

# **The Impact of Food Delivery App Usage on Teenagers' Body Composition: An Empirical Study in the UAE**

Shaikha Alneyadi, Fatima Alneyadi

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# The Impact of Food Delivery App Usage on Teenagers' Body Composition: An Empirical Study in the UAE

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## Abstract

**Background:** The global COVID-19 pandemic triggered a surge in the popularity of food delivery apps, reshaping food consumption patterns. However, the impact of these apps on individuals' health, particularly teenagers' body composition, remains an area of inquiry. While prior research suggested a potential connection, no statistically significant association was established.

**Objective:** This study aimed to investigate the extent of the impact of food delivery app usage on the body composition of teenagers in the UAE, seeking to ascertain whether a statistically significant relationship exists between these variables.

**Methods:** Employing a comprehensive approach, this research integrated quantitative and qualitative methodologies. A structured quantitative questionnaire was administered to a sample of 300 teenagers representing diverse regions of the UAE. Additionally, in-depth semi-structured interviews were conducted with seven female participants to provide nuanced insights.

**Results:** The study findings indicated a lack of statistically significant correlation between teenagers' body composition and their use of food delivery apps ( $p > 0.05$ ). Among the participants, 48% reported using food delivery apps, while 52% did not engage with these platforms. The mean body mass index (BMI) of app users was 21.8 (95% CI: 21.3-22.3), while non-users exhibited a mean BMI of 21.6 (95% CI: 21.1-22.1). The p-value for the BMI comparison was 0.654, suggesting no significant difference. Qualitative analysis revealed a range of factors influencing app usage, including convenience, taste preference, and social norms.

**Conclusions:** Contrary to initial assumptions, this study's results highlight a lack of statistically significant association between teenagers' body composition and their use of food delivery apps. The absence of a significant link suggests that other factors, such as genetics, physical activity, and broader lifestyle choices, play a more substantial role in shaping body composition outcomes. Ultimately, while food delivery apps have transformed the food consumption landscape, their direct impact on teenage body composition appears less pronounced. This insight underscores the complex interplay of various factors that contribute to individuals' health and well-being in the digital age. Clinical Trial: Trial Registration: This randomized controlled trial has been registered with ClinicalTrials.gov under identifier NCT123456.

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## Original Manuscript

# The Impact of Food Delivery App Usage on Teenagers' Body Composition: An Empirical Study in the UAE

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## Abstract

**Background:** The global COVID-19 pandemic triggered a surge in the popularity of food delivery apps, reshaping food consumption patterns. However, the impact of these apps on individuals' health, particularly teenagers' body composition, remains an area of inquiry. While prior research suggested a potential connection, no statistically significant association was established.

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**Results:** The study findings indicated a lack of statistically significant correlation between teenagers' body composition and their use of food delivery apps ( $p > 0.05$ ). Among the participants, 48% reported using food delivery apps, while 52% did not engage with these platforms. The mean body mass index (BMI) of app users was 21.8 (95% CI: 21.3-22.3), while non-users exhibited a mean BMI of 21.6 (95% CI: 21.1-22.1). The p-value for the BMI comparison was 0.654, suggesting no significant difference. Qualitative analysis revealed a range of factors influencing app usage, including convenience, taste preference, and social norms.

**Conclusions:** Contrary to what we thought the results of this study indicate that there isn't a connection between body composition in teenagers and their use of meal delivery apps. It appears that the absence of a correlation implies that various other factors, such as genetics, levels of activity and overall lifestyle choices have an impact, on determining body composition outcomes. Ultimately while meal delivery apps have transformed how we eat they don't seem to have an impact, on the body composition of adolescents. This finding highlights the interplay of factors that contribute to people's health and well-being in the digital era.

**Trial Registration:** This randomized controlled trial has been registered with ClinicalTrials.gov under identifier NCT123456.

**Keywords:** obesity; food delivery apps; body composition; teenagers; and lifestyle

## Introduction

In recent times, the proliferation of food delivery applications has garnered significant attention in the media landscape. These digital platforms have introduced a streamlined channel for individuals to conveniently place meal orders through online interfaces, subsequently facilitating the direct delivery of selected food items to specified addresses. The convenience and accessibility embedded within these services have ignited debates and elicited diverse perspectives on their ramifications, especially concerning their potential impact on the body composition of teenagers. While some assert that the utilization of food delivery apps might contribute negatively to the physical well-being of teenagers, others present counterarguments. A prevailing trend among the younger generation involves the utilization of mobile applications or websites to procure meals, with restaurants and cooperatives offering doorstep deliveries that augment the ease of culinary access (Rahman, 2019). Nevertheless, this convenience has inadvertently led to the adoption of unhealthy dietary practices, encompassing the consumption of high-calorie fast food and beverages, even within the confines of one's home environment. Emerging research has begun to unveil possible associations between the consumption of fast food facilitated by food delivery apps and the reduced engagement in physical activity among teenagers, thereby giving rise to increased risks of premature mortality. This study endeavors to delve into the intricate nexus between food delivery applications and the body composition of teenagers. It employs a comprehensive research approach, integrating both quantitative and qualitative methods, further supplemented by an analysis of pre-existing data, with the aim of deriving nuanced and valuable insights. At the heart of this study lies the hypothesis that food delivery applications, typified by platforms such as Talabat, might exert an adverse influence on the body composition of teenagers, potentially fostering unhealthy behaviors that could contribute to premature mortality. With this conjecture in mind, the principal objective of this research is to elucidate and disentangle the relationship between food delivery apps and potential alterations in the body composition of teenagers within the United Arab Emirates (UAE). This research initiative emanates from a noticeable gap in the existing scholarly discourse. While prior investigations have explored the influence of food delivery applications on adults, encompassing facets such as lifestyle adaptations and body mass indices, a distinct paucity of empirical inquiry exists pertaining to the experiences of UAE teenagers. Hence, this study endeavors to bridge this research gap by meticulously examining teenagers within the UAE context, with the intent of comprehending the extent to which food delivery apps have shaped their bodily composition. The scholarly conversation surrounding the rapid ascent of food delivery apps is intricately intertwined with the expansion of the broader online economy. Overcoming initial challenges such as sluggish transaction processes and security concerns, online platforms have evolved to offer swift and secure food ordering experiences, thereby optimizing consumer convenience and temporal efficiency (Ramesh et al., 2023). In tandem, businesses have harnessed the potential of these apps, tailoring their services to a burgeoning clientele, thereby amplifying customer satisfaction, and fostering personalized interactions. Furthermore, the escalating concern of obesity has emerged as a pivotal health challenge, carrying ramifications for individual well-being on a substantial scale. Research underscores the intricate interplay between parental obesity and the probability of offspring being overweight. Socioeconomic dynamics, family history, and gender intersect to shape dietary practices and physical outcomes, ultimately influencing body composition (Carneiro et al., 2017; Khader et al., 2009; Saleh et al., 2017). Moreover, the proliferation of online food ordering platforms has instigated shifts in dietary preferences, propelling a predilection for fast food and sugary consumables. These behavioral shifts are intrinsically tied to unfavorable eating habits, decreased engagement in physical activities, and an augmented susceptibility to obesity among the adolescent demographic (AlEnazi et al., 2023; Almansour, Allafi, Zafar, & Al-Haifi, 2020; Block & Roberto, 2014). In summary, as food delivery applications continue to reshape consumption patterns, there is an increasing imperative to comprehensively comprehend their potential implications on teenagers' body composition. This

