

From Knowledge to Practice: Factors Influencing Healthy Eating Behaviour Among College Students

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Abstract

College life brings independent decision-making, which frequently alters personal food choices. This cross-sectional survey examined nutritional knowledge, attitudes, and eating practices, along with everyday barriers faced by students. A structured digital questionnaire was filled out by 35 college students ($N = 35$). The survey evaluated nutritional knowledge across six questions, attitudes using five Likert-scale items, routine practices across six frequency questions, and primary self-reported barriers. Data were analysed using percentages, means, standard deviations, Pearson correlation coefficients, and independent two-sample t -tests. The participants demonstrated high factual knowledge (5.29 ± 1.15 out of 6, or 88.1%) and positive attitudes (20.71 ± 3.41 out of 25, or 82.9%). In contrast, actual dietary practices scored lower (19.94 ± 3.37 out of 30, or 66.5%), with 57.1% consuming fast food often or always and 68.6% drinking sugary beverages regularly. Nutritional knowledge correlated positively with dietary attitude ($r = 0.463$, $p = 0.0051$). However, knowledge had no significant positive link with practice ($r = -0.223$, $p = 0.1979$), and attitude did not significantly correlate with practice ($r = 0.175$, $p = 0.3140$). Female students had higher knowledge scores than male students ($t = 2.825$, $p = 0.0080$). The primary barriers identified were cravings and taste preferences (60.0%), lack of time (51.4%), easy availability of fast food (42.9%), and academic stress (31.4%). These results demonstrate a clear knowledge–practice gap, showing that factual knowledge alone is insufficient to sustain healthy eating in an environment dominated by convenient fast food and academic time pressures.

Keywords: Nutritional Knowledge, Dietary Attitudes, Eating Practices, College Students, Knowledge–Practice Gap, Fast Food.

Introduction

College is a crucial transition in the life of young people. It's the first time that many students

have realized that they oversee their own decisions and must fend for themselves without their parent in the house. But this newfound autonomy can come with a hectic school schedule, crunchy deadlines and unexpected living routines that can prove challenging to maintain a healthy diet.

Good nutrition is crucial at this age. When you have a healthy eating plan and consume enough fruits and vegetables, clean water and whole grains, you're on a path to good energy balance for studying and to preventing chronic diseases like obesity, hypertension and diabetes. The skills acquired in college will be applied in daily life. Despite this, students at college are still not eating their meals and snacking on junk food and sugary energy drinks.

Pupils have a good awareness of healthy eating, but this is not always reflected in their daily routines. This knowledge–practice gap is known as the “knowledge–practice gap.” For effective on-campus health promotion programs, it is crucial to talk to students about their decisions to eat convenience foods even when they know the problem. This study examines nutrition knowledge, attitudes, and nutrition behaviours as well as the key barriers to healthy eating among college students.

Background and Rationale

The Knowledge, Attitude, and Practice (KAP) model is well adopted to assess health behaviours. It proposes that learning attitudes leads to positive attitudes which then leads to healthy action. But this development is sometimes interrupted in universities. While declarative knowledge, like recommended daily allowances, is not necessarily linked to procedural knowledge, such as planning a meal using the grocery list or preparing a meal or reading a nutrition label in a busy environment. Students have high workloads, limited access to cooking facilities, and much access to cheap and easy food. Knowing these dynamics can give education institutions concrete evidence to help students make healthy choices in the canteen and make real-life interventions to their lifestyle.

Review of Literature

1. Nutritional Knowledge and the Knowledge–Practice Gap

Previous research indicates that tertiary students generally understand basic nutrition principles, but this understanding is rarely reflected in their meals. Anchal et al. (2024) studied Community Science college students in Haryana, India, finding that although students identified healthy food groups, they frequently consumed fast food due to convenience, taste preferences, and academic workloads. Waghmare et al. (2019) evaluated 200 medical and non-medical students in Chhattisgarh, India, showing that while 69% of medical students demonstrated good nutritional knowledge, only 4% practiced healthy eating.

Similar patterns have been documented globally. Hassan et al. (2015) examined 300 Malaysian students, finding high knowledge (74.0%) and positive attitudes (80.3%), but poor dietary practices (22.0%). Yusni et al. (2023) confirmed this imbalance among Malaysian undergraduates, where 95.3% had good knowledge but 63.6% had poor practices. In a scoping

review of 22 studies, O'Leary et al. (2025) observed that while nutrition knowledge is frequently evaluated, universities rarely provide instruction on procedural food skills such as meal preparation, which directly influence food choice.

2. The Mediating Role of Dietary Attitudes

Researchers have noted that positive attitudes serve as a bridge between awareness and behaviour. Jiang et al. (2024) analysed 139,832 adolescents using structural equation modelling and found that the direct effect of knowledge on practice was small ($\beta = 0.054$), whereas the indirect effect through attitude was substantially stronger ($\beta = 0.127$). In a study of 1,026 Chinese undergraduates, Wu et al. (2024) observed that dietary attitude was the sole factor directly influencing practice ($\beta = 0.366$, $p < 0.001$), whereas knowledge had no significant direct impact ($\beta = 0.015$, $p = 0.223$).

Mahato and Rastogi (2026) studied college students in Greater Noida, India, noting that knowledge correlated with attitude ($r = 0.42$), but only weakly with practice ($r = 0.25$). Alves and Precioso (2020) reported that Portuguese university students held moderate attitudes, but living away from the family home significantly undermined their daily eating practices.

3. Meal Skipping, Dehydration, and Fast-Food Intake

College life is often characterized by irregular eating schedules. Aakriti et al. (2022) surveyed female college students in Coimbatore, India, discovering that 52% skipped meals, primarily due to morning time limits (30%) and poor appetite (32%). Notably, 57% skipped meals intentionally to alter their physique.

Inadequate hydration is also common. Yuan et al. (2026) surveyed 815 students and found that despite positive attitudes (3.61 ± 0.86 out of 4), only 17% drank the recommended daily fluid volume, with many relying on coffee or packaged beverages. Sam et al. (2022) examined students across medical and technical colleges in Chitradurga, India, finding elevated fast-food and soda consumption despite high awareness of fat-related health risks. Mary et al. (2024) similarly observed that medical interns frequently relied on fast foods and sweetened drinks because of demanding clinical rotations and delivery app convenience.

4. Disciplinary Focus, Living Conditions, and Alternative Habits

Enrolling in healthcare-related degrees does not guarantee healthy personal habits. Sousa et al. (2022) found that 71.9% of healthcare students across nine courses had insufficient nutrition knowledge, with medical students scoring lowest (8.3%).

Living away from home also influences diet. Liu et al. (2020) observed that 66.8% of international students experienced dietary decline after moving to Dublin, turning to processed foods due to costs and kitchen constraints. ul Haq et al. (2018) reported that international students in China had higher body fat and drank more carbonated beverages than local students who had access to family meals. Additionally, Alhomoud et al. (2016) noted that 39% of

students in the UAE used dietary supplements, with 65% believing supplements were necessary to compensate for poor daily meals. As highlighted by Moitra et al. (2021) and Sethi and Rastogi (2023), interventions should focus on practical time management and food preparation rather than simple factual lectures.

Research Gap

While large institutional surveys and studies on medical interns exist, several specific gaps remain:

1. There is a need for small-scale, localized campus studies that capture everyday food choices in general student cohorts.
2. Prior studies often measure KAP variables separately without examining the personal trade-offs students make between taste, cost, and time within the same tool.
3. Understanding how campus food environments directly relate to self-reported barriers remains valuable for planning targeted canteen improvements.

This study examines these dynamics using a direct survey of nutritional knowledge, attitudes, practices, and specific personal barriers.

Aim and Objectives

Aim

To assess nutritional knowledge, dietary attitudes, and actual eating practices among college students, and to identify the primary factors influencing their dietary choices.

Objectives

1. To assess the demographic characteristics of the participants (age, gender, study level, living situation).
2. To measure the levels of nutritional knowledge, dietary attitudes, and eating practices.
3. To determine the statistical relationships between knowledge, attitudes, and practices.
4. To examine whether knowledge, attitudes, and practices differ between male and female students.
5. To identify the primary self-reported barriers and reasons for choosing unhealthy foods.

Research Questions

1. What are the current levels of nutritional knowledge, dietary attitudes, and eating practices among college students?
2. Is there a significant relationship between nutritional knowledge and dietary practices?
3. Is there a significant relationship between nutritional knowledge and dietary attitudes?
4. Is there a significant relationship between dietary attitudes and dietary practices?
5. Do nutritional knowledge, attitudes, and practices differ significantly between male and female students?
6. What are the main self-reported barriers preventing students from maintaining healthy

eating habits?

Hypotheses

Hypothesis 1 (Knowledge and Practice)

- **Null Hypothesis (H_{01}):** There is no significant relationship between nutritional knowledge and dietary practices among college students.
- **Alternative Hypothesis (H_{11}):** There is a significant relationship between nutritional knowledge and dietary practices among college students.

Hypothesis 2 (Knowledge and Attitude)

- **Null Hypothesis (H_{02}):** There is no significant relationship between nutritional knowledge and dietary attitudes among college students.
- **Alternative Hypothesis (H_{12}):** There is a significant relationship between nutritional knowledge and dietary attitudes among college students.

Hypothesis 3 (Attitude and Practice)

- **Null Hypothesis (H_{03}):** There is no significant relationship between dietary attitudes and dietary practices among college students.
- **Alternative Hypothesis (H_{13}):** There is a significant relationship between dietary attitudes and dietary practices among college students.

Hypothesis 4 (Gender Differences in Knowledge)

- **Null Hypothesis (H_{04}):** There is no significant difference in nutritional knowledge scores between male and female college students.
- **Alternative Hypothesis (H_{14}):** There is a significant difference in nutritional knowledge scores between male and female college students.

Methodology

Research Design

A quantitative, descriptive, cross-sectional survey design was used to evaluate knowledge, attitudes, practices, and perceived barriers at a single point in time.

Study Population and Setting

The study targeted enrolled undergraduate and postgraduate college students. Data were collected via an online Google Form distributed through academic student groups.

Sample Size and Sampling Technique

A total of 35 students ($N = 35$) completed the survey. Non-probability convenience sampling

was employed. Given the sample size, this study serves as an exploratory pilot investigation.

Inclusion and Exclusion Criteria

- **Inclusion:** Currently enrolled college or university students who voluntarily completed the online form.
- **Exclusion:** Non-students and incomplete submissions.

Data Collection Instrument

The self-administered questionnaire included five sections:

1. **Socio-Demographic Information:** Age, gender, study level, and living arrangement.
2. **Nutritional Knowledge:** 6 questions (Yes/No/Don't Know) on breakfast, fruits/vegetables, fast-food risks, water intake, meal skipping, and food labels.
3. **Dietary Attitudes:** 5 statements on a 5-point Likert scale (Strongly Disagree to Strongly Agree) regarding health beliefs, willingness to improve, homemade vs. fast food, and academic impact.
4. **Dietary Practices:** 6 questions on a 5-point frequency scale (Always to Never) measuring breakfast regularity, fruit/vegetable intake, water intake, fast-food consumption, sugary drinks, and meal timings.
5. **Barriers and Influencing Factors:** Checklist questions on barriers to healthy eating, reasons for choosing junk food, and perceived difficulty.

Variables

- **Independent:** Demographics, nutritional knowledge, and dietary attitudes.
- **Dependent:** Dietary practices and self-reported barriers

Ethical Considerations

Participation was voluntary and anonymous. No personal identifiers (names, phone numbers, email addresses) were gathered.

Data Analysis

Data were compiled in an electronic spreadsheet. Frequencies, percentages, means, and standard deviations (SD) were calculated. Pearson correlation coefficients (r) assessed relationships between KAP scores, and independent two-sample t-tests compared scores across gender ($p < 0.05$).

Results

1.Socio-Demographic Profile

The characteristics of the 35 participants are outlined in Table 1.

Table 1: Socio-Demographic Characteristics of Respondents (N = 35)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Age Group	17–19 years	16	45.7%
	20–22 years	14	40.0%
	23–25 years	3	8.6%
	Other / Older	2	5.7%
Gender	Female	24	68.6%
	Male	11	31.4%
Current Level of Study	Undergraduate	29	82.9%
	Postgraduate	6	17.1%
Current Place of Living	With family	23	65.7%
	Rented/Independent accommodation	6	17.1%
	Hostel	4	11.4%
	Paying Guest (PG)	2	5.7%

Females represented 68.6% (n = 24) of respondents, and males represented 31.4% (n = 11). Most participants were aged 17–22 years (85.7%), 82.9% were undergraduates, and 65.7% lived with family.

2. Nutritional Knowledge

Responses to the nutritional knowledge statements are presented in Table 2.

Table 2: Responses to Nutritional Knowledge Statements (N = 35)

Nutritional Knowledge Statement	Yes (n, %)	No (n, %)	Don't Know (n, %)	Correctness (%)
Drinking enough water is important for good health	35 (100.0%)	0 (0.0%)	0 (0.0%)	100.0%
Fruits and vegetables provide important nutrients	34 (97.1%)	1 (2.9%)	0 (0.0%)	97.1%
Frequent consumption of fast food negatively affects health	30 (85.7%)	3 (8.6%)	2 (5.7%)	85.7%
Regularly skipping meals can affect health and energy levels	30 (85.7%)	3 (8.6%)	2 (5.7%)	85.7%
Eating breakfast	29 (82.9%)	4 (11.4%)	2 (5.7%)	82.9%

regularly is important for a healthy diet				
Reading nutrition labels helps in making healthier food choices	27 (77.1%)	4 (11.4%)	4 (11.4%)	77.1%

Knowledge scores were high overall (mean 5.29 ± 1.15 out of 6, or 88.1%). All participants (100.0%) recognized the importance of water, and 97.1% identified the value of fruits and vegetables. Over 80% recognized the health impacts of fast food, skipping meals, and breakfast omission. Understanding nutrition labels was lowest, but still acknowledged by 77.1%.

3. Dietary Attitudes

Attitude responses are summarized in Table 3.

Table 3: Responses to Dietary Attitude Statements (N = 35)

Attitude Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Healthy eating is important for my overall health	21 (60.0%)	11 (31.4%)	3 (8.6%)	0 (0.0%)	0 (0.0%)
I want to improve my eating habits	17 (48.6%)	13 (37.1%)	4 (11.4%)	1 (2.9%)	0 (0.0%)

Homemade food is generally healthier than fast food	15 (42.9%)	11 (31.4%)	9 (25.7%)	0 (0.0%)	0 (0.0%)
I am willing to reduce junk/fast food consumption	8 (22.9%)	18 (51.4%)	5 (14.3%)	2 (5.7%)	2 (5.7%)
Diet affects energy levels and academic performance	13 (37.1%)	11 (31.4%)	6 (17.1%)	5 (14.3%)	0 (0.0%)

Most students showed positive attitudes (mean: 20.71 ± 3.41 out of 25, or 82.9%). A total of 91.4% agreed that healthy eating is important, and 85.7% expressed a desire to improve their habits. Additionally, 74.3% agreed that homemade food is healthier than fast food, and 74.3% expressed willingness to reduce fast-food intake.

4.Dietary Practices

Reported dietary practices are outlined in Table 4.

Table 4: Frequency of Reported Dietary Practices (N = 35)

Dietary Practice Statement	Always	Often	Sometimes	Rarely	Never
I eat breakfast	10 (28.6%)	11 (31.4%)	9 (25.7%)	5 (14.3%)	0 (0.0%)

regularly					
I eat fruits and vegetables regularly	8 (22.9%)	10 (28.6%)	11 (31.4%)	4 (11.4%)	2 (5.7%)
I drink enough water throughout the day	11 (31.4%)	13 (37.1%)	10 (28.6%)	1 (2.9%)	0 (0.0%)
I consume fast food/junk food	6 (17.1%)	14 (40.0%)	13 (37.1%)	2 (5.7%)	0 (0.0%)
I consume sugary drinks (soft drinks, juice)	4 (11.4%)	8 (22.9%)	12 (34.3%)	7 (20.0%)	4 (11.4%)
I eat my meals at regular timings	4 (11.4%)	14 (40.0%)	11 (31.4%)	5 (14.3%)	1 (2.9%)

Practices were noticeably lower than knowledge and attitudes (mean: 19.94 ± 3.37 out of 30, or 66.5%). Regular breakfast was reported by 60.0% ("Always" or "Often"), and regular fruit and vegetable intake by 51.4%. More than half (57.1%) consumed fast food often or always, and 68.6% consumed sugary drinks at least sometimes.

5.Barriers and Reasons for Unhealthy Food Choices

Overall, 51.4% of participants reported that maintaining healthy habits in college was "Difficult" (40.0%) or "Very Difficult" (11.4%), 40.0% were neutral, and 8.6% found it easy.

Table 5: Self-Reported Barriers to Healthy Eating (N = 35, Multiple Selections Allowed)

Barrier Identified	Frequency (n)	Percentage (%)
Cravings and taste preferences	21	60.0%
Lack of time	18	51.4%
Easy physical availability of fast food	15	42.9%
Academic stress	11	31.4%
Irregular college schedule	11	31.4%
Healthy food is expensive	7	20.0%
Lack of cooking facilities / appliances	4	11.4%
Social media advertisements / influence	3	8.6%
Peer / friend influence	2	5.7%

Table 5 indicates that cravings and taste preferences (60.0%) and lack of time (51.4%) were the most prominent barriers, followed by easy fast-food availability (42.9%) and academic stress (31.4%).

Table 6: Main Reasons for Choosing Unhealthy Food (N = 35, Multiple Selections Allowed)

Reason for Choosing Unhealthy Food	Frequency (n)	Percentage (%)
Taste and cravings	31	88.6%
Easy availability	16	45.7%
Convenience (ready-to-eat)	10	28.6%
Lack of time to prepare wholesome food	8	22.9%
Stress / emotional coping	6	17.1%
Low cost / affordability	5	14.3%
Peer influence	2	5.7%

As shown in Table 6, taste and cravings were selected by 88.6% of respondents as a main driver, followed by easy physical availability (45.7%) and convenience (28.6%).

Hypothesis Testing

Hypothesis 1: Nutritional Knowledge and Dietary Practice

- H_{01} : There is no significant relationship between nutritional knowledge and dietary practices among college students.
- H_{11} : There is a significant relationship between nutritional knowledge and dietary practices among college students.
- **Test & Result:** Pearson correlation yielded $r = -0.223$ ($p = 0.1979$).
- **Decision:** Since $p > 0.05$, the null hypothesis H_{01} is **not rejected**.

- **Interpretation:** There is no statistically significant positive linear relationship between nutritional knowledge and dietary practice. Having higher nutritional knowledge did not correspond to better daily eating habits in this sample.

Hypothesis 2: Nutritional Knowledge and Dietary Attitude

- H_{02} : There is no significant relationship between nutritional knowledge and dietary attitudes among college students.
- H_{12} : There is a significant relationship between nutritional knowledge and dietary attitudes among college students.
- **Test & Result:** Pearson correlation yielded $r = 0.463$ ($p = 0.0051$).
- **Decision:** Since $p < 0.01$, the null hypothesis (H_{02}) is **rejected**, and H_{12} is accepted.
- **Interpretation:** There is a statistically significant, moderate positive relationship between nutritional knowledge and dietary attitude. Students who are more knowledgeable about nutrition hold more positive attitudes toward healthy eating.

Hypothesis 3: Dietary Attitude and Dietary Practice

- H_{03} : There is no significant relationship between dietary attitudes and dietary practices among college students.
- H_{13} : There is a significant relationship between dietary attitudes and dietary practices among college students.
- **Test & Result:** Pearson correlation yielded $r = 0.175$ ($p = 0.3140$).
- **Decision:** Since $p > 0.05$, the null hypothesis H_{03} is **not rejected**.
- **Interpretation:** The relationship between attitude and practice was not statistically significant. Positive health attitudes alone were insufficient to produce healthy dietary practices without addressing external constraints.

Hypothesis 4: Gender Differences in Nutritional Knowledge

- H_{04} : There is no significant difference in nutritional knowledge scores between male and female college students.
- H_{14} : There is a significant difference in nutritional knowledge scores between male and female college students.
- **Test & Result:** Independent samples t-test yielded $t = 2.825$, $df = 33$, $p = 0.0080$ (Female mean: 5.62 ± 0.82 ; Male mean: 4.55 ± 1.44).
- **Decision:** Since $p < 0.01$, the null hypothesis (H_{04}) is **rejected**, and (H_{14}) is accepted.
- **Interpretation:** Female students had significantly higher nutritional knowledge scores than male students.

Discussion

1. The disconnect between knowledge and practice

This study's overall result is that there is a definite gap between knowledge and practices. The scores for knowledge (88.1%) and attitude (82.9%) were good with the daily practices having an average of 66.5%. More than half of the subjects (57.1%) often consumed fast food and 40.0% of them did not eat any breakfast regularly.

This reflects the results of more general university research. The current study by Waghmare et al (2019) shows that 69% of medical students were aware of good nutrition and only 4% students were following healthy eating habits. Hassan et al. (2015) found that the percentage of positive attitude is 80.3% while poor practice is 78.0% in Malaysia. Yusni et al. (2023) revealed a parallel gap with good level of knowledge 95.3% and good level of practice 36.4%.

Hypothesis 1 was supported as there was no significant correlation between the knowledge and the practice ($r = -0.223$, $p = 0.198$). This is comparable to Wu et al. (2024) who reported that the relationship between knowledge and practice was not direct ($\beta = 0.015$, $p = 0.223$), but rather indirect through attitude, and Jiang et al. (2024) who reported that knowledge indirectly influenced the behaviour through attitude. In this study, knowledge correlated with attitude ($r = 0.463$, $p = 0.0051$), but attitude did not translate into practice ($r = 0.175$, $p = 0.3140$). This demonstrates that pupils value good nutrition but this is problematic due to practical constraints.

2. Taste cravings and time constraints as dominant factors

The most prominent answers to the question of why people make bad food choices were craving and time constraints. Of the 60.0% that indicated cravings as a barrier, 88.6% indicated that taste was a barrier. In addition, 51.4% said they were short on time, and 31.4% said they were stressed in school and working irregular hours.

The three factors mentioned above are consistent with the results of Anchal et al. (2024), who reported that convenience, taste preferences and workload were the primary challenges related to healthy eating among college students. Mary et al (2024) found that interns often turned to easily accessible and tasty junk food due to their clinical workloads and fatigue. Sethi and Rastogi (2023) have reported that the rational nutritional awareness is often not as important as hedonic appeal and stress in food choice.

3. Environmental influences

Student eating habits are also influenced by the food environment within the campus. More than one-third of respondents (42.9%) reported that it was easy to get fast food and over one-half (45.7%) said that availability was one of the main reasons they buy junk food. More than half of those who responded (51.4%) said it was difficult or very difficult to maintain a healthy lifestyle in college.

This corroborates the findings from Yusni et al. (2023) who found an interesting relationship between proximity of fast food in the campus and poor eating habits ($p = 0.019$). According to

Sousa et al. (2022), affordable and balanced options are often not provided in the dining halls of universities. Short breaks between lessons and students will tend to resort to local takeout. Convenience and peer habits appeared to affect food choice regardless of the dwelling type, as our data showed that the students living with family also ate fast food regularly, while living away from home has been correlated with poor eating habits.

4. Gender Differences in Nutritional Knowledge

There was a significant difference between the nutrition knowledge score of the female students compared to the male students (5.62 vs. 4.55, $p = 0.0080$). This finding is consistent with previous studies. It was observed that the knowledge level of females students were higher than males students ($r = 0.22$, $p < 0.001$) by Bhuvaneshwari (2025) and Mahato and Rastogi (2026) also reported similar gender difference in nutritional awareness. The female gender was also found to have significantly higher knowledge scores than the males ($p = 0.023$) (Yuan et al., 2026). Research indicates that this also may be connected to higher levels of health interest, awareness of food intake and body image among female students.

Conclusion

This research aimed to assess the nutritional knowledge, attitudes and eating habits of college students. The results demonstrate an evident knowledge–practice gap. The nutritional knowledge score was high (88.1%) and the attitudes were positive (82.9%); however, eating habits were poor with frequent consumption of fast food (57.1%) and sugary drinks (68.6%) and skipping meals. The nutritional knowledge was correlated with the attitude while neither nutritional knowledge nor attitude was significantly correlated with the practice. Taste craving, lack of time, academic stress, and easy availability of fast food were the major influences on daily eating habits. There are practical and environmental barriers as well as classroom education that must be tackled to improve the nutrition of college students.

Limitations

1. Small Sample Size: The sample ($N = 35$) does not allow for the generalizability to other students.
2. Non-probability recruitment may have targeted students who have an interest in health issues.
3. Self-reported data: answers may be flawed due to recall errors and/or social desirability.
4. Cross-Sectional Design: Information collected at one time cannot be used to assess longitudinal cause and effect relationships.

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