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## The Impact of Qat Chewing on Health and Social Life: A Cross-Sectional Study Among Yemeni Adults

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### Abstract

**Background:** Qat chewing is a widespread social practice in many regions, notably in Yemen and East Africa, with increasing prevalence. While traditionally rooted in cultural and social gatherings, its health and social impacts remain a growing concern. This study aims to explore the demographic patterns of qat chewing, the health issues associated with its use, and the social implications among different population groups.

**Methods:** A cross-sectional survey was conducted, including 920 participants from various demographic groups. Data were collected on age, gender, educational level, occupation, frequency of qat chewing, health issues, and attempts to quit. Statistical analyses were performed to examine correlations between qat chewing behaviors, health outcomes, and social perceptions.

**Results:** The majority of qat chewers were aged between 18-24 years (66%), and the practice was more prevalent among males (67%). Frequent qat chewers, especially those who chew daily, reported higher incidences of health issues, with dental problems (41%), weight loss (32%), and gastrointestinal issues (22%) being the most common. Educational level and occupation significantly impacted health outcomes; participants with higher education were more likely to report weight loss and gastrointestinal issues, while unemployed individuals reported the highest incidence of health problems.

**Social impact:** Qat chewing is deeply embedded in social gatherings, with 61% of respondents viewing it as an important or very important part of social events. However, despite its cultural significance, 75% of respondents stated they would not encourage others to chew qat, reflecting growing awareness of its negative health and social consequences. Additionally, nearly 38% of respondents reported that qat chewing had a positive impact on their productivity, although 22% reported negative effects.

**Conclusion:** The findings reveal that qat chewing, though culturally significant, is associated with various health risks and negative social perceptions. Public health interventions aimed at reducing qat use and addressing its health consequences are needed, particularly for younger populations and those in lower socioeconomic groups.

**Keywords:** Qat chewing, Health impacts, Social perceptions, Yemeni adults, Addictive behavior, Cultural practices, Mental health, Substance abuse, Public health, Gastrointestinal issues, Dental health, Cross-sectional study.

### Introduction

#### Health impacts of qat chewing

The health effects of qat chewing are profound, particularly concerning oral and gastrointestinal health. Al-Maweri and AlAkhali conducted a case-control study examining the oral hygiene and periodontal health status among qat chewers [1]. The study found that qat chewers exhibited significantly poorer oral hygiene and higher prevalence of periodontal diseases compared to non-chewers. The

abrasive nature of qat chewing and its chemical composition contribute to these oral health issues, as corroborated by Kalakonda et al., who conducted a systematic review and found consistent evidence linking qat chewing to an increased risk of periodontal diseases [2].

The impact of qat chewing extends beyond oral health. Nigussie, Gobena, and Mossie highlighted the association between qat chewing



and gastrointestinal disorders in a cross-sectional study conducted in Ethiopia [3]. Their findings indicated that regular qat use is significantly associated with a higher prevalence of gastrointestinal problems, including gastritis and peptic ulcers. This association is likely due to the irritative effects of qat's active compounds on the gastrointestinal mucosa.

In addition to these findings, Al-Hebshi and Skaug provided an updated review of the broader health implications of qat chewing, emphasizing its potential to exacerbate both oral and systemic health conditions [4]. Al-Motarreb, Baker, and Broadley also examined the pharmacological effects of qat, noting its stimulant effects that elevate heart rate and blood pressure, potentially increasing the risk of cardiovascular diseases such as myocardial infarction [5].

Asfaw further explored the adverse effects of qat chewing in a community-based study in Ethiopia, identifying not only oral and gastrointestinal issues but also other systemic health problems, underscoring the need for targeted public health interventions in regions where qat use is prevalent [6].

## Socio-economic implications

Qat chewing has significant socio-economic implications, particularly in regions where it is a widespread cultural practice. Kennedy, Teague, and Fairbanks conducted a seminal study on qat use in North Yemen, exploring its socio-economic dimensions [7]. The study revealed that qat consumption has detrimental effects on productivity, as the psychoactive properties of qat often lead to reduced focus and efficiency. Moreover, the financial burden of sustaining the habit frequently imposes economic strain on households, diverting resources away from essential needs such as food, healthcare, and education.