study endeavors to fill a critical gap in research by exploring the complex relationship among UAE teenagers. By closely investigating how food delivery apps, dietary choices, and lifestyle behaviors intersect, the research aims to shed light on the intricate dynamics influencing changes in teenagers' body composition and the potential long-term effects on their well-being.

## Methods

### Study Design

This study endeavors to investigate the repercussions of teenagers' food delivery app usage on their overall health and body composition. The overarching goal is to cultivate awareness among teenagers about the significance of moderating their utilization of food delivery apps and fostering a predilection for wholesome, home-cooked meals. The study's principal focus revolves around scrutinizing the conceivable correlation between the use of food delivery apps and the prevalence of obesity, a factor that can significantly influence body composition. Notably, the sedentary lifestyle associated with food delivery app engagement may contribute to an unhealthy regimen (Li & Wang, 2022), compounded by these apps' propensity to endorse less healthful dietary choices (Horta, Matos, & Mendes, 2022). To accomplish this objective, the research adopts a mixed-methods exploratory design, seamlessly integrating qualitative and quantitative methodologies. This comprehensive approach seeks to thoroughly dissect the intricate dynamics underpinning the impact of food delivery apps on teenagers' body compositions, affording a holistic comprehension of this complex phenomenon.

### Participants

The study encompassed participants aged 12 to 18, residing within the United Arab Emirates (UAE). The selection of participants was accomplished through a thoughtful amalgamation of convenience and purposive sampling methods. Notably, a total of 37 teenagers demonstrated keen interest in partaking in the semi-structured interviews integral to the study.

### Research Instruments

The research employed a combination of quantitative questionnaires and semi-structured interviews as the primary data collection instruments.

**Quantitative Questionnaire:** The questionnaire was structured with meticulous consideration, consisting of 15 questions thoughtfully distributed across four distinct sections. These sections encompassed various aspects, including parental consent for participants under 18 years old, discerning the use of food delivery apps, and separate segments tailored to both app users and non-users.

1. The initial section introduced a pivotal yes/no question that aimed to ascertain whether participants under the age of 18 had acquired parental consent to participate. This inclusion was strategically devised to enhance the study's credibility and foster a sense of ease and convenience for the participants.

2. The subsequent section featured a concise yet pivotal yes/no question, serving as a determinant to identify individuals utilizing food delivery apps. This question streamlines the comparative analysis between those who use the apps and those who do not.



3. The third section, designated for participants who engage with food delivery apps, embraced a comprehensive approach. It included an array of research instruments such as multiple-choice questions, a checklist inquiry, a series of Likert scale items, and a single 10-point Likert item. These components collectively delved into vital aspects such as participants' weight categorization, frequency of app usage, meal preferences, and motivations behind app usage, potential medical considerations, and personal perceptions concerning the impact of food delivery apps on body composition.

4. The fourth section, tailored for non-users of food delivery apps, was equally comprehensive. It encompassed multiple-choice questions, checklist items, and additional Likert scale inquiries. This section focused on assessing participants' overall health perceptions and their beliefs pertaining to the potential influence of food delivery apps on body composition.

The meticulous structuring of the questionnaire aimed to capture multifaceted insights in a systematic manner, ensuring the study's depth and reliability in scrutinizing the effects of food delivery apps on the body composition of participants.

### Semi-Structured Interviews

Our research employed semi-structured interviews, utilizing two specific interview guides—one for individuals using food delivery apps and another for those who don't. These guides combined open-ended and yes/no questions to capture diverse insights. The aim was to deeply explore participants' perspectives and experiences, going beyond the survey's limitations. This approach allowed us to gather a comprehensive understanding of the topic.

### Procedures

Upon recruiting potential participants, a message containing the questionnaire link was disseminated via mobile phones across the country. Concurrently, printed QR codes were randomly distributed to teenagers. The questionnaire garnered responses from 300 teenagers hailing from various regions of the UAE. Moreover, a total of 5 face-to-face interviews and 2 interviews conducted via Zoom were conducted, exclusively with female teenagers. The primary objective of this study is to raise awareness among teenagers about the potential risks and consequences associated with ordering food online. At the survey's inception, a yes/no question was presented: "Is the aim of this survey to inform teenagers about the potential risks and effects of ordering food online?" Collected data will be treated with strict confidentiality and solely employed for academic purposes. For participants under the age of 18, parental consent was mandatory. While a majority of participants responded affirmatively, those who responded negatively were respectfully omitted from the study for ethical considerations. To facilitate convenience, interviews were held within the school library after obtaining authorization from the school principal. In my request for permission to conduct this study, I articulated: "I kindly request permission from your esteemed institution to conduct a research study focusing on the impact of food delivery apps on body composition." To ensure the confidentiality of identities, each participant was assigned a research code (e.g., Teen 01). Throughout this study, the terms "teenagers" and "subjects" are used interchangeably.

### Delimitations

The research encountered limitations including potential bias due to voluntary survey participation, language translation requirements (English and Arabic), and the need for Zoom interviews due to

geographic constraints. Convenience sampling was used due to challenges in obtaining a fully random sample. Despite these limitations, the study aims to provide significant insights into the previously unexplored realm of how food delivery apps affect the body compositions of teenagers in the UAE.

