

Research Article

Food Safety and Dietary Practices in Adult Individuals of Nadiad District

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The purpose of this study was to inspect healthy adult individuals' food safety knowledge and dietary practices followed by them. The analysis was carried out by conducting a survey in Nadiad city for data collection, which basically described the knowledge of food safety, healthy eating practices, and physical activity of the responders. Results observed that the level of food safety knowledge differed by age, gender, and monthly income. It was noticed that more than 80% of responders do check the expiry date and about 67% check for the presence of food allergens and preservatives labelled on the food packets or grocery items. On the other hand, only 18% of responders consume a diet rich in whole grains, dry fruits, and other healthy foods on a regular basis every day, and the majority of the responders (68%) do so once or twice a week. Furthermore, about 50% of the responders do yoga, exercise, or physical activities to remain fit and healthy on a regular basis. It also highlights the importance of food safety knowledge as an effort to control foodborne diseases (FBD), by focusing on consumer food handling in the home and how to extend the benefits of food safety education to the whole society.

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1. Introduction

Food is indispensable for the endurance of all living beings on Earth. With the increase in population growth, the demand for food has increased in tandem globally^[1]. This, in turn, poses a challenge in ensuring that the food is safe for consumption, meaning it is free from any type of microbiological, chemical, or physical hazards, including compounds like allergens, toxins, chemicals, and microorganisms. Annually, roughly 600 million individuals worldwide contract illnesses stemming from

tainted food, with 549 million individuals experiencing symptoms of diarrhoea. Tragically, approximately 420,000 individuals lose their lives as a result of consuming contaminated food^[2].

Globally, Food Safety Management Systems (FSMS) have been implemented as a measure to overcome these hazards. This system ensures that the food supplied in the market is free from hazards since quality control in food is obligatory. Therefore, it restores consumers' confidence, and consequently, consumers are willing to pay more for food products free from any types of microbial or chemical hazards^{[3][4]}. Nevertheless, consumers should have a basic knowledge about food safety, such as the practices to maintain and monitor food hygiene and the correct way of handling food^[5].

In today's fast-growing world, evaluating the knowledge, understanding, attitude, and behaviour of individuals about food habits is important to ensure food safety. The occurrence of foodborne diseases is more prevalent due to decreased sanitation, lack of clean drinking water, polluted inadequate food storage facilities, and lack of food safety education in many developing countries.

In developing countries, outbreaks of foodborne diseases very often occur at home and at group social gatherings^{[6][7]}. It is mainly attributed to a lack of food safety knowledge, diminished personal hygiene, inappropriate handling of foodstuffs, along with household preparation. It may involve the contamination of perishable raw food ingredients (such as milk, meat, and fish products) with processed food^[8]. In general, household preparations play an important role in foodborne illnesses in daily life^[9]. In these cases, enhancing the food safety knowledge of people may minimize the infection of pathogenic microorganisms in food and hence, will assist in diminishing the spread of foodborne illnesses like typhoid, dysentery, toxi-food infections, etc.

Food safety education is encouraging for young people since it would be apt to establish positive attitudes and good knowledge as well as follow appropriate practices to increase awareness of food safety issues^{[8][10]}. There is a crucial need to examine the acquaintance, approach, and practice of individuals on food safety in their prospective roles for a healthier generation^{[9][11]}. Ensuring the safety of food is a paramount concern in the field of public health, and it has a substantial impact on the expenses associated with healthcare^[12]. A number of studies have shown a low level of food safety awareness and practice among individuals or students at the household level, in higher education institutions, hospitals, and also among street food workers/handlers^{[7][11][12]}. Because foodborne diseases are a global problem, they consequently demand the understanding, cooperation, funding, and undertakings of all stakeholders from different governments and policy makers universally. On the other hand, the

awareness and education of food safety in the populations of developing countries like India should be emphasized and promoted to a large extent^[13].

A positive lifestyle endeavor to enhance longevity under proper conditions of quality life, and it actually starts with the development of healthy habits. According to Pastor^[14], a number of the variables are relevant to a healthy lifestyle, including physical activity, eating habits, free time activities, sleeping patterns, etc. It is necessary to trigger sport habits at some stage in childhood or adolescence, which then further transmits into the adulthood of the person. However, the level of physical activity linked to the avoidance of any specific chronic diseases is variable^[15]. Unhealthy lifestyles, including an unhealthy diet, lack of physical activity, use of tobacco, cigarettes, or alcohol, etc., are linked with an increased risk of major non-communicable diseases (NCDs) and obesity.

According to the economic hypotheses underpinning individual behaviour and resulting decision making, individual preferences and decisions to carry out physical activity (like walking, running, cycling) and to consume a healthy diet are influenced by various factors^{[16][17]}. Income, health status, price promotions on healthy foods, taxes on less healthy foodstuffs, etc., are several of these factors. According to one of the reports, a total of 2688 foodborne disease outbreaks and 572 deaths were reported to the IDSP during 2009–2018^[18]. However, in India, outbreak investigations frequently lack essential comprehensive information required for thorough monitoring, analysis, and evaluating response practices. Therefore, based on the above-mentioned facts, the current study was planned considering the following basic objectives, viz. (i) to determine people's understanding of food safety, (ii) to determine knowledge of the measures taken to ensure food safety, and (iii) to assess knowledge of healthy eating habits and dietary practices.

2. Materials and Methods

2.1. Study Design

The survey was conducted in Nadiad city, Gujarat state, India. A total of 100 participants aged above 20 years who were mainly involved in food preparation/cooking in the households were randomly approached for inclusion. Those who declined to give consent were excluded. This study involved minimal risk, and ethics approval was not required under institutional guidelines. All participants provided informed consent before taking part in the survey, and the study adhered to established ethical standards for human-subject research in public health contexts.

A structured questionnaire was used for data collection. The first part of the questionnaire contained information on the sociodemographic characteristics of the participants, while the second part consisted of questions related to the level of food safety knowledge and healthy dietary practices followed by the participants.

2.2. Data analysis

Data summarization through frequencies and percentages was conducted using descriptive statistics, followed by their visual representation in tables and figures.

3. Results and Discussion

The outcomes of the current study for various parameters included are discussed in the text below chronologically.

3.1. Socio-demographic information of the participants

The socio-demographic distinctiveness of the participants included differences in their age, gender, marital status, and occupation. The largest groups of respondents were men (60%), followed by 40% women; where most individuals were aged 20-35 years (78%) (Figure-1). Along with them, 60% of individuals were married, while 40% were single. From Figure 2a, it can be noticed that about 55% of responders are in service (government/private), 18% are housewives, 16% of responders were self-employed, and the remaining 11% were students.

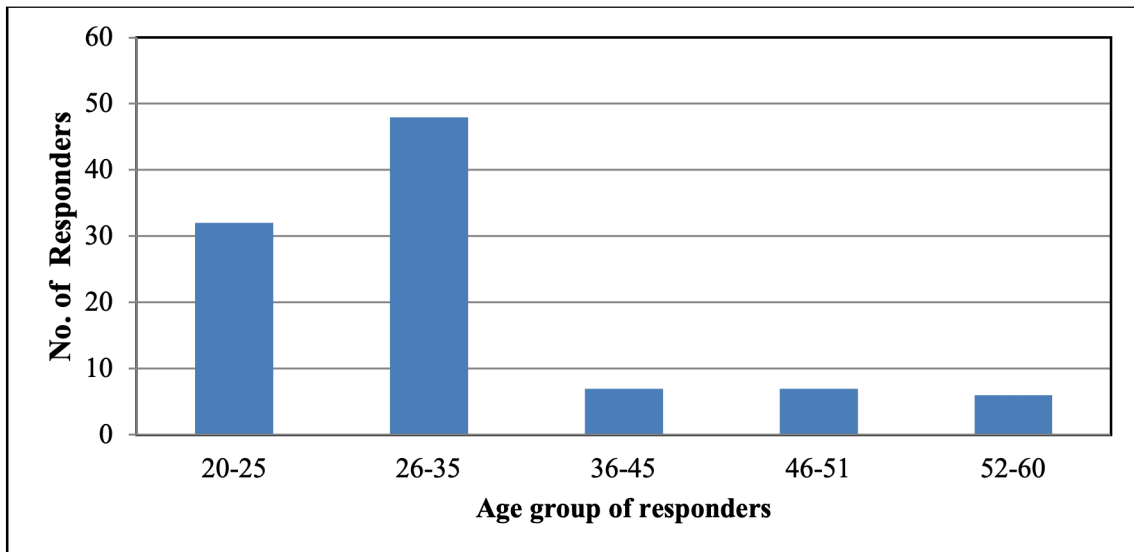


Figure 1. Distribution of participants into different age groups

The socioeconomic status of the participants based on their monthly income showed that the monthly income (in Indian Rupees) of the majority of the responders (48%) ranged between 5000-10000 Rs (Figure-2b). About 20% of the responders chose not to reveal their income. The monthly income of the other 20% of the responders ranged between 10000-50000 Rs, while for the remaining 12%, the monthly income is more than 50000 Rs. per month.

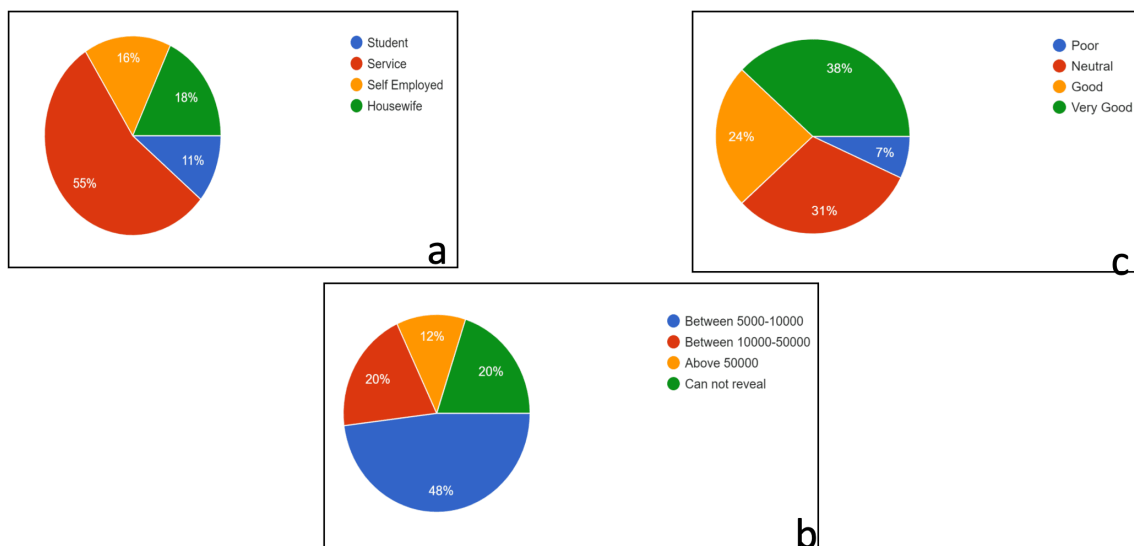


Figure 2. Distinctiveness of the participants based on (a) occupation, (b) Salary/monthly income, and (c) self-rating for overall habits of eating healthy foods

3.2. How would you rate your overall habits of eating healthy foods?

From Figure 2c, it can be noticed that 38% of responders have very good, 24% have good, 31% have neutral, and the remaining 7% have shown poor habits of eating healthy foods overall. Converse to these results, another study reported that 24% of respondents have poor, 9% have fair, 26% have neutral, 34% have a good, and 24% have very good habits of eating healthy foods after Covid-19^[19].

3.3. Do you regularly wash/soak raw ingredients with water before cooking?

It can be seen from the figure that about 97% of the responders regularly wash or soak raw ingredients like vegetables, pulses, rice, etc. with water before cooking. Our results are in agreement with the study performed by Rabeya et al.^[20], in which about 92.5% of participants always used to wash fruits and vegetables with clean water prior to intake. In another study, 96% of participants knew that fruits and vegetables must be washed before eating^[21].

Sr. No.	Parameter	Response (%)	
		Yes	No
1	washing/soaking raw ingredients with water before cooking	97	3
2	have a fridge and stove/microwave	98	2
3	pets allowed to come in the kitchen while preparing food	90	10
4	cleaning of surface area immediately after preparing food	97	3
5	cleaning of the utensils and equipment after immediately preparing food	99	1
6	check the expiry date of the food packet	82	18
7	check for presence of food allergens and preservatives on the packet	68	32

Table 2. Response of participants for different parameters

3.4. Do you protect your hands with bandages or gloves prior to handling food?

All the responders protect their hands with bandages or gloves prior to handling food. The washing of hands using soap prior to cooking food and the use of gloves, aprons, and head coverings helps to prevent

physical, chemical, and biological contamination of food. Our results are in accordance with the study of Rabeya et al.^[20].

3.5. Do you have a fridge and stove/microwave where you live?

Almost all (98%) responders have a fridge and stove/microwave facility where they live.

3.6. Do your pets come in the kitchen while you prepare food?

About 90% of the responders do not permit the entry of pets in the kitchen while preparing food, whereas about 10% of responders have no restriction for the same.

3.7. Do you clean the surface area immediately after preparing food?

The majority of the responders (97%) immediately carried out cleaning of the surface area after preparing food.

3.8. Do you clean the utensils and equipment after immediately preparing food?

Almost all (99%) responders had the habit of cleaning the utensils and equipment immediately after cooking and/or eating food. It suggests that participants were well aware of the fact that keeping the kitchen surface clean could help to reduce the risk of illness due to the absence of dirt and food particles. It also decreases the risk of flies and other insects. Food should be handled in thoroughly washed, cleaned, and sanitized equipment and utensils^[22]. Systematic washing, drying, and disinfecting of utensils are considered necessary to maintain a hygienic condition and to prevent contamination^[23].

3.9. Do you check the expiry date of the food packet?

It is always advisable to check the expiry date of food products or even ingredients used for cooking. In the current study, it was observed that more than 80% of responders do check the expiry date of the food packets; however, about 18% of responders do not do so. It indicates that educated people are also unaware of the health risk associated with the expiry date of food products or ingredients. Our results are in agreement with previous studies^[22].

3.10. Do you check for the presence of food allergens and preservatives on the packet?

Similarly, about 32% of responders do not check for the presence of food allergens and preservatives labelled on the food packets or grocery items. While more than 67% were regularly keeping an eye on the presence of food allergens and preservatives. Our results are in agreement with previous studies^[22]. It is noteworthy to mention that the majority of the students or single responders fall into the category that does not check for food allergens or preservatives.

3.11. How often do you eat outside food in a month?

It can be seen from Figure 3a that the majority, about 40%, of responders eat outside food once or twice a week, 36% of responders eat outside food once a month, 21% eat outside food twice or thrice in a month, and only 7% never eat outside food in a month. People who are used to preparing food at home on a regular basis were more likely to have better knowledge of food safety than those who do not cook or prepare food at home so frequently and eat outside food^{[22][24]}. Moreover, it is believed that regular preparation of food/cooking practices at home makes one more knowledgeable since their routine helps construct self-efficacy, which is reflected in their food safety concepts owing to the daily recall of their behaviour^[25]. Vinchhaniya^[19] also reported that the majority of the respondents were eating outside food 2-3 times a month before Covid-19, but the number of respondents decreased and changed their outside food habits after Covid-19.

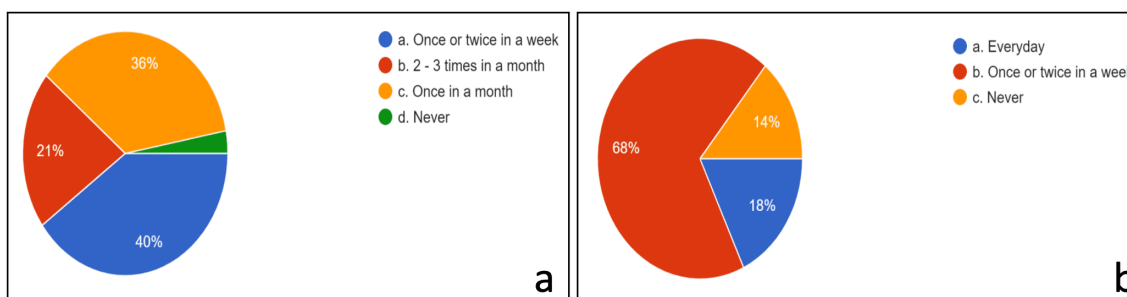


Figure 3. Participants' responses for (a) frequency of eating outside food in a month, and (b) consumption of a diet rich in whole grains, dry fruits, and other healthy foods?

3.12. How often do you consume a diet rich in whole grains, dry fruits, and other healthy foods?

As shown in Figure 3b, only 18% of responders consume a diet rich in whole grains, dry fruits, and other healthy foods on a regular basis every day, and the majority of the responders, i.e., 68%, do so once or twice a week. The remaining 14% of responders never consume a diet rich in whole grains, dry fruits, and other healthy foods. Results of similar work during Covid-19 observed that around 80% of the participants were following a diet rich in whole grains, dry fruits, and other healthy foods on a regular basis every day^[19]. The outcome of the results is suggestive that with ready-to-eat food packets as well as easy access to outside food, people forget or somehow cannot find time to follow a healthy lifestyle by eating healthy foods at home. It is really a worrisome situation.

3.13. How often do you do yoga, exercise, or physical activities to remain fit and healthy?

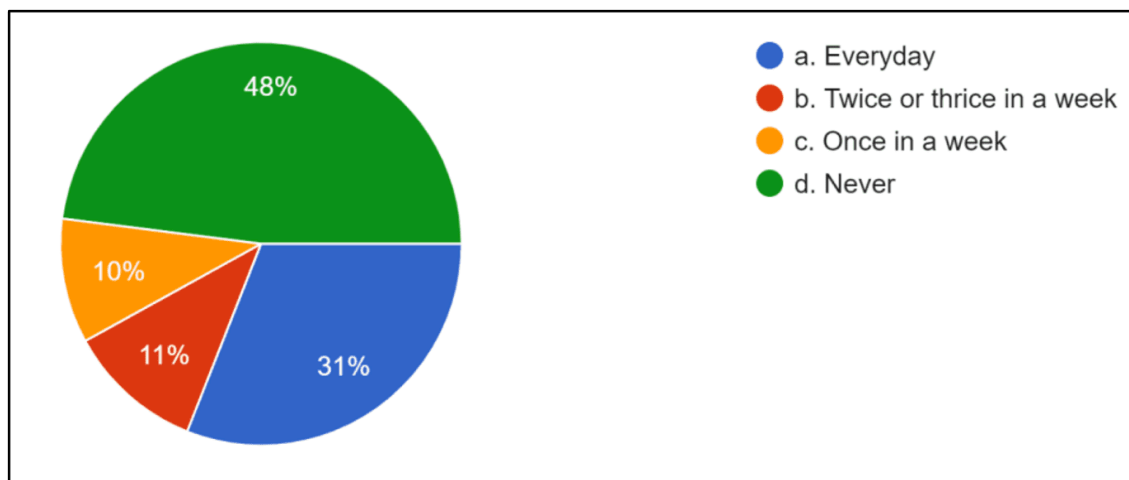


Figure 4. Participants' responses for performing yoga, exercise, or physical activities

It can be seen from the figure that about 31% of responders do yoga, exercise, or physical activities to remain fit and healthy on a regular basis every day, 11% do so twice or thrice a week, 10% do so once a week, and more than half of the responders, i.e., 48%, never do any such activity to follow a healthy lifestyle. The latter includes both male and female responders, and it is noteworthy to mention that the majority of them are doing service or are self-employed irrespective of single or married status.

Furthermore, it can also be revealed that those responders who earned above 50,000 Rs. per month regularly perform physical activity.

In a few studies, men were less likely to eat a healthy diet but more likely to be physically active^[16]. A recent community-based cohort study by Pinidiyapathirage et al.^[26] that evaluated correlates of physical activity among Sri Lankan adults observed that being physically active was linked with male subjects with better self-reported health than females. From our study, it can be stated that job status and monthly income are also crucial factors that affect healthy lifestyle practices.

From the above results, it can be revealed that the responders have a good knowledge of food safety and the majority of them follow healthy dietary practices. Furthermore, it can be noticed that the majority of the responders were from the service or self-employed/business group, who might have good education and hence more knowledge and understanding than those who only work at home. A few studies revealed that consumer knowledge of food safety was not differentiated by age^[27]. In contrast, Worsley et al.^[28] mentioned that elderly responders have better insights into food safety owing to their more experience and understanding in dealing with food safety issues. Conversely, in the current study, the younger group proved to have better knowledge and understanding about food safety and healthy dietary practices. It is also because of easy access to and exposure to the latest food safety information via various sources of social media in conjunction with their active association in food preparation or cooking at home.

4. Conclusions

In general, it can be revealed that the responders have a good knowledge of food safety and the majority of them follow healthy dietary practices. A greater part of the responders understands the significance of checking the expiry date, food allergen, or preservative labeled on the food packet. Similarly, about 97% of the responders regularly wash or soak raw ingredients like vegetables, pulses, rice, etc. with water before cooking. The majority of the responders (86%) know the importance of a healthy diet in regular meals; only a few (14%) responders never consume a diet rich in whole grains, dry fruits, and other healthy foods.

From our study, it can be stated that job status and monthly income are also crucial factors that affect healthy lifestyle practices like dietary patterns or physical activity. The extent of understanding regarding food safety and healthy dietary practices followed by them varied based on different factors

such as age, gender, status, monthly income, etc. Eventually, a disparity persisted between the information participants possessed about food safety as well as a healthy lifestyle and their actual implementation of safe practices. The findings of this research represent a need for stronger emphasis on education or awareness programs or training relating to domestic food safety and dietary health practices among developing countries, including India.

Statements and Declarations

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest.

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Declarations

Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.