good housing and working environment. External factors such as economic policieswhich includes direct and indirect taxes and the development policies, social norms, social policies and also political systems.SDH matters because addressing them not only helps prevents illness but also promotes healthy lives and equity.

Health also follows a social inequality in health whereby the more underprivileged area are in whichthe people lacking of resource live, there lower income, the less years of there education, the illness and the very few healthy years they can expect to live. The government policies need to ensure that governance structure and systems are need to get developed and also insured to get implemented so that everyone can realize the conditions needed for a healthy and decent life. [27]

Prevalence of diabetes in low SES populations

Not every part of the society is equally affected by diabetes. According to NFHS-5 (2019-2021) data, there is an approximate prevalence of approximately 16.1 percent among

adults although prevalence is significantly higher in urban regions than in rural ones. It also shows that some states, which are more affluent, like those who moved into cities have disclosed higher diabetes rates among people with a poor background compared to their family members who have not migrated to urban centers. Low-income populations are more likely to have diabetes that is characterized by earlier onset and is found among non overweight individuals, a phenomenon sometimes known as lean diabetes because of urban living that is associated with reduced movement, more food consumption, and increased stress. These people might be unaware that they have high blood sugar levels over a long period of time, which results in the development of complications at a faster pace. The educated and better-off have a higher chance of having them tested at early ages and taken care of, but people with poor backgrounds tend to learn about the condition once an extensive damage has already been inflicted.

Current evidence about awareness of diabetes complications

The extent to which individuals are aware of diabetes and the complications directly depends on their education, earnings, and proximity to a medical facility. NFHS-5 estimates that an appalling number of people diagnosed with diabetes do not even suspect it; in fact, it is much worse in rural communities and poorer populations. According to the ICMR-INDIAB study, only half of general population (51.5) and 72.7 of people, who had already obtained diagnoses of diabetes, knew that the disease may influence other body parts. The numbers were even lower among the less educated and lowly financially endowed people. [9] Awareness is seen to be high in states such as Tamil Nadu, whereas it is extremely low in states such as Jharkhand. These state-level disparities mostly expose education levels and access to the local health programmes, and studies to date (2023-2025) have shown that education and occupation level of a person influences to a large extent their knowledge of diabetes complications, with the lowest scores always identified as low-SES groups.[11]

Socio-economic barriers to awareness

There are factors, which complicated the process of people with low-SES backgrounds getting informed about diabetes and the risks associated with it. First, low level of schooling often translates into inability to understand medical terminology, as diabetes appears to them as a foreign language, next, the treatment is often expensive with an annual cost ranging between 10,000 to50, 000 The two also have a burden of house chores and have less control over decision making in the family thus receiving less attention and care as opposed to men, thereby causing their awareness level to remain low and letting complications get the best of them.

Impact of low awareness on complications: why this study is needed

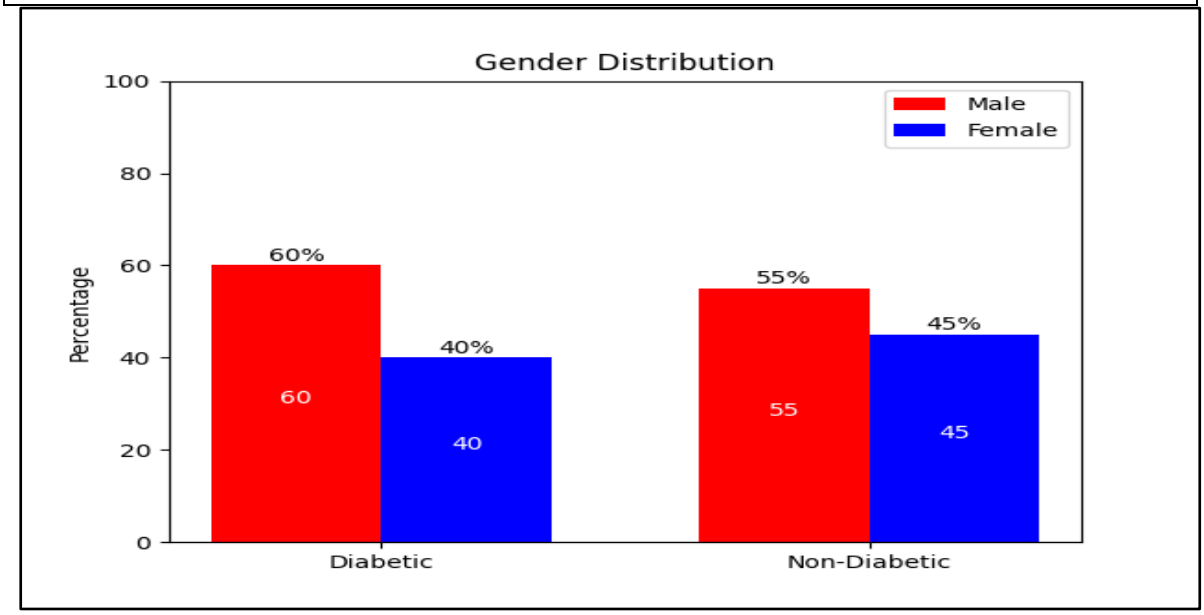
In cases where people are uneducated about the risks, neuropathy, eye complications, and heart diseases amongst poorer patients are more common. On top of this, poor awareness also contributes to depression and mental suffering. The families in the urban slums, such as, are normally full of anxieties about the medical bills and the long-term consequences of sickness; thus without the proper education, the care is able late to be provided and this may drive the already impoverished families further down. This is an excellent indicator of why the current study is relevant. The analysis of the awareness level among low-SES groups and

a comparison of awareness with and without diabetes assist the study in identifying certain areas of knowledge deficiency and helping to plan the practical, community-oriented action to address the prevention and management issues.

Results

Table 1 Frequency distribution on the basis of Gender Distribution

GROUP	Male	Female	Total
Diabetic	60	40	100
Non-Diabetic	55	45	100
Total	115	85	200
Source: Survey Data			



Chi-square (χ^2) = 0.51
P-value ≈ 0.47
There is no statistically significant difference in gender distribution between diabetic and non-diabetic groups.

Table 2 Frequency distribution on the basis of Awareness about Complications of Diabetes

Group	Aware (%)	Unaware (%)
Diabetic	42%	58%
Non-Diabetic	41%	59%

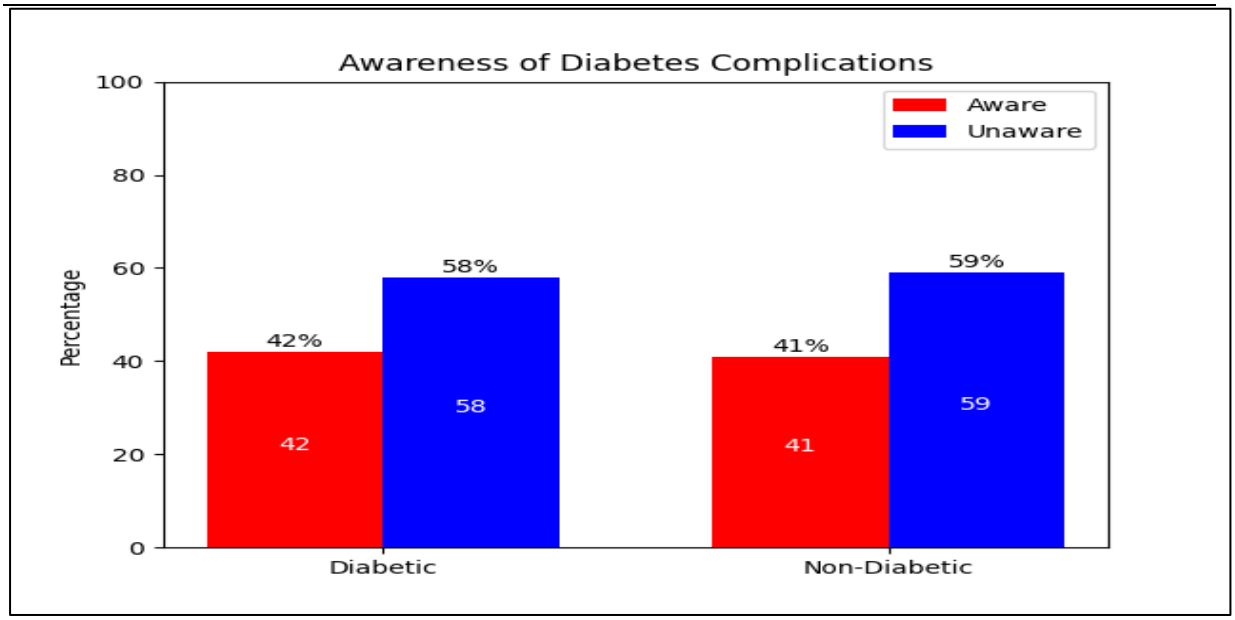


Figure 1: Awareness of Diabetes Complications in Low-SES Urban Participants

Table 3 Comparison of Awareness of Diabetes Complications between Diabetic and Non-Diabetic Respondents in Low Socioeconomic Population

Variable	Diabetic (n=100)	Non-Diabetic (n=100)	χ^2 Value	df	P-value	Significance
Awareness (Yes)	42 (42%)	41 (41%)				
Awareness (No)	58 (58%)	59 (59%)	**0.00**	1	**1.00**	Not Significant

No significant relationship was observed as to diabetes status in relation to awareness of complications (2 = 0.00, p = 1.00). The level of awareness in both groups was matched, indicating that disease status is not a critical factor of socioeconomic and educational levels.

Table 4 Correlation analysis (φ coefficient) to assess the strength of association between diabetes status and awareness.

Group	Aware	Unaware	φ coefficient	Correlation
Diabetic	42	58	**0.01**	**Negligible**
Non-Diabetic	41	59		

The value obtained (φ = 0.01) is very low, suggesting that there is no positive relationship between the two variables**.**

Table 5 SES CLASS & AWARENESS ABOUT DIABETES INDIABETIC GROUP

SES Class	Aware (n)(%)	Unaware (n)	Total	Chi-square (χ^2)	df	p-value
Upper Lower	30(46.2%)	35 (53.8%)	65	1.32	1	0.25
Lower	12(34.3%)	23(65.7%)	35			
Total	42	58	100			

No statistically significant association between SES class and awareness

Table 6: SES CLASS & AWARENESS ABOUT DIABETES INNON DIABETIC GROUP

SES Class	Aware (n)(%)	Unaware (n)	Total	Chi-square (χ^2)	df	p-value
Upper Lower	28 (43.1%)	37(56.9%)	65	0.3	1	0.58
Lower	13(37.1%)	22(62.9%)	35			
Total	41	59	100			

No statistically significant association between SES class and awareness

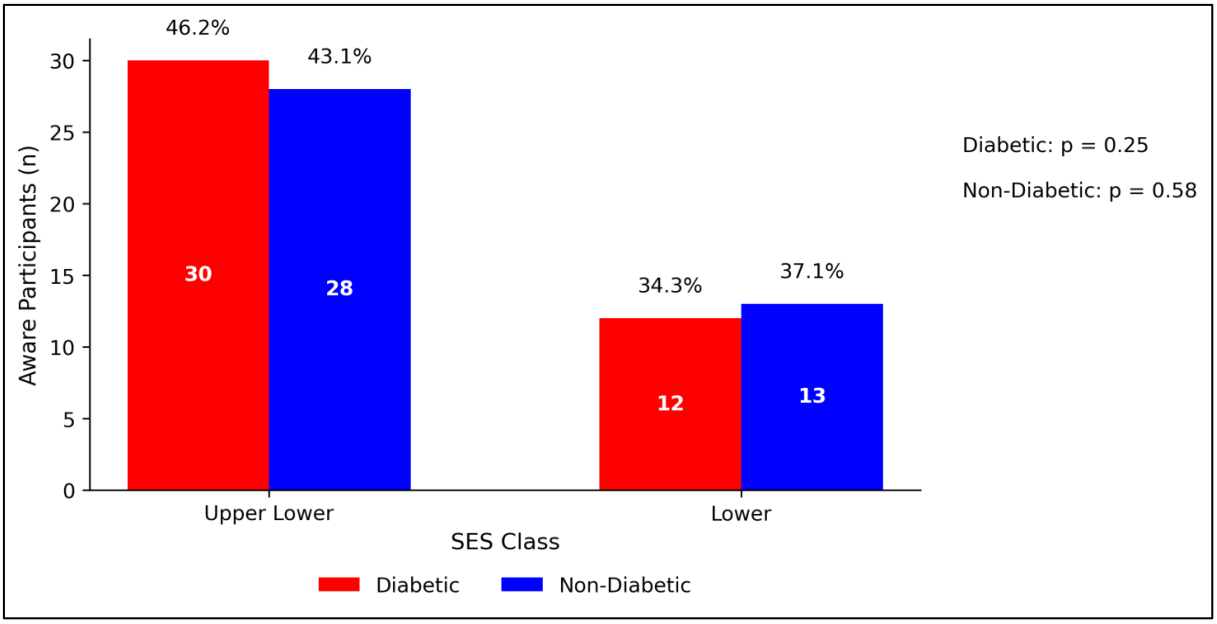


Figure 1.Comparison of awareness of diabetes complications across socioeconomic classes between diabetic and non-diabetic groups.

Discussion

In the current study, there was the evidence that people with low socioeconomic status background levels had low awareness on diabetes complications whether they had the disease (42%), or did not (41%). These results are very divergent to the findings of NFHS-5 and ICMR-INDIAB surveys which indicate awareness of among diabetics and non diabetics as 71 percent and 52 percent respectively. On comparing the awareness about complications of diabetes among the different socio-economic classes(lower class & upper lower class) in both the groups no significant difference was observed (p=0.25 in diabetic group and p=0.58 in non diabetic group) however the upper lower class reflected a slight more awareness as compared to lower class. Moreover the correlation analysis showed negligible correlation (φ = 0.01) about awareness of complications of diabetes & being diseased, indicating that mere

presence of disease in not necessary for being aware about its complications. When there is low income, it is common to get health related information through family members, neighbours or traditional healers within the vicinity. Nevertheless, the information of this type is often incomplete or erroneous. Monetary issues and distance to healthcare facilities tend to prevent people to visit regularly to receive sufficient guidance and follow-up treatment often further supports the opinion that the lack of education and unresolved poverty alongside urban-rural divide still limit the awareness and results in rising complication rates.[11,12] A diagnosis is not the solution. Patients must receive continuous and direct counseling in a language that they can comprehend.

Recommendations

In order to enhance knowledge about diabetes complications in low-SES populations, the following measures of practice are proposed: To disseminate awareness about the complications of diabetes among the population with low socioeconomic status (low-SES), the following practical actions are proposed:

1) There is a need to introduce community based education programmes in simple local languages. These activities must be based on visual modes like pictures and posters, short stories, street plays, and local personalities whom people or communities trust like ASHAs, ANMs, panchayat members, and religious leaders. This method can be used to describe diabetes and its complications in a manner familiar and easy to comprehend.
2) Mobile health clinics and telemedicine services should be increased, particularly in the rural regions and slums. These services would enable the poor families to receive screening, counseling and follow-up care regularly without necessarily having to traverse long distances and incur huge costs.
3) The government is supposed to bolster funding of low-income patients. Free or highly subsidized medications, blood sugar test strips and regular check-ups are supposed to be made ubiquitous by schemes such as Ayushman Bharat and other existing schemes of public health programmes.
4) Specialized training on the communication of diabetes in simple and understandable words should be provided to frontline health workers including ASHAs and ANMs. The emphasis of the training should be placed on the fact that the cultural beliefs and the challenges that patients face in their everyday life must be respected and that the necessity of tests, medicines, and their adverse effects should be made clear. Regular refresher courses would assist these workers to deal better with families of low-income origins.

Conclusion

The level of awareness on diabetes complications among individuals with low socioeconomic backgrounds remains very low in India. We demonstrated that even current diabetes patients were not much more aware of the complications of diabetes than individuals without the condition. Such a lack of understanding frequently leads to later care, more severe health conditions, and poorer living conditions of many families. The causes of this issue are deeper in the social issues of poverty, lack of schooling, lack of equality in

assigning men and women, and loopholes in the healthcare system. To close this gap in knowledge, community education should be provided on a consistent basis in local languages and in forms that are conducive to local culture. Increased access to healthcare services and increased government assistance to relieve the poor families of the financial burden is also crucial. Future research ought to consider the effectiveness of particular interventions in the long run, particularly in women and rural settings. It is not until India embraces sensible people-centered policies that it can expect to reduce the growing incidence of diabetes and the health and life conditions of its most disadvantaged groups.

Limitations

Small sample size, limited geographical area, cross sectional analysis, binary classification of awareness, lack of long term follow up.

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