Kassim et al., explored the local market dynamics of qat in East London, U.K., prior to the ban on its sale [8]. Their study highlighted how the trade of qat, while providing economic opportunities for some, also perpetuates socio-economic inequalities and challenges, especially among immigrant communities.

Al-Mugahed discussed the broader socio-economic challenges posed by qat chewing in Yemen, noting that the practice contributes significantly to the country's economic difficulties [9]. The high cost of qat, coupled with the time-consuming nature of its use, often leaves little room for productive economic activities, exacerbating poverty levels in already vulnerable populations.

## Cultural and social dimensions

Qat is deeply embedded in the cultural fabric of societies in Yemen and other regions where it is commonly used. Al Shubbar delved into the sociocultural implications of qat in Saudi Arabia, highlighting how the practice, while traditional, presents challenges in balancing cultural heritage with modern public health concerns [10]. Qat chewing sessions are integral to social interactions, serving as occasions for community bonding and the exchange of ideas.

The cultural significance of qat is also reflected in its consumption patterns among women in Yemen. El-Zaemey, Heyworth, and Fritschi investigated qat consumption among women, revealing that despite cultural norms often discouraging female qat use, a significant number of women engage in the practice, particularly in social contexts [11]. This study sheds light on the

gendered aspects of qat chewing and the social pressures that influence its consumption.

Kennedy et al., also highlighted the social importance of qat, noting that its use is deeply intertwined with social rituals and community interactions in North Yemen [7]. The strong cultural attachment to qat presents a considerable challenge for public health initiatives, which must navigate the complex social dynamics that sustain the practice.

## Qat chewing as an addiction

While qat is often regarded as a cultural and social practice, there is growing recognition of its addictive potential. Nutt et al., developed a rational scale to assess the harm of drugs of potential misuse, categorizing qat among substances with moderate addiction potential [12]. The stimulant effects of cathinone, the active ingredient in qat, contribute to its potential for abuse, leading to psychological dependence.

The addictive nature of qat has significant implications for public health and social well-being. As documented by Kennedy et al., the regular use of qat can lead to dependency, which exacerbates its health and socio-economic impacts [7]. This dual nature of qat—as both a cultural tradition and an addictive substance—presents a complex challenge for policymakers and public health officials aiming to mitigate its negative effects.

## Problem statement

Despite the cultural significance of qat, there is growing concern over its health impacts and its role in exacerbating social and economic challenges. Many studies have focused on individual health effects, but few have holistically examined both health and socio-economic dimensions across diverse demographic groups. This study aims to address this gap by exploring the associations between qat chewing and various health issues (e.g., dental, gastrointestinal, and mental health problems), as well as its broader socio-economic and cultural impacts.

## Objectives/Hypothesis

The primary objective of this study is to investigate the health and social consequences of qat chewing across different demographic groups, with a focus on gender, age, education, and occupation. We hypothesize that frequent qat chewers will report a higher prevalence of health issues, and that socio-economic factors will significantly influence qat consumption patterns. Additionally, we expect to find that qat's cultural role creates challenges for public health initiatives aimed at reducing its use.

## Significance

This research is critical for several reasons. First, it contributes to the growing body of literature on the public health risks associated with qat, providing a comprehensive view of its impact across demographic groups. Second, the findings can inform targeted public health interventions, especially in regions where qat consumption is prevalent. Lastly, this study sheds light on the socio-cultural dimensions of qat chewing, offering insights into how public health strategies can balance respect for cultural traditions with the need for health improvements.



## Methodology

### Study design

This research utilizes a cross-sectional study design aimed at understanding the health and social consequences of qat chewing across various demographic groups in Yemen. The cross-sectional design was chosen to provide a snapshot of qat consumption behavior, health-related outcomes, and social implications at a specific point in time. By surveying a diverse sample, the study aimed to explore correlations between qat chewing habits, health issues, and socio-cultural perceptions.

### Study population and sampling

The study population comprised Yemeni adults aged 18 and above, representing both urban and rural areas. Participants were recruited through multiple channels, including in-depth interviews, mini-lectures at universities, and social media posts. The inclusion criteria were:

- Adults aged 18 or older.
- Current or past qat chewers.
- Individuals willing to participate voluntarily and provide informed consent.

To ensure representation across demographic groups, a stratified random sampling method was employed. The strata included:

- **Age categories:** Under 18, 18-24, 25-34, 35-44, 45-54, 55 and above.
- **Gender:** Male, Female.
- **Education levels:** No formal education, Primary education, Secondary education, Higher education.
- **Occupation:** Student, Government employee, Private sector employee, Unemployed.