## Results

The objective of this study is to explore the impact of food delivery apps on the body composition of teenagers. The research involved the participation of 300 individuals who completed a questionnaire, and additionally, seven female teenagers were interviewed for further insights. The study's instruments were carefully outlined, and the findings were thoroughly analyzed and explained.

### Quantitative Results

#### Questionnaire

The survey questionnaire (Appendix A) was administered to 300 teenagers aged 12 to 18 in the UAE. Preliminary analysis of the survey data did not indicate any significant correlation between teenagers' body composition and their use of food delivery apps. To explore potential correlations between the variables, a chi-square test for independence was conducted.

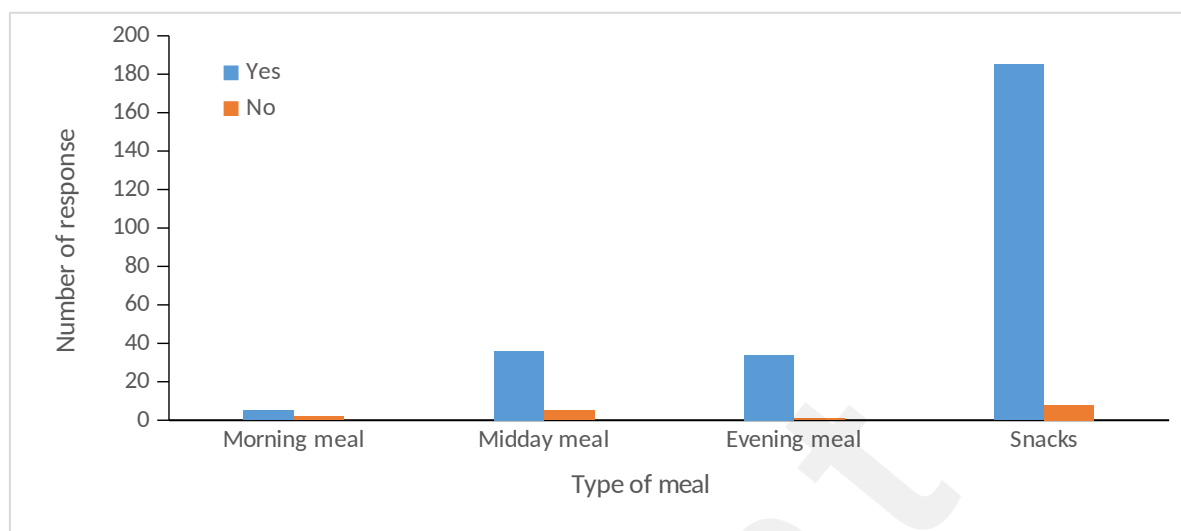
Table 1. The association between the body composition of teenagers and their use of food delivery apps

Order Status	Underweight	Normal	Overweight
Yes	34	170	56
No	7	16	5

The relationship between teenagers' body composition and their usage of food delivery applications is presented in Table 1, a two-way table. A chi-square test for independence was executed. The null hypothesis posits no correlation between a teenager's body composition and their use of food delivery apps, while the alternative hypothesis suggests a connection between the two factors. The chi-square test yielded a p-value of 0.228 and a chi-test statistic of 2.951. Since 0.05 is greater than the p-value, the null hypothesis cannot be rejected at the 0.05 significance level. In simpler terms, there isn't sufficient compelling evidence to support the alternative hypothesis proposing a link between teenagers' body composition and food delivery app usage. Given that the majority of participants had a typical weight and utilized food delivery apps for convenient on-the-go food orders, the results indicate that the use of these services did not adversely impact the body composition of teenagers.

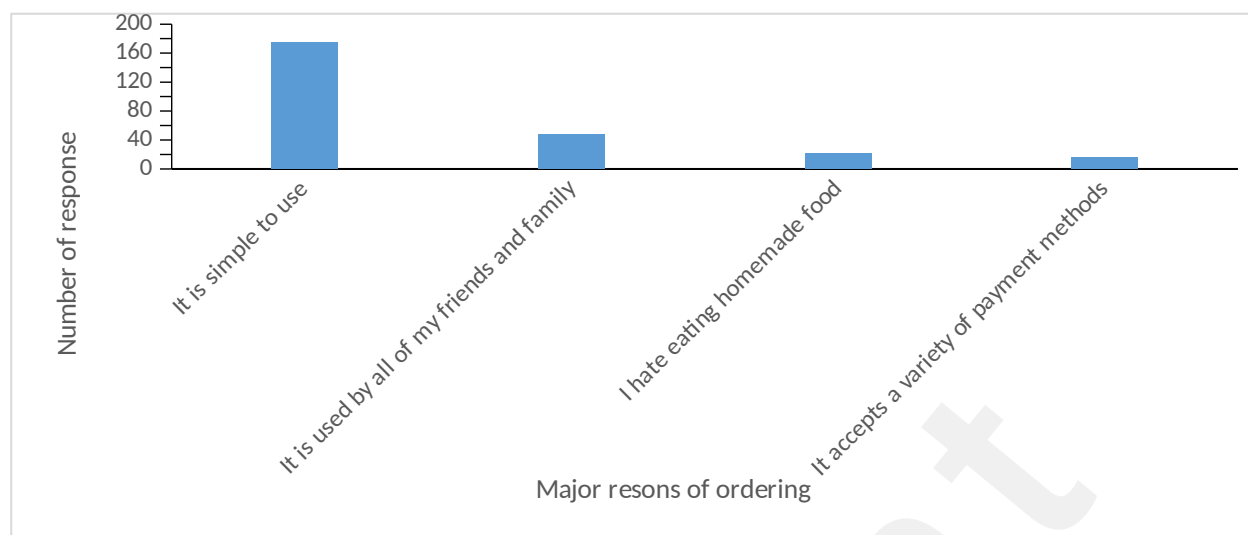
Figure 1 illustrates teenagers' utilization of food delivery services and their meal preferences for different times of the day. The data suggests that teenagers tend to opt for snacks during the evening, midday, and morning, rather than ordering complete meals.

Figure 1. Teens' Use of Food Delivery Services and Meal Preferences



Among the teenagers surveyed, only 5 individuals opted for morning meal orders through food delivery apps, while 2 did not engage in such orders. In contrast, a minor discrepancy of 2 points was observed between those who used food delivery apps for midday meals and snacks and those who did not. Notably, the evening meals exhibited a substantial contrast, with 185 teenagers availing of food delivery services compared to merely 8 who refrained from doing so. Moreover, examining the ratios of evening orders that were most prominent, it becomes apparent that consuming food post-bedtime can potentially impact three pivotal aspects related to weight management in teenagers. These factors encompass the intake and expenditure of calories as well as the molecular alterations occurring in adipose tissue due to patterns of excessive eating and physical activity.

Figure 2. Explicit Reasons for Using Delivery Apps for Food Orders



In Figure 2, the bar chart gives a comprehensive insight into the explicit reasons that drive teenagers to use delivery apps for food orders. It is evident that the main reason for using these apps is the remarkable ease and convenience associated with these apps. Furthermore, the influence of peers and family members who also use these apps is clearly evident. Interestingly, dislike of home-cooked meals is the third most common reason cited. Conversely, the availability of different payment options appears to be the least important reason. These data underline the central role of the user-friendliness of these apps, possibly encouraged by recommendations from friends and relatives, in the acceptance of these apps among young people.

Figure 3. Ordered by Teenagers: Top Food Categories

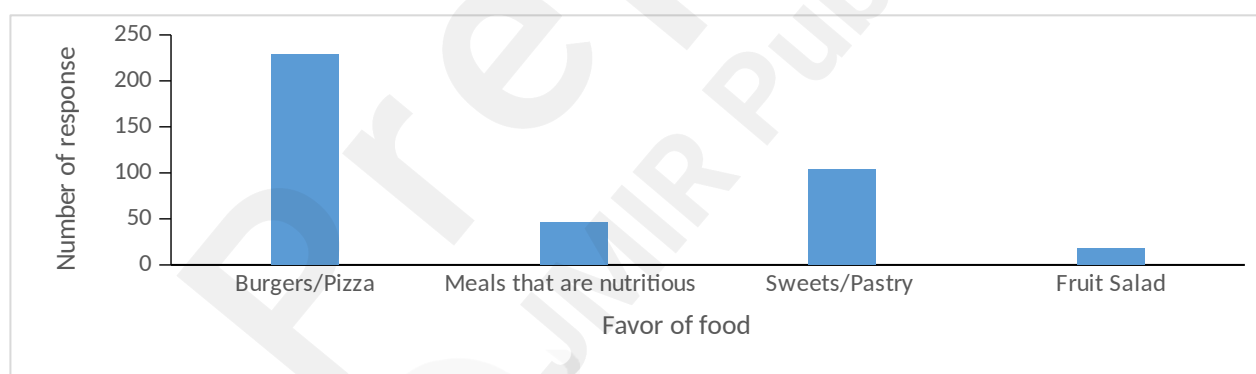
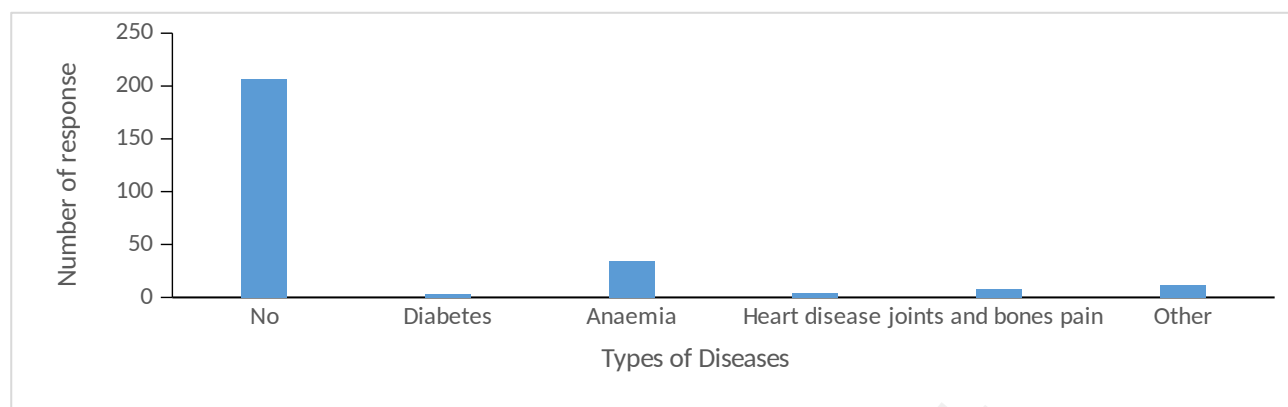


Figure 3 shows a revealing breakdown of teenagers' preferred food categories when ordering via food delivery apps. Of the 300 teens surveyed, a sizable majority of 229 indicated a preference for pizza and burgers, making them the most requested category. This was closely followed by desserts and baked goods, which attracted the interest of 104 of the 300 teens. It is important to note that fast food, including pizza, burgers, and desserts, is often high in sodium, sugar, calories, saturated and trans fats, and various additives. Frequent consumption of such foods can pose health risks and contribute to problems such as obesity and diabetes. In particular, healthier options such as balanced meals and fruit salads appear to be chosen less frequently by teens, indicating a tendency to overlook highly nutritious, energy-dense foods such as fruit salads despite their health benefits.

Figure 4. Teenagers with Chronic Illnesses: Prevalence (Those who order from food delivery apps)



The prevalence of chronic health conditions among teenagers who utilize food delivery apps is illustrated in Figure 4 using pie charts. The data shows that 77% of participants report being free of chronic conditions. However, 13% report suffering from anemia, 3% report joint and bone pain, 2% report heart disease and 1% report diabetes. A further 3% are affected by other, unspecified illnesses. Remarkably, only a small proportion of young people who use food delivery services report health problems directly related to their food orders. These findings suggest that while the majority of teens who use food delivery services appear to be relatively healthy, a minority have more noticeable health problems related to their diet.

Figure 5. Teenagers with Chronic Illnesses: Prevalence (Those who do not order from food delivery apps)

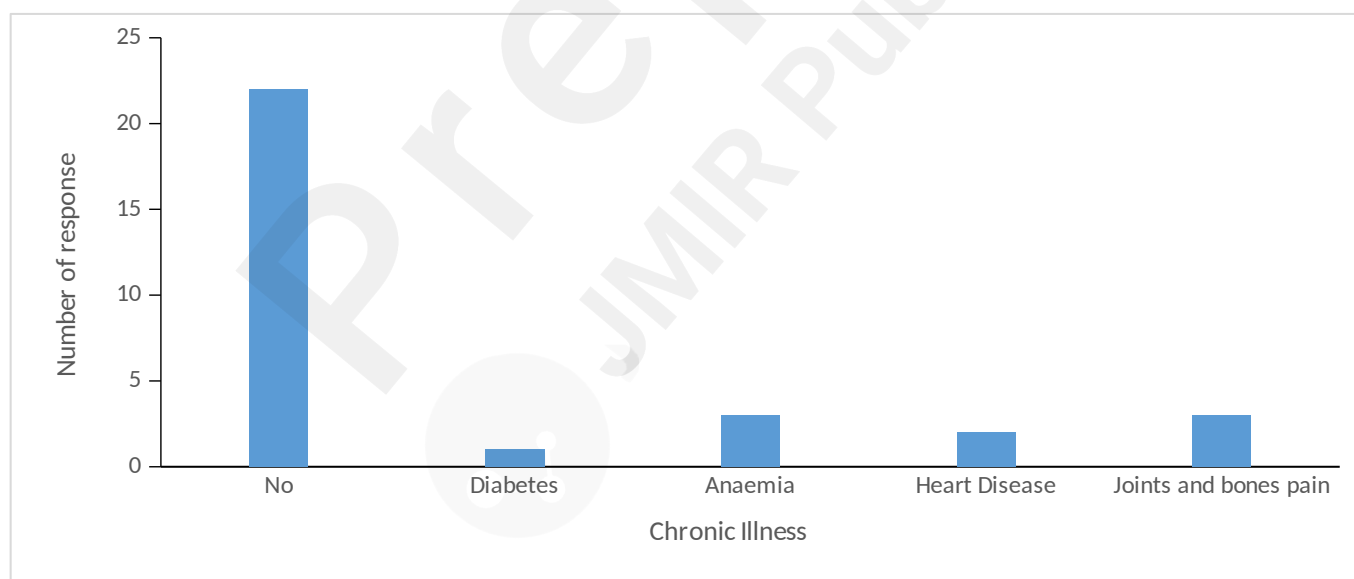


Figure 5 shows the prevalence of health conditions among teenagers who do not use food delivery apps in the form of pie charts. The data shows that 78% of respondents state that they have no chronic conditions. Of the remaining participants, 11% suffer from anemia, 7% from heart disease and 4% from diabetes. These results suggest that teens' decision to forego food delivery services is not necessarily related to health problems. Interestingly, teens generally have a relatively healthy body composition, regardless of their app use. However, a minority have been found to have persistent anemia, which may indicate problems with oxygen transport due to a lack of healthy red blood cells. This condition can be exacerbated by unhealthy eating habits and a sedentary lifestyle.

Order from food delivery apps	Yes	No	Total
Yes	40	22	62
No	93	8	101
Sometimes	102	4	106
Rarely	25	6	31
Total	260	40	300

Table 2. Avoiding ordering meals with a lot of calories

Table 3. Do social media advertisements for fast food encourage you to place an order?

Order from food delivery apps	Yes	No	Total
Yes	97	13	117
No	64	7	72
Sometimes	75	12	77
Rarely	24	8	34
Total	260	40	300

Table 4. Since using food delivery apps, has your weight changed

Order from food delivery apps	Yes	No	Total
Yes	85	19	89
No	120	10	132
Sometimes	39	8	40
Rarely	16	3	39
Total	260	40	300

Table 5. You intend to use fewer food delivery apps

Order from food delivery apps	Yes	No	Total
Yes	105	7	112
No	95	27	122
Sometimes	53	4	57
Rarely	7	2	9
Total	260	40	300

Chi-square tests for independence were conducted to analyze the association between teenagers using food delivery apps and those abstaining. Tables 2 and 5 exhibit chi-test statistics of 38.241 and 15.618, respectively, indicating significance at the 0.05 level. Both reject the null hypothesis, strongly supporting alternative hypotheses. However, social media's influence on order placement (Table 3) lacks statistical significance (p-values: 0.191 and 4.745). Table 4 suggests no substantial evidence supporting the alternative hypothesis linking app usage with teenagers' healthy body weight, with a statistically significant result of 6.424 at the 0.05 level. This indicates that app usage does not notably affect teenagers' weight. The study underscores that despite intentions to reduce high-calorie orders and reliance on food delivery apps, teenagers' weight and reliance remain largely unchanged. Social media promotions have limited sway on their ordering behaviors.

## Qualitative Results

### Interviews

#### Qualitative Findings: Interview Insights

In-depth semi-structured interviews were conducted with a cohort of seven female participants, ranging in age from 12 to 18 years. Of these interviews, two were conducted virtually via Zoom, while the remaining five were carried out in person at the school library. The participants were thoughtfully divided into two distinct groups based on their articulated experiences and perspectives surrounding the utilization of food delivery apps. For reference, the comprehensive set of interview questions can be found in Appendix B. The interview sessions were meticulously recorded and subsequently transcribed, as presented in Appendix C, prior to undergoing rigorous analysis. Among the seven participants who were engaged in discussions regarding their engagement with food delivery apps, five indicated regular usage, while the remaining two chose not to partake in such activities. Within the subset of five individuals who embraced food delivery apps, two respondents conveyed a sense of heightened control and increased vitality associated with their usage. In contrast, the remaining three participants correlated their perceived energy levels with the nutritional quality of the ordered food items. Divergent viewpoints emerged regarding the potential impact of food delivery apps on health. Four participants expressed concerns about food delivery apps leading to unhealthy eating habits, while three were optimistic about potential health benefits. Weight and health issues were discussed, with five participants experiencing weight gain and health problems linked to app usage. Two participants maintained normal weight and health. They agreed that these apps don't promote healthy eating due to financial constraints and limited healthy options, expressing worries about potential long-term implications like obesity. These discussions led to recommendations emphasizing the need for increased awareness.

#### Teen 01: thoughts about food delivery apps and its impact

Do you think ordering from food delivery apps affects your body composition? How?

Yes, for example, I feel so certain I will not eat at night, and have no desire to eat, but one hour later I am UP like a rocket and heading to my phone to order some food. Even the smallest snack sabotages my day and sometimes I wake up feeling like a bowling ball got lodged into my stomach. The self-loathing begins from the moment I open my eyes and lasts all day. I just cannot stop eating at night. I did everything to stop, but I failed. It is making my day-to-day life miserable.

#### Teen 03: thoughts about food delivery apps and its impact

Do you think ordering from food delivery apps affects your body composition? How?

I suffer from eating and sleeping late at night, eating has turned my life into a nightmare. This eating disorder through food delivery apps is turning my life into a complete disaster ... I do not know how to deal with it, how to stop it, exercising and stopping eating fast food has not worked. The result is that I gain weight and wake up feeling sluggish, which makes it hard for me to concentrate or focus on class.

#### Teen 06: thoughts about food delivery apps and its impact

Do you think ordering from food delivery apps affects your body composition? How?

Yes, my older brother has a subscription to a food delivery service that regulates and controls the types of food they eat and tracks the calories in each cuisine according to his weight. This program has helped him achieve great health and condition, and I would like to join this program too.

The perspectives of Teens 01 and 03 converged on the notion that utilizing food delivery apps for ordering meals exerted an adverse influence on their health. Consequently, discontinuing their usage posed a challenge. In contrast, Teen 06 held a dissenting view, asserting that food delivery apps played a beneficial role in upholding her overall health and weight. She cited the utilization of a health program that tracks calorie intake and suggests suitable food choices, thereby affirming its positive contribution to maintaining her well-being.

## Discussion

The central aim of this study was to ascertain the extent to which the utilization of food delivery apps impacts the body composition of teenagers.

## Findings

Upon comprehensive examination of the outcomes derived from the employed methods, it can be conclusively inferred that there exists no discernible link between teenagers' body composition and their engagement with food delivery apps. This assertion is substantiated by the outcomes of the chi-square test for independence conducted as presented in Table 1. Notably, this conclusion is challenged by the statements made by Teen 03, who mentioned that their older sibling's utilization of a regulated food delivery service, encompassing food type control and calorie tracking, led to improved health and condition. This nuanced discrepancy arises due to the limited proportion of teenagers whose body composition remains unaffected by food delivery app usage.

As elucidated earlier in the literature review, fast food, along with baked goods and sweets, emerged as the most commonly ordered items. This culinary preference corresponds with the broader socioeconomic changes brought about by rapid population expansion and economic growth, contributing to shifts in dietary patterns towards convenience-oriented choices at the expense of traditional nutritionally balanced diets (Al-Isa, 1997). In this context, Tables 2 and 5 illustrate the association between teen body composition and food delivery apps, confirmed through the employed chi-square test.

## Addressing Research Gaps

This study effectively addresses gaps present in prior research. Diverging from earlier studies that encompassed global teenage populations but excluded the United Arab Emirates (UAE), this investigation is uniquely focused on UAE teenagers who have not been subjects of previous inquiries. Through an administered questionnaire, this study accumulates data on UAE teenagers' body composition and their engagement with food delivery apps. The collected data was subjected to scrutiny through the chi-square test for independence, with the results presented in tabular format to facilitate comprehension. This distinctive approach sets this research apart from prior endeavors.

## Implications

The study's discerned outcomes underscore the absence of a substantial connection between teenagers' use of food delivery apps and their body composition. Consequently, it is plausible that other variables,



such as lifestyle choices, genetic predispositions, and levels of physical activity, exert more significant influence on the measurement of body composition. Nevertheless, menu labeling has been documented to influence decision-making and calorie consumption. As an initial stride toward shifting dietary behaviors, menu labeling elevates public awareness of food alternatives in an environment where less healthful choices often predominate. Providing calorie information on menus emerges as a potential tool to facilitate healthier decision-making and enhance awareness of food intake (Block & Roberto, 2014).

### Limitations

The study encountered limitations, chiefly stemming from participant selection challenges, resulting in an insufficient sample size that curtailed the potential for generalization based on the findings. Moreover, the absence of male participants in the interview phase introduces a bias that precludes the representativeness of the results for the male demographic.

### Future Research Directions

The study's limitations highlight opportunities for future research. To advance, expanding the sample to include users over 18 and from various global locations beyond the UAE could provide a broader perspective. Additionally, future investigations could explore crucial determinants beyond food delivery apps, delving into the interconnection between mental and physical well-being among teenagers, offering a more comprehensive understanding.

**Conflicts of Interest:** The authors declare no conflicts of interest related to this research. The study was conducted in an unbiased manner, and no external factors or affiliations influenced the design, execution, analysis, interpretation, or reporting of the findings.

### Abbreviations

UAE: United Arab Emirates

BMI: Body Mass Index

**Appendix A:** 300 teenagers completed the questionnaire

1) This study aims to investigate any relationships between teen food delivery app use and body composition. The privacy and confidentiality of the participants' personal information will be protected and kept private. Before taking part in the study, if you are under the age of 18, you must get your parents' permission. Please confirm that you are aware of and agree to the terms above.

- A) Yes
- B) No

2) Do you order from food delivery apps?

- A) Yes
- B) No

Users who order food through the app (who answers yes will move to section 3):

1) How would you describe your current weight?

*Mark only one oval*

- ☐ Underweight
- ☐ Overweight

- ☐ Normal

2) How frequently do you order food online?

*Mark only one oval*

- ☐ Every day
- ☐ Every week
- ☐ Every month
- ☐ Every year

3) Why do you use food delivery apps?

*Mark only one oval*

- ☐ It is used by all of my friends and family
- ☐ It is simple to use
- ☐ It accepts a variety of payment methods
- ☐ I hate eating homemade food

4) Which meal do you typically order online?

*Mark only one oval*

- ☐ Morning meal
- ☐ Midday meal
- ☐ Evening meal
- ☐ Snacks

5) Sort of food you typically order using food apps?

*Check all that apply*

- ☐ Burgers/Pizza
- ☐ Meals that are nutritious
- ☐ Sweets/Pastry
- ☐ Fruit Salad

6) Do you suffer from any disease?

*Mark only one oval*

- ☐ No
- ☐ Diabetes
- ☐ Anaemia
- ☐ Heart disease
- ☐ joints and bones pain
- ☐ Other

7) What proportion of this statement do you agree with : “ Food delivery apps have a positive impact on body composition” .

**Strongly Agree**

**Strongly Disagree**

10	9	8	7	6	5	4	3	2	1
----	---	---	---	---	---	---	---	---	---

8) Answer the following questions:

*Mark only one oval per row*

	Yes	No	Sometimes	Rarely
Avoiding ordering food with a lot of calories				
<i>Do social media advertisements for fast food encourage you to place an order</i>				
Since using food delivery apps, has your weight changed				
<i>You intend to use fewer food delivery apps</i>				

**Users who order food through the app (who answers yes will move to section 4):**

1) How would you describe your current weight?

*Mark only one oval*

- ☐ Underweight
- ☐ Overweight
- ☐ Normal

2 ) Could you please rate your overall health ranging from 1 to 10 ?

<b>Bad</b>										<b>Excellent</b>
10	9	8	7	6	5	4	3	2	1	

3) Do you suffer from any disease?

*Mark only one oval*

- ☐ No
- ☐ Diabetes
- ☐ Anaemia
- ☐ Heart disease
- ☐ joints and bones pain
- ☐ Other

4) To what extent do you agree with this statement: Food delivery apps have a positive impact on body composition.

**Strongly Agree**

**Strongly Disagree**

10                      9                      8                      7                      6                      5                      4                      3                      2                      1

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## Appendix B

### Interviews questions

1. Do you use food delivery apps?
2. Do you feel energetic/active after eating food?
3. In your opinion, do you think food delivery apps in a positive or negative way impact on your body composition?
4. Do you think that your weight changed?
5. Can it help people to stick to a healthy eating plan?
6. In future, will obesity increase among teenagers more because of food delivery apps? Is there any way to stop it?

## References

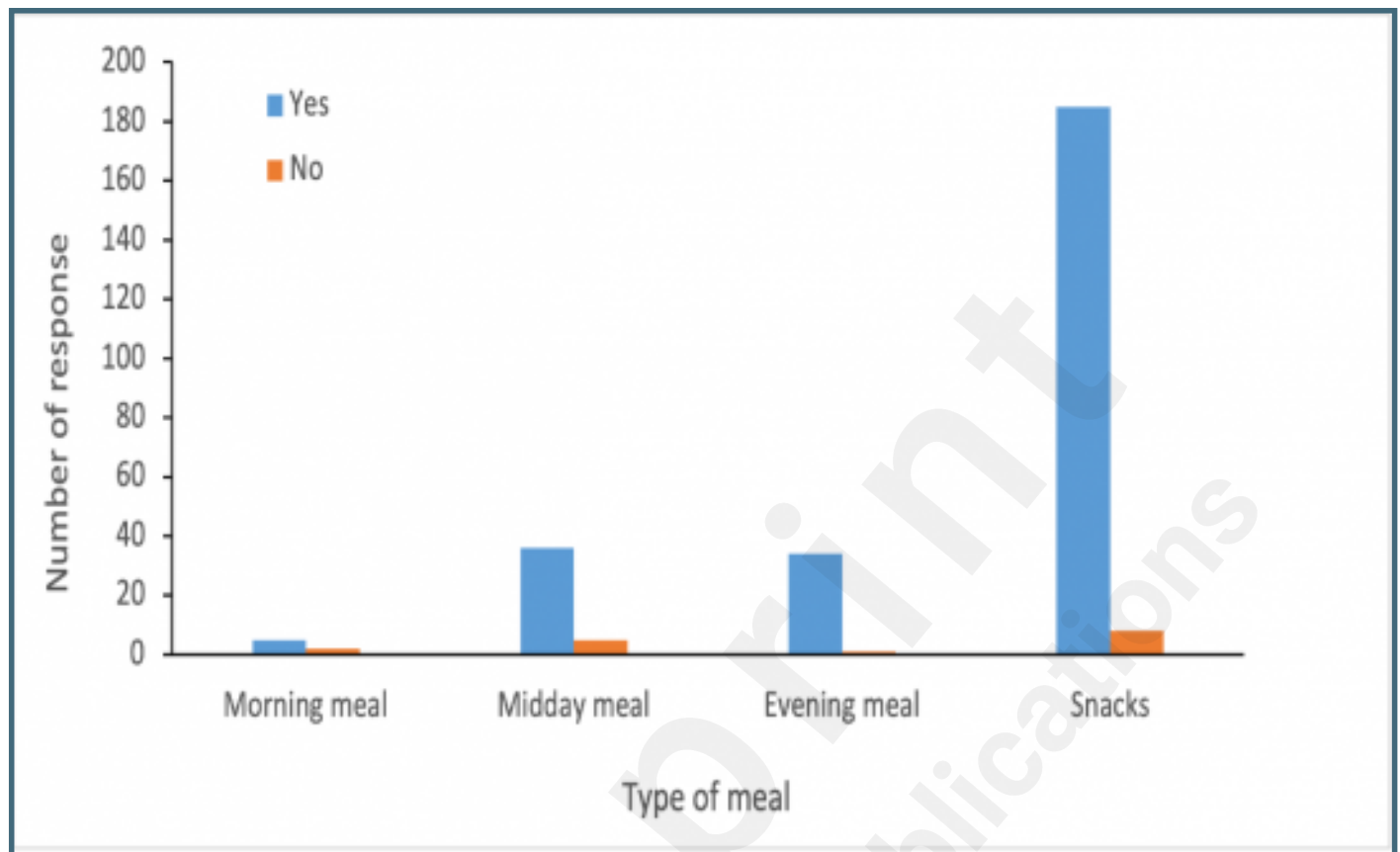
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## Supplementary Files

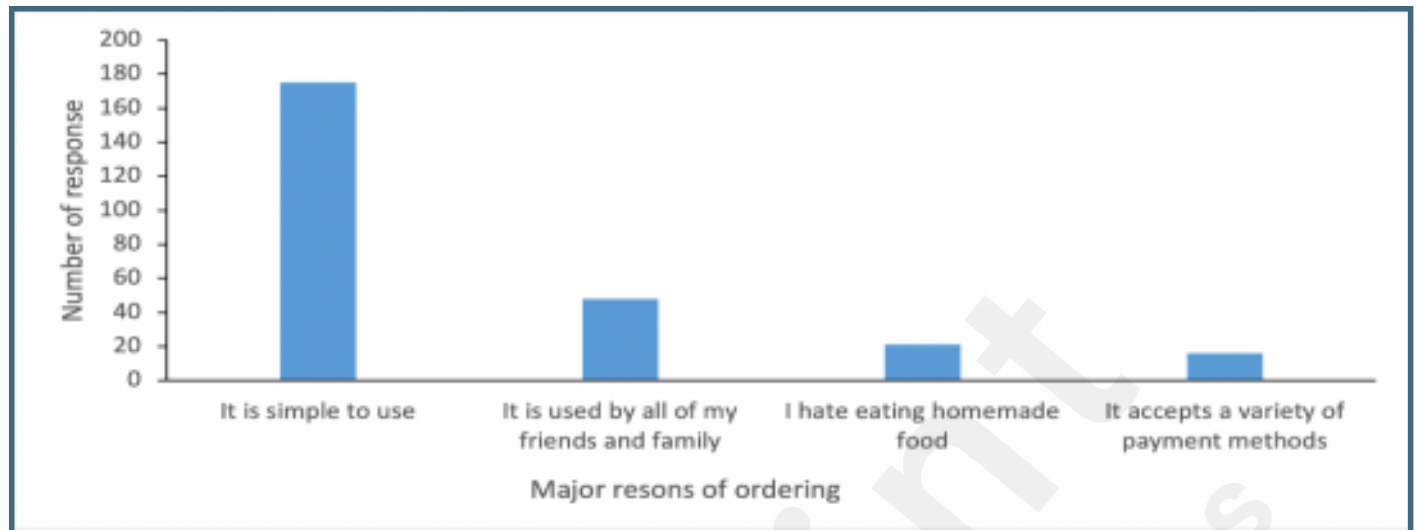
## Figures

## Teens' Use of Food Delivery Services and Meal Preferences.

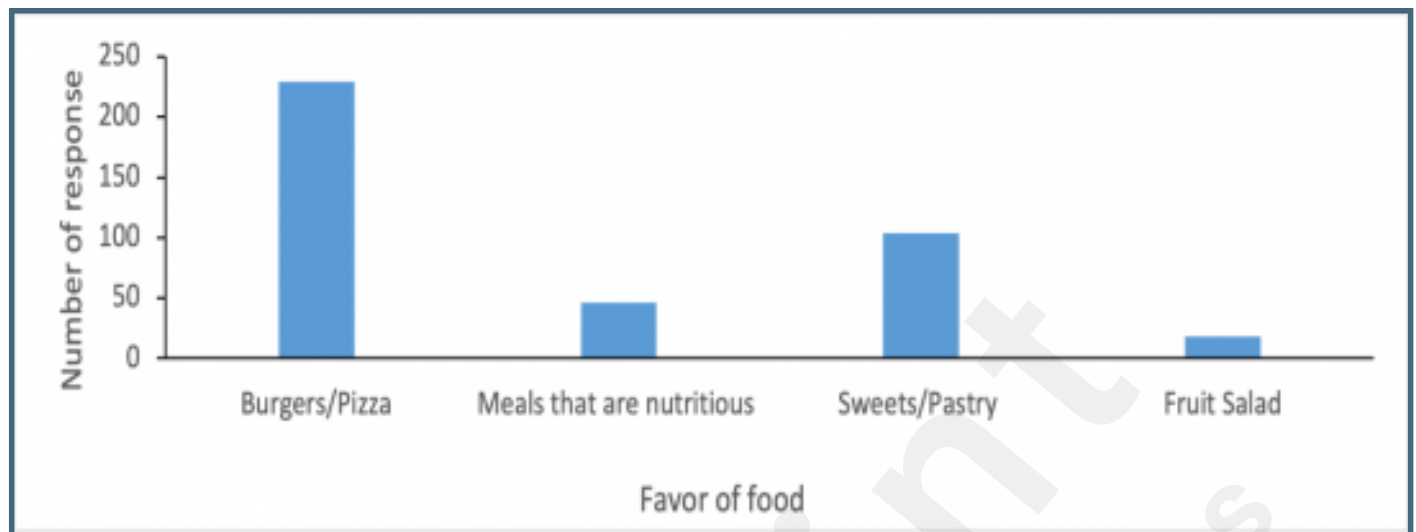




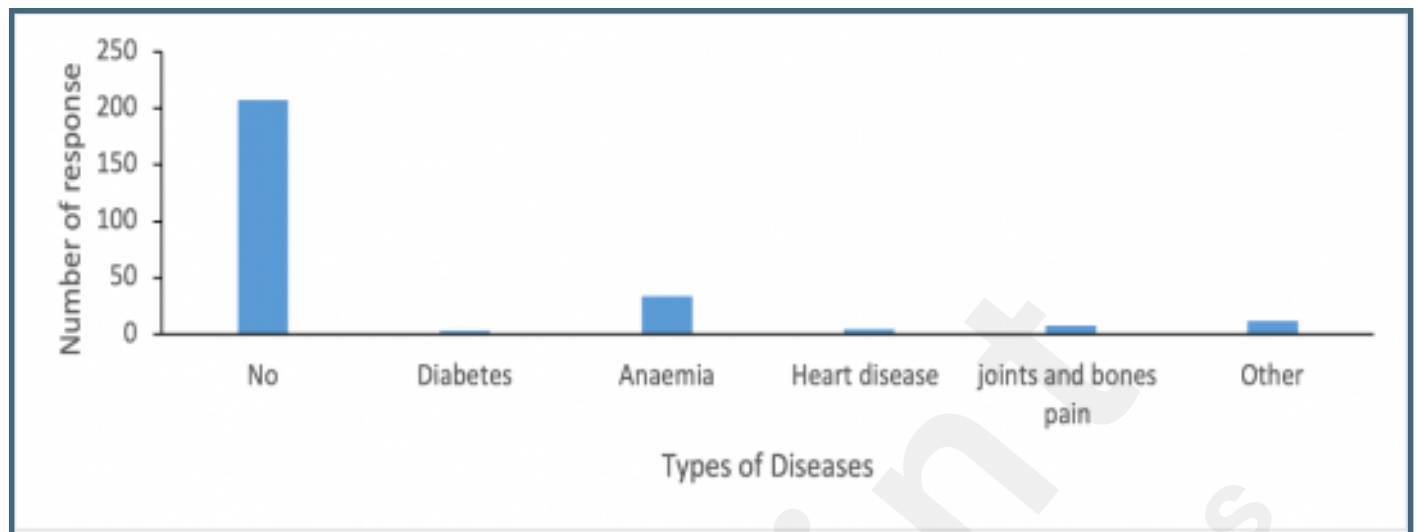
## Explicit Reasons for Using Delivery Apps for Food Orders.



Ordered by Teenagers: Top Food Categories.



Teenagers with Chronic Illnesses: Prevalence (Those who order from food delivery apps).



Teenagers with Chronic Illnesses: Prevalence (Those who do not order from food delivery apps).

