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Influence of Education, Age and Area of Living on Knowledge, Attitude and Practices towards Obesity: A Cross-Sectional Study in West Bengal

Jayeeta Majumder[1*], Sourav Gangopadhyay[2], Ayan Banerjee[3], Saptaparni Roy Chowdhury[4] and Susmi Biswas[5]

[1-4]Brainware University, 398, Ramkrishnapur Road, near Jagadighata Market, Barasat, Kolkata, West Bengal 700125, India
[5]Haldia Institute of Management, P.O. Hatiberia, ICARE Complex, HIT Campus, 721657, Kshudiram Nagar, Haldia, West Bengal 721657, India

Author Designation: [1,2]Associate Professor, [3,5]Assistant Professor

*Corresponding author: Dr. Jayeeta Majumder (e-mail: drjayeetamajumder@gmail.com).

Abstract Obesity is becoming a global health problem at an alarming rate and is one of the main causes for the increasing number of chronic and lifestyle-related illnesses. It is important to comprehend how socio-demographic factors affect people's knowledge, attitudes and practices (KAP) towards obesity for the development of effective prevention programs. In West Bengal, this cross-sectional research study was aimed at evaluating the impact of age, education and area of residence on obesity-related knowledge, attitudes and practices among 253 participants. Data collection involved the use of a structured questionnaire that was given to people via Google Forms and shared on WhatsApp. After that, the data were analysed statistically using both descriptive and comparative methods among generational cohorts, educational levels and rural-urban groups. There were considerable demographic differences in the KAP scores. Generation Z had the highest mean score in knowledge (4.23), attitude (4.25) and practice (4.53), whereas Generation X had the lowest scores in knowledge (1.56) and attitude (1.55) ($p<0.001$). Comparing the urban and the rural participants, the mean scores of the urban respondents in knowledge (4.06 vs 2.69) and attitude (4.05 vs 2.66) were significantly higher, whereas there was no significant difference in terms of practice scores ($p = 0.395$), which is an indication of the effect of the traditional lifestyle practices domineering in rural areas. Education was found to be the main factor contributing to knowledge, attitude and practice. Undergraduate and postgraduate respondents scored the highest, whereas participants with only primary education showed the lowest scores for knowledge (1.92) and attitude (1.88), even though their practice scores (3.81) were at moderate levels ($p <0.001$). In general, youth demonstrated a higher level of knowledge, attitude and practice related to obesity. Individuals with higher education were also found to have better knowledge, attitude and practice. People living in cities had better performance than those living in the countryside. Among the different age groups, Generation Z had the highest practice scores. Nevertheless, all groups lacked the connection between knowledge and actual practice. Hence, it can be said that acquiring more knowledge does not necessarily result in adopting healthier behaviour. Therefore, there is a demand for intervention approaches that are compatible with local culture and everyday life, not only information-based programs. The study adopted the method of online data collection. As a result, there is a possibility that rural and less educated people are not adequately represented. This drawback should be taken into consideration when interpreting the findings.

Key Words Obesity, Knowledge, Attitude, Practice (KAP), Education, Age, Area of Living (Urban Vs. Rural)

INTRODUCTION

Obesity is known to be a major global health challenge. It is the main reason for morbidity and mortality through its association with chronic diseases such as diabetes, cardiovascular disorders and certain cancers [1], [2]. According to some researchers, the worldwide prevalence of obesity has nearly tripled since 1975, with over 650 million adults classified as obese in 2016 [3]. The main contribution of this is rising urbanization, sedentary lifestyles and changes in dietary patterns—collectively known as the "nutrition transition" [4]. Apart from the biomedical risks, effective management of obesity depends on people's knowledge, attitudes and practices (KAP) related to diet, physical activity and health-seeking behaviours. It has been

observed that the Knowledge-Attitude-Practice (KAP) framework is globally utilized to assess awareness, perceptions and behavioural responses to health conditions [28], [22]. Many researchers have emphasized that higher knowledge about obesity is significantly related to more positive attitudes and healthier behavioural practices [5]; on the other hand, lack of awareness often results in misconceptions and poor lifestyle choices [6]. However, knowledge alone is not sufficient; translating awareness into practice requires supportive social, cultural and environmental contexts [7]. Demographic factors such as age, education level and place of residence are critical determinants of obesity-related KAP outcomes. Evidence suggests that younger individuals are more likely to access health information as they are more exposed to digital platforms, which helps them to improve awareness and attitudes toward obesity prevention [8]. Similarly, higher education is consistently associated with health literacy and proactive approaches to disease prevention, including obesity [9], [10]. At the same time, rural-urban differences in living conditions and access to resources to address obesity foster imbalances in knowledge and preventative behaviour related to obesity [11]. In this case, the measurement of how demographic factors influence the knowledge, attitude and practice (KAP) about obesity is critical in designing evidence-based, specific health interventions. The current research aims at the comparison of KAP scores in different generational groups, including residential area and education level, thus providing knowledge on the socio-demographic factors of obesity awareness and prevention measures. Despite a growing body of national and international research, evidence from eastern India, particularly West Bengal, remains limited. Understanding how demographic factors are associated with obesity-related KAP in this regional context is important for developing targeted and contextually appropriate public health interventions.

LITERATURE REVIEW

Education is Influencing the KAP Score of Obesity among People

Education has a central role in the Knowledge, Attitude and Practice (KAP) scores related to obesity, but these effects differ in their strength among different population groups [12]. From a behavioural aspect, this coordination can be explained using pivotal health behaviour models like the Health Belief Model (HBM) and the Theory of Planned Behaviour (TPB). The HBM indicates that enlarged knowledge provokes perceived susceptibility and severity of health condition, motivating preventive actions, though TPB highlights the capability of attitudes and perceived behavioural control moulding health behaviours.

Education has a strong and positive relationship with increased awareness of obesity, the etiological determinants, health consequences and preventive measures [13]. Studies with adults and other student groups have shown that people with secondary or higher education have a better understanding of the health consequences of obesity and have higher chances of recognizing the preventive precautions [14]. Even people are still doubtful about details like the role of micronutrients or how sleep affects weight management [15]. Education provides positive attitudes toward obesity prevention and healthy behaviours [16], though sometimes it shows weaker results than that with knowledge. On the contrary, some studies report that those with more education hold more optimistic or proactive attitudes, while others note that attitude does not always significantly differ by education level. This could be since more educated individuals are aware of the complexities and challenges of weight management, resulting in more complicated views [17]. Increased knowledge from higher education often translates into improved practices, such as healthier eating patterns, increased physical activity and adherence to weight management strategies. Interventional and observational studies demonstrate that educational interventions can produce immediate and significant improvements in KAP scores [18], especially when education is known to be practical, relevant and reinforced over time. However, a consistent challenge is the "knowledge-practice gap", because on most occasions good knowledge and attitudes are not always leading to sustained healthy behaviours unless complemented by regular monitoring, effort and supportive environments [19]. Education, especially when tailored and repeated, has been shown to significantly raise KAP scores in target groups, such as obese adults or students [5]. Structured nutrition education, online modules and interactive health communication not only enhance knowledge and attitudes but also foster healthier practices in the short and medium term. However, retention and long-term compliance require ongoing support and possibly addressing other factors like environment, access and motivation [21].

The Area of Living is Influencing the KAP Score of Obesity among People

Different researchers have shown that the area of living significantly influences Knowledge, Attitude and Practice (KAP) scores related to obesity, though there are some complex and counterintuitive results [27]. People who are living in urban areas often have better exposure to health information and thus higher knowledge scores regarding obesity and its health risks compared to their rural counterparts. Nevertheless, certain researchers have discovered that even in cities, there exist significant groups of the population, i.e., urban homemakers, who remain uninformed as to obesity, necessitating targeted education programs [23]. Conversely, the rural or semi-urban population. On the one hand, there may be a more favourable awareness among highly educated people or those with a more personal touch with health care, but in general, we can draw a conclusion that the awareness is lower than in urban areas [12]. It has been discovered that Attitudes towards obesity and weight management can be affected by the area. Others indicate that attitudes may not necessarily represent a

strong desire to prevent or control obesity, even though people in urban populations are more knowledgeable. Positive prevention intentions may be weakened because rural residents might not believe that obesity is a severe health risk or its consequences might be fatal. On the other hand, high health awareness can also be combined with an unhealthy or negative or pessimistic attitude in the city, maybe because of a higher exposure to weight stigma or unhealthy social messages [24]. In both situations of urban and rural citizens, it is observable that there is a lack of connection between knowledge/attitude and real practice. Urban residents may know more about obesity prevention, but they lead unhealthy lifestyle behaviours due to convenience, lifestyle pressures or workplace stress. Due to limited access to healthy food and money, they have a lower Practice score [25]. Studies across various areas by different researchers consistently showed that translating knowledge and positive attitudes into behavioural change remains a difficult job, particularly without environmental support [26]. Some research identified that in certain contexts, rural populations can have better practice scores (e.g., more physical activity from manual labour) even though they have lower knowledge, while urban populations, despite high knowledge, may have worse practices due to sedentary lifestyles and unhealthy food environments. On the other hand, weight management behaviours and KAP scores are influenced by other socio- demographic factors (income, age, education) that can modify the direct effects of area of residence [27].

Age is Influencing the KAP Score of Obesity among People

Age has complex effects on the Knowledge, Attitude and Practice (KAP) scores concerning obesity, due to age variations in experience, motivation and barriers that various age groups experience [20,24]. The elderly people (Generation X, born between 1965 and 1980) tend to record higher scores of knowledges regarding obesity and weight management than the younger generation. This could be because of the increased life experience, more encounters with healthcare providers and more exposure to health information over time. Research shows that individuals aged 40 years (Generation Y, born between 1981 and 1996) and above understand the health risks and management of obesity better. Nonetheless, in the population of older adults, there, too, are knowledge gaps, especially regarding effective methods of weight management and the effects of micronutrients [5]. Older persons may have lower or more negative attitudes towards obesity prevention and management in spite of having better knowledge. This could have been associated with repeated failure in weight control, resulting in frustration and low motivation. The aged can also grow bitter or less hopeful of their capacity to alter behaviours, thus affecting their perception of obesity management in a negative manner. The younger individuals (Generation Z, born between 1997 and 2012) may possess more positive or optimistic attitudes, but do not have the hands-on experience that can be utilized in how to practice weight management [5]. Despite better knowledge, older adults sometimes show inconsistent or suboptimal practices concerning obesity management, potentially due to psychological or physical barriers. Studies report a "knowledge-practice gap" where good knowledge and even positive attitudes do not always translate into sustained healthy behaviours, particularly among older populations facing comorbidities or functional limitations. Younger people may have poorer knowledge but can be more physically active, though they often lack sustainable behavioural habits related to diet and exercise [26].

Objective

- To explore the relationship among age, educational attainment and area of living with obesity-related Knowledge, Attitude and Practice (KAP) values among the population of West Bengal
- To understand differences in demographics in KAP values and recognize probable knowledge practice gaps across different groups

METHODS

Study Design

Here, we have conducted a descriptive cross-sectional survey together with analytical elements to assess the impact of age, education and area of living on the score of knowledge, attitude and practices (KAP) on obesity among people of West Bengal. The main goal of the research was descriptive in nature to depict a profile of obesity-related knowledge, attitudes and practices among different socio-demographic groups. Besides, within the cross-sectional design, group-wise differences and associations were also looked into; hence, inferential statistical analyses were carried out.

Inclusion and exclusion Criteria

Adults aged 18 years and above, living in West Bengal and willing to participate by giving informed consent were considered eligible. Pregnant women, patients who had medical conditions that could have a significant impact on body weight (for instance, endocrine disorders, chronic renal disease or long-term steroid therapy) and respondents with incomplete questionnaire responses were excluded.

Sample Size

A sample population of 253 respondents was found to be sufficient to compare them. The size of the sample needed for this cross-sectional KAP study was calculated by using the typical formula $n = Z^2pq/d^2$. Since there was no previous data on the prevalence of KAP in West Bengal, basically, the most cautious assumptions were used: $p = 0.50$, $q = 0.50$, $Z = 1.96$ (95% confidence level) and $d = 0.06$. As a result, the minimum sample size required for the study was about 267 participants. The final actual sample consisted of 253 respondents, which is 94.8% of the estimated total and is acceptable from a methodological point of view for both descriptive and comparative cross-sectional studies.

Data Collection and Study Tool

We have developed a questionnaire and the items of the questionnaire were designed after a comprehensive review of relevant literature, ensuring inclusion of validated and conceptually sound questions relating to obesity awareness, attitudes and behavioural practices. This process was complemented by five experts in total from various fields (Public Health and Social Health) and consultations to refine the content and relevance of the questionnaire. A structured questionnaire was created, typed in Google Forms and distributed to people. The completed survey was conducted using WhatsApp groups and a purposive-convenience sampling technique was utilized in order to sample both urban and rural residents and representatives of different education levels.

Pilot Test

A pilot test was conducted with 15 respondents representing diverse demographic backgrounds to assess clarity, construct validity and reliability (Cronbach's Alpha value was - 0.822) of the instrument; based on their feedback, minor revisions were incorporated to improve comprehensibility.

Analysis and Entry Method

The analysis was done using SPSS version 21 to perform statistical analysis. Demographic nature and KAP scores have been summarized by descriptive statistics. The way ANOVA has been tested is to determine the difference in mean KAP scores among age groups, education levels and the area of residence. The statistical significance was determined by a p-value of less than 0.05.

Data Availability Statement

The datasets that have been generated or analysed during the current study cannot be made publicly available due to the ethical restrictions and the requirement to preserve participant confidentiality. However, the datasets can be obtained from the corresponding author by making a reasonable request.

RESULTS

Table 1 depicts the descriptive statistical analysis of the Knowledge, Attitude and Practice (KAP) scores with regard to obesity with respect to various demographic characteristics, i.e., age group (generation), area of living and educational qualification. The following parameters were used to report them: sample size (N), percentage (%), mean, standard deviation, skewness and kurtosis, which together will give a complete description of the distributional characteristics of KAP scores. Age (Generational Cohorts): The research categorized the respondents as Generation X, Generation Y and Generation Z. Generation Z comprised the largest share of participants (43.08%) with a mean KAP score of 4.34 (SD = 0.47), showing higher awareness and practices compared to the other groups.

The skewness was extremely negative (-3.04) and the kurtosis was large (8.14), indicating that the scores were concentrated towards the higher end. The percentage and mean (SD = 0.10) of Generation Y was 32.41 with an average of 3.52, which is a moderate knowledge and practice level. The lowest mean value of 2.31 (SD = 0.55) with the least contribution percentage of 24.51 showed that Generation X has a rather low level of KAP. Location of Living: The sample was nearly equal (urban 49.01/rural 50.99) in terms of areas of living. The KAP score (4.06, SD = 0.64) of urban respondents was higher and the distribution was negatively skewed (Skewness = -1.91) and leptokurtic (Kurtosis =4.85), which indicates that it was concentrated at higher levels of distribution. The mean score among rural respondents was relatively low (3.11, SD = 0.88), skewness is close to zero (-0.12),

Table 1: Descriptive Statistics of Knowledge, Attitude and Practice (KAP) Related to Obesity Across Demographic Groups

Variable		n	Percentage	Mean	SD	Skewness	Kurtosis
Age	Generation X	62	24.51	2.3110	0.55737	-0.678	-1.444
	Generation Y	82	32.41	3.5169	0.10466	-0.595	1.162
	Generation Z	109	43.08	4.3396	0.47635	-3.040	8.142
Area of Living	Urban	124	49.012	4.0621	0.64814	-1.911	4.847
	Rural	129	50.99	3.1084	0.87597	-0.123	-0.507
Education	Under Graduate	39	15.42	4.4431	0.10678	1.228	1.784
	Post Graduate	58	22.92	4.4205	0.27333	-2.564	6.884
	Higher Secondary	82	32.41	3.5054	0.38539	0.216	2.560
	Primary	74	29.25	2.5348	0.73434	0.139	-0.104

Table 2: Comparative Analysis of Knowledge, Attitude and Practice (KAP) Scores on Obesity Across Demographic Characteristics

Characteristic	Category	Knowledge	Attitude	Practice
Age	Generation X	1.5581	1.5484	3.8253
	Generation Y	3.5659	3.4797	3.5041
	Generation Z	4.2330	4.2538	4.5321
	P Value	<0.001		
Area of Living	Urban	4.0597	4.0484	4.0780
	Rural	2.6899	2.6589	3.9755
	P Value	<0.001		
Education	Post Graduate	4.4138	4.4109	4.4368
	Undergraduate	4.4154	4.4573	4.4573
	Higher Secondary	3.4195	3.3699	3.7256
	Primary	1.9162	1.8784	3.8086
	P Value	<0.001		

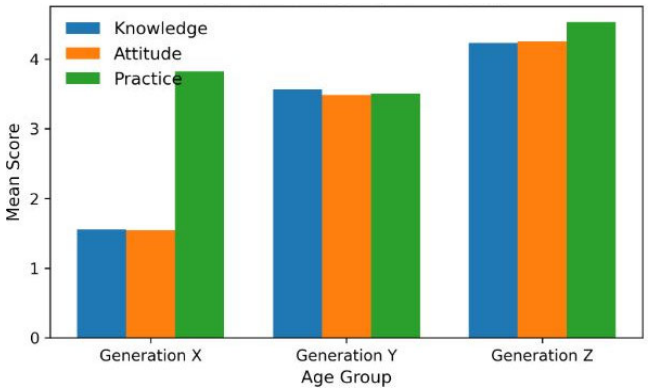

Figure 1: Mean KAP scores by age group

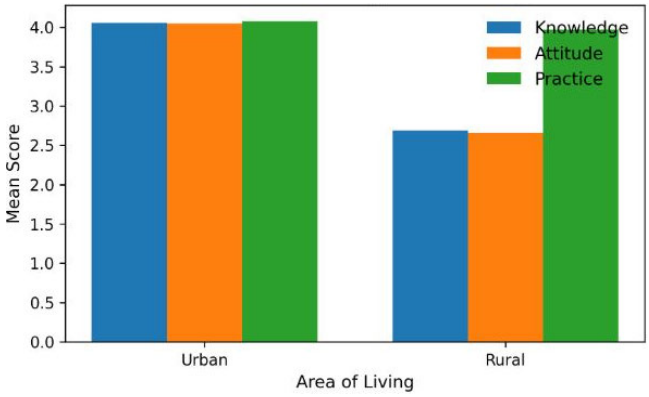

Figure 2: Mean KAP scores by area of living

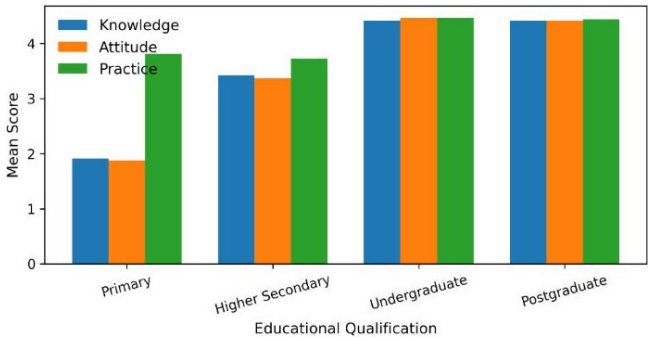

Figure 3: Mean KAP scores by educational qualification

the platykurtic measure of dispersion is close to negative (-0.51) and the variability is greater and the distribution is more balanced. Education: There was a gradient in education qualification on KAP scores. Respondents who had undergraduate degrees registered the highest mean score of 4.44 (SD = 0.11) and closely behind were the postgraduates with a mean of 4.42 (SD = 0.27). Both samples have shown extreme kurtosis (1.78 and 6.88, respectively), which shows that the high scores are highly concentrated. The highest scores were registered by higher secondary respondents (32.41), with moderate scores (3.51, SD = 0.39) and the lowest mean was obtained in the group of primary school participants (29.25) (2.53, SD = 0.73), implying that they were not well informed in terms of knowledge and practices regarding obesity.

Skewness and kurtosis values were analysed before the analysis was done to prove whether the values of the scores were normally distributed. Some groups exhibited the abnormality of the distribution. Even with these deviations, the sample size in each group used ANOVA, which was justified because it is moderate to large. Even when the data are not normally distributed, especially when the sample size is large, ANOVA has been proven to work satisfactorily. This is why the analysis was conducted. The main aim was to contrast the variation in the KAP scores between the groups. The analysis was not to be utilized in drawing cause and consequences.

Overall, the results bring out the fact that younger generations (especially Generation Z), urban dwellers and better-educated persons have far better KAP scores on obesity. On the contrary, the less-educated people, populations in rural areas and older generations represent less awareness, attitudes and practices, which means that the targeted interventions to be applied to these groups are of health education.

Table 2, along with Figures 1, 2 and 3, demonstrates the average scores of Knowledges, Attitude and Practice (KAP) regarding obesity among the three largest demographic groups of age (generational cohorts), surroundings (urban vs. rural) and level of education. The value has been used to evaluate the difference between the group with values less than 0.05 and found to be statistically significant. Age (Generational Cohorts): Generation Z, with the highest KAP scores of 4.23, 4.25 and 4.53, respectively, is the largest in terms of mean knowledge, mean attitude and practice, respectively. It implies that they are very much aware, have positive attitudes and are healthier in their practices towards obesity prevention and management. Moderate performance in all groups was exhibited in the case of Generation Y, whose scores on KAP are 3.56, 3.47 and 3.50, respectively, implying a reasonable level of engagement but worse than that of Generation Z. Generation X has the lowest KAP scores since the knowledge score is 1.55; attitude score is 1.54 and the practice score is 3.83. It indicates that there are low levels of knowledge and attitudes that are less favourable, though they scored a bit higher in their practice, than what is expected given their level of knowledge. The differences between generations were also statistically significant because the p-value is less than 0.001. It becomes an evident generational gap as younger respondents are more educated and proactive when it comes to obesity. In the Urban vs. Rural case study (Area of Living), Urban respondents had always higher scores in terms of knowledge (4.06), attitude (4.05) and practice (4.08). It provides a better exposure to health information, facilities and lifestyle opportunities that promote obesity prevention. The Rural people demonstrated poor knowledge score (2.69) and attitude score (2.66), but still their practice scores (3.98) were relatively close to those of urban participants (p = 0.395). This suggests that the rural people are maintaining some healthy practices due to traditional lifestyles, even if they lack scientific knowledge or a favourable attitude

towards obesity prevention. The differences in knowledge and attitude were highly significant, as the p-value is less than 0.001, but on the other hand, practice did not differ significantly between urban and rural groups, as we have already discussed. Education: Education has a significant influence on the KAP score of obesity. It is evident that higher educational attainment strongly influenced KAP scores. In this research, it can be easily seen that the postgraduates and undergraduates have the highest and nearly identical scores across knowledge (≈4.41), attitude (≈4.41-4.45) and practice (≈4.44-4.45). It suggests that higher education fosters both awareness and positive behavioural outcomes. In this paper, it can also be seen that the higher secondary people had moderate scores (knowledge= 3.42; attitude= 3.37; practice = 3.73), which means they have partial awareness but weaker engagement compared to graduates. In the case of Primary-level educated respondents, they have the lowest scores in knowledge (1.92) and attitude (1.88).

Their practice score (3.81) was rather higher, which may have been caused by lifestyle-based behaviours and not formal awareness. The variations by the education levels were found to be statistically significant, with the p-value being less than 0.001, which reaffirms the role of education in determining obesity-related KAP. The discussion indicates that age, place of residence and education play a significant role in determining knowledge, attitudes and practices relating to obesity. Young people (particularly Generation Z), urban dwellers and the more educated population are more informed, their attitudes score better and their practices toward the management of obesity are better. However, the older groups, rural people and the less-educated groups demonstrate the high gaps, indicating the necessity of narrowing the differences through specific health education and awareness campaigns.

DISCUSSION

The research proved that there was a significant effect of age, geographical location of residence and education level on knowledge, attitudes and practices (KAP) of obesity. The findings indicate that younger generations, urban dwellers and better-educated people are much more aware, have positive attitudes and healthier lifestyles in terms of obesity prevention and management. The analysis reveals that Generation Z has the highest KAP score, then generation Y. The lowest score was the Generation X. This finding showed that the younger individuals are more tech savvy and well connected online and exposed to health-related information and could be more aware of the dangers of obesity and preventive measures [28]. The other studies have found that youthful age groups tend to be more health literate and have more interest in general health information campaigns due to increased social media access and availability of online information [29,30]. Contrastingly, the elderly have been noted to exhibit less knowledge and negative attitudes with respect to obesity, irrespective of their occasional support of more conventional lifestyles [31]. This is one pattern that is valid with our current findings. We have determined that Generation X had low knowledge but greater-than-anticipated practice scores. This is an indication that their practices could be lifestyle-based and not based on knowledge, which is in line with the research that has indicated the connection between cultural traditions and protection in older cohorts [32]. Urbanites were always rated much higher in terms of knowledge and attitude scores than rural individuals. This finding is consistent with previous scholars who have demonstrated that people in urban areas have been advantaged with improved access to healthcare, increased awareness of nutritious diets and lifestyle opportunities [33,34]. The fact that there is not much difference in the practice scores of the rural and urban respondents is significant. Rural populace, despite drug consciousness, is upholding relatively healthier lifestyles, which could be attributed to the likelihood of more physically active lifestyles, dependence on domestic foods and the customary diet [35]. Some researchers have also reached similar conclusions, having determined that the unintentional obesity-preventive behaviours of rural communities are frequently practiced at low levels of formal knowledge [36,26]. It explains why the difference in practices did not reach statistically significant levels, despite the extremely high difference in knowledge and attitudes. Education proved to be a powerful forecast of KAP related to obesity. Undergraduates and postgraduates scored much higher, which proves that exposure to education in terms of awareness and the formation of healthier attitudes and behaviours is not only possible, but it also takes place. This confirms the research done in the past, where it was always reported that higher education levels are in a positive relationship with health literacy and active participation in disease prevention [37,38]. Conversely, those with a lower level (primary and secondary levels) were weak in their knowledge and attitudes, although their practices in real life were moderately maintained. This disparity implies that, as much as higher education affects informed decision-making, there are individuals who do not obtain higher education. Practices were the product of socioeconomic circumstances and traditions of the lifestyle instead of conscious awareness [39]. These results demonstrate that specific measures are needed in obesity prevention. In the case of the older population and the rural population, knowledge improvement and attitude restructuring by culturally appropriate educational programs may bridge the gap. Similarly, the interventions should be designed depending on the literacy levels, which include visual, community-based and experiential learning to teach the less-educated groups [40]. More than this, the results of this paper have shown that there is no one-fits-all type of policies and campaigns because of the differences between generations and urban-rural areas. Instead, the interventions should be demographic-based, which involves the use of digital media to address young people, formal healthcare communication to educate populations and community mobilization to address rural dwellers. Conclusively, we can state that our

study supports the position that education, urban exposure and generational changes are prominent predictors of KAP of obesity. It is quite evident that the relatively equal practice scores of the rural and older populations show that the traditional lifestyles interact with the health practices that can be enhanced further by the intervention of the public health.

CONCLUSIONS

Our empirical evidence demonstrated the huge influence of the demographic variables of age, residential area and level of education on obesity-related knowledge, attitudes and practices. This study shows Generation Z has the highest awareness, positive attitudes and healthier behaviours than the older generations. In the same breath, urban populations are more knowledgeable and in terms of attitude level than their rural counterparts, but surprisingly, the rural folks were equally strong, probably because of the lifestyle-inspired traditional habits. Education, on the other hand, emerged to be a very sensitive element and UG and Pakistan participants had better KAP scores, highlighting the importance of health literacy in promoting obesity preventive behaviours. The results demonstrated that specific public health interventions taking into consideration demographic variations are necessary. The focus of the strategies should be to bridge the gap between the knowledge and attitude of older, less-educated and rural people by developing a bridge between them through simple, culturally sensitive and easily-accessible health education. Conversely, more digital platforms will have the potential to increase engagement between younger and more educated groups further. On balance, the research findings prove that knowledge and education have a significant impact on positive obesity-related outcomes, but, nevertheless, there are cultural and lifestyle environments that shape practical behaviours, and, therefore, the multi-level and focused strategies in overcoming obesity are significant.

Limitations

- The research used a cross-sectional design in which online convenience-based sampling was used. Because of this, the findings can hardly be generalized to the population of West Bengal and even less so to the population of other regions at present
- The information on knowledge, attitudes and practices was reported by the participants themselves, and, therefore, the findings might be influenced by recall bias and social desirability bias, especially for the behaviour related to practice
- Not all-important background and clinical variables were recorded. Such omitted variables may be income level, body mass index (BMI) and obesity-related morbidities. Due to this, assessing the KAP scores against the real risk of obesity was challenging
- This investigation was limited to West Bengal only. Hence, the outcomes may not be relevant to other parts of India. Besides that, the results may also not be indicative of rural and tribal areas having different social and cultural backgrounds
- Inferential analysis was employed to assess the differences between groups. However, the research design was cross-sectional. So, it is not possible to establish cause-and-effect relationships. Hence, the observed associations must be interpreted with caution

Future Recommendations

- Future studies need to use stratified or probability sampling methods coupled with offline data collection to more effectively represent populations that have low literacy levels, those living in rural areas and those digitally excluded
- Mixed-methods research is advisable. This can be a combination of qualitative interviews or focus group discussions. Such approaches allow uncovering the reasons behind the fact that certain groups demonstrate better practices, such as rural residents or people with only primary education, who may follow better practices despite having a low level of knowledge
- If we also integrate objective health markers, e.g., BMI, waist circumference and clinical history, into the study, it will become more insightful to relate KAP scores to the actual status of obesity
- Multivariable regression models or structural equation modelling (SEM) may be used for analysing the pathways through which age, education and residence affect KAP and, as a result, obesity-related outcomes
- Intervention-based and longitudinal studies evaluating the effectiveness of targeted educational, digital or community-driven strategies are urgently needed to surpass descriptive findings only and to measure the causal impact

Ethical Statement

The respondents were given ethical clearance. The purpose of the study was explained before the survey itself. Participation in the study is totally voluntary. Informed consent was obtained electronically from all participants before they completed the questionnaire and they were promised anonymity and confidentiality. The data were collected for the period from May 2025 to June 2025. No incentives were offered to any of the participants. Formal approval from an Institutional Ethics Committee (IEC) was not required as per prevailing ethical guidelines.

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