The final sample size was 920 participants, calculated based on expected prevalence rates of qat use in Yemen, using a 95% confidence level and a  $\pm 5\%$  margin of error. The sample size provided adequate statistical power to detect differences in health outcomes and social impacts across demographic groups.

### Data collection

Data collection was conducted through three primary methods to ensure diversity and reach within the study population:

1. **In-depth interviews:** Interviews were conducted with a subset of participants (N=150) to explore detailed personal accounts of qat use, health impacts, and social attitudes. These interviews were semi-structured and conducted either face-to-face or via phone calls, based on participant availability.
2. **Mini-lectures at universities:** Researchers delivered mini-lectures at several universities across Yemen, discussing qat use and its health implications. After the lectures, students and staff were invited to participate in the study by completing a survey. This method was particularly effective in reaching younger populations.
3. **Social media posts:** An online self-administered questionnaire was distributed via social media platforms (Facebook, WhatsApp, and Twitter) to reach a broader audience, particularly in urban areas. The questionnaire was designed in Arabic, ensuring accessibility for all participants. A pilot test

with 50 participants was conducted to refine the language, structure, and content of the questionnaire.

The questionnaire was divided into four main sections:

1. **Demographic data:** Age, gender, education level, occupation, and income.
2. **Qat chewing behavior:** Frequency of qat use (daily, several times a week, weekly, occasionally, or never), duration of qat chewing sessions, and age of initiation.
3. **Health issues:** Participants were asked about specific health problems, including dental issues, weight loss, gastrointestinal issues, depression, anxiety, and cardiovascular conditions. Additionally, participants were asked whether qat use had affected their productivity or academic performance.
4. **Social and cultural perceptions:** Participants shared their views on the cultural significance of qat, its role in social gatherings, and whether they had attempted to quit qat. The survey also assessed whether respondents encouraged others to chew qat.

Most of the survey data were collected through structured questions with pre-defined responses. Likert scale questions were used to measure attitudes toward qat use, and open-ended questions were used during interviews to gain in-depth insights into personal experiences.

### Variables and measurements

The dependent variables in the study included health and social outcomes, such as:

- **Health outcomes:** Self-reported dental problems, weight loss, gastrointestinal issues, mental health issues (e.g., depression, anxiety), high blood pressure, and fatigue.
- **Social outcomes:** The perceived social acceptability of qat chewing, its role in cultural identity, and its impact on productivity.

The independent variables included:

- **Demographic factors:** Age, gender, education level, occupation.
- **Qat chewing frequency:** Daily, several times a week, weekly, occasionally, never.
- **Duration of qat sessions:** Less than 1 hour, 1-2 hours, 2-4 hours, more than 4 hours.

### Data analysis

Data were entered into SPSS for statistical analysis. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize the demographic characteristics and qat chewing behaviors of the study population.

Chi-square tests were applied to examine the relationships between qat chewing frequency and demographic factors, as well as between qat chewing frequency and health outcomes. To explore the predictors of health problems among qat chewers, logistic regression analysis was performed, controlling for potential confounding variables such as age, gender, and education level.

Further, cross-tabulation was used to explore correlations between social perceptions of qat and qat chewing behavior across different



demographic groups. Multivariate analysis was conducted to assess the simultaneous influence of multiple independent variables on health and social outcomes.

A p-value of  $<0.05$  was considered statistically significant for all analyses.

## Ethical considerations

All participants were provided with detailed informed consent forms, outlining the study's purpose, voluntary nature of participation, and confidentiality. Participants were assured that their responses would remain anonymous, and data were securely stored with restricted access.

Given the sensitive nature of discussing health issues related to qat, particularly in the in-depth interviews, participants were informed that they could withdraw at any time without penalty. The ethical considerations also extended to ensuring that participants recruited via social media were not coerced or unduly influenced to participate.

## Results

### Demographic characteristics of the study population

A total of 920 participants were included in the study, with respondents representing diverse demographic groups. The age distribution of the sample indicated that the largest proportion of respondents (66%) were aged between 18-24 years, followed by 25-34 years (18%), 35-44 years (6%), and under 18 (5%). Participants aged 45-54 years and those 55 and above made up 3% and 2% of the sample, respectively.

In terms of gender distribution, 67% of the respondents were male, while 33% were female. The study also found that a significant majority of participants had some level of formal education, with 76% having attained higher education (college/university), 11% secondary education, 6% primary education, and 7% reporting no formal education.

Regarding occupational status, 64% of the participants were students, followed by 16% unemployed, 14% employed in the private sector, and 6% employed in the government sector. This suggests that a large portion of qat chewers in the study were young adults, primarily students, which aligns with the widespread prevalence of qat use in social settings within this age group.

### Qat chewing frequency

The frequency of qat chewing varied across the sample. 52% of participants reported chewing qat daily, while 14% chewed qat several times a week, and 7% did so weekly. A further 21% stated that they chewed qat occasionally, and 6% reported never chewing qat. These results indicate that qat use is a regular and entrenched practice among the majority of participants.

### Health issues associated with qat chewing

The study revealed a high prevalence of self-reported health issues among qat chewers, with 77% of respondents indicating that they had experienced at least one health issue related to their qat use. The most commonly reported health issues were dental problems, weight loss, and gastrointestinal issues.

**Dental problems:** 41% of participants reported experiencing dental issues, including gum disease, tooth decay, and oral lesions. Dental problems were particularly prevalent among daily qat chewers, with 15.84% of participants who chewed qat daily reporting significant dental issues.

**Weight loss:** 32% of respondents stated that they had lost weight as a result of their qat chewing habits. This was especially common among participants with higher educational attainment and younger age groups (18-24 years).

**Gastrointestinal issues:** 22% of participants reported experiencing gastrointestinal problems such as gastritis, peptic ulcers, and digestive discomfort. Gastrointestinal problems were more frequently reported among participants who chewed qat for more than 4 hours per session.

**Mental health issues:** 23% of respondents indicated experiencing symptoms of depression or anxiety related to qat chewing. Mental health issues were more prevalent among those who chewed qat daily, with 26% of daily chewers reporting symptoms of depression and anxiety, as well as 10% reporting insomnia. These results suggest a correlation between frequent qat use and poor mental health outcomes.

**High blood pressure:** 13% of respondents reported high blood pressure as a direct consequence of qat chewing, particularly among those who chewed qat for long durations (2-4 hours or more per session). These participants often reported combining qat chewing with other stimulants, which may have contributed to the cardiovascular strain.

### Health issues by demographic group

Health issues were analyzed by demographic group to determine the most affected populations.

**Age group:** Participants aged 18-24 years were the most likely to report health issues, particularly dental problems and weight loss. 45% of participants in this age group reported some form of dental issue, and 32% experienced weight loss. This was followed by the 25-34 years' age group, where 14% reported health issues, predominantly related to mental health (e.g., anxiety and depression).

**Gender:** 67% of male respondents reported experiencing at least one health issue due to qat use, compared to 43% of female participants. Dental problems and gastrointestinal issues were more commonly reported among men, while mental health issues were more prevalent among women.

**Educational level:** Interestingly, participants with higher education were more likely to report weight loss (12%) and gastrointestinal issues (6%). On the other hand, participants with no formal education or primary education reported fewer health issues overall, although a significant proportion still experienced dental problems.

### Attempts to quit qat and success rates

The study explored participants' attempts to quit qat and the associated health outcomes. 42% of participants reported successfully quitting or reducing their qat use, while 32% had attempted but failed to quit. 26% had never tried to quit.



**Success rates:** Participants who had successfully quit qat reported fewer health issues, with 45.32% of successful quitters experiencing no health issues. Conversely, those who had unsuccessfully tried to quit reported higher incidences of dental problems (14.62%) and weight loss (5.38%).

**Health improvement after quitting:** Among participants who successfully quit qat, there was a significant reduction in health issues, particularly in mental health (e.g., reduced anxiety and depression) and gastrointestinal problems. However, some former users continued to report dental problems, likely due to long-term damage from previous chewing.

**Social and cultural perceptions of qat chewing**

Qat chewing is deeply integrated into the social fabric of Yemeni society, with 61% of respondents viewing qat as "important" or "very important" in social gatherings. However, the cultural acceptance of qat chewing appeared to contrast with its growing recognition as a health issue.

**Cultural identity:** 32% of respondents strongly agreed that qat chewing is an important part of their cultural identity, while 17% agreed. This highlights the difficulty in reconciling the cultural significance of qat with public health initiatives aimed at reducing its use.

**Perception of addiction:** 27% of participants viewed qat chewing as a growing addiction problem within their community, particularly among younger populations. Participants aged 18-24 years were most likely to report concerns over qat addiction, with 80% stating that qat use was becoming "more common."

**Encouragement of others:** Despite the cultural significance of qat, 75% of respondents indicated that they would not encourage others to chew qat, signaling growing awareness of its harmful health impacts.

**Impact of qat chewing on productivity and academic performance**

The impact of qat chewing on productivity and academic performance was mixed. 38% of respondents reported that qat chewing had a positive effect on their productivity, citing increased concentration and alertness during long study or work sessions. However, 22% stated that qat chewing had negatively affected their work or academic performance, particularly due to insomnia, fatigue, and lack of focus during periods without qat (Figure 1-6) (Table 1-7).

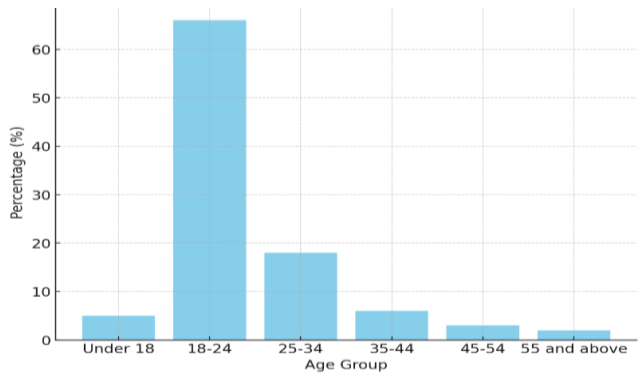


Figure 1: Age Distribution of participants.

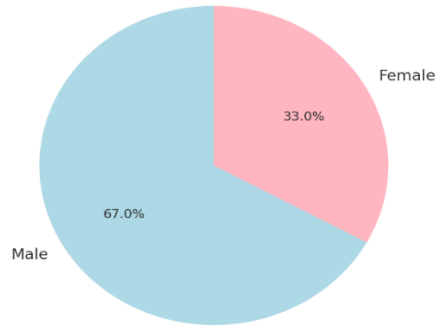


Figure 2: Gender distribution of participants.

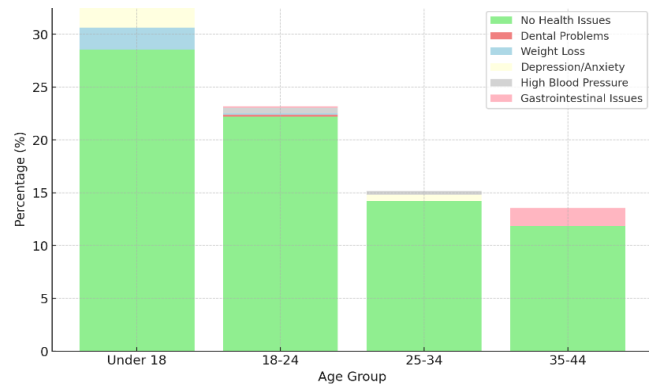


Figure 3: Health issues by age group.

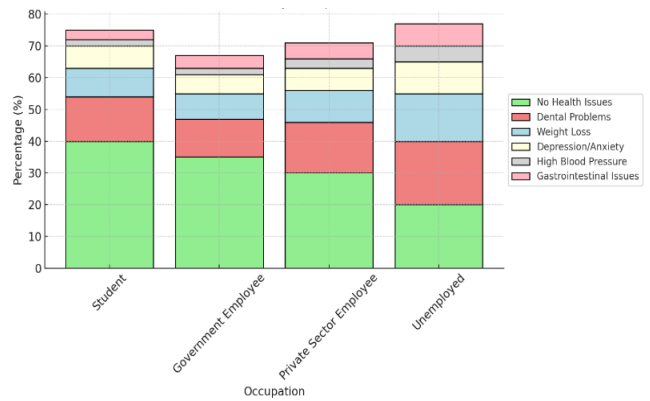


Figure 4: health issues by educational level.

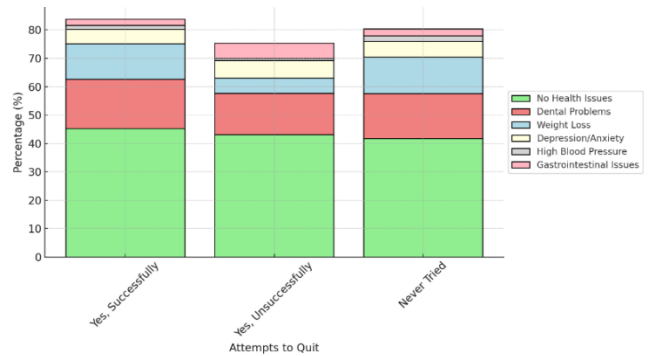


Figure 5: Health issues by occupation.

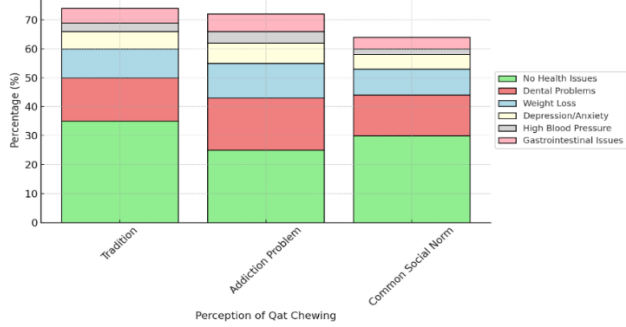


Figure 6: Attempts to Quit vs. Health Issues

Age Group	Percentage	Count
Under 18	5%	49
18-24	66%	604
25-34	18%	162
35-44	6%	59
45-54	3%	32
55 and above	2%	14
Total	100%	920

Table 1: Age distribution of study participants.

Gender	Percentage	Count
Male	67%	612
Female	33%	308
Total	100%	920

Table 2: Gender distribution of study participants.

Age group	No health issues (%)	Dental problems (%)	Weight loss (%)	Depression/anxiety (%)	High blood pressure (%)	Gastrointestinal issues (%)
Under 18	28.57	0	2.04	2.04	0	0
18-24	22.19	0.17	0.17	0	0.5	0.17
25-34	14.2	0	0	0.62	0.33	0
35-44	11.86	0	0	0	0	1.69

Table 3: Qat Chewing Frequency by Demographics.

Education level	No health issues (%)	Dental problems (%)	Weight loss (%)	Depression/anxiety (%)	High blood pressure (%)	Gastrointestinal issues (%)
No formal education	35	10	8	5	2	3
Primary education	30	12	6	4	1	4
Secondary education	25	15	10	6	3	5
Higher education	20	18	12	7	4	6

Table 4: Health issues by educational level.

Occupation	No health issues (%)	Dental problems (%)	Weight loss (%)	Depression/anxiety (%)	High blood pressure (%)	Gastrointestinal issues (%)
Student	40	14	9	7	2	3
Government Employee	35	12	8	6	2	4
Private Sector Employee	30	16	10	7	3	5
Unemployed	20	20	15	10	5	7

Table 5: Motivations for qat chewing by demographics.



Attempts to quit	No health issues (%)	Dental problems (%)	Weight loss (%)	Depression/anxiety (%)	High blood pressure (%)	Gastrointestinal issues (%)
Yes, successfully	45.32	17.27	12.59	5.04	1.44	2.16
Yes, unsuccessfully	43.08	14.62	5.38	6.15	0.77	5.38
Never tried	41.74	15.84	12.87	5.45	1.98	2.48

**Table 6:** Social perceptions of qat chewing and its impact.

Perception of qat Chewing	No health issues (%)	Dental problems (%)	Weight loss (%)	Depression/anxiety (%)	High blood pressure (%)	Gastrointestinal issues (%)
Tradition	35	15	10	6	3	5
Addiction problem	25	18	12	7	4	6
Common social norm	30	14	9	5	2	4

**Table 7:** Perception of qat chewing over time by demographics.

## Discussion

### Summary of key findings

This study aimed to examine the health and social consequences of qat chewing among adults in Yemen, focusing on the demographic factors associated with qat use, the health issues related to its consumption, and the broader socio-cultural impacts. The findings provide critical insights into the pervasive role of qat in Yemeni society and its significant health burden. The study revealed a high prevalence of qat chewing, particularly among younger adults, and identified substantial associations between qat use and various health problems, including dental issues, weight loss, gastrointestinal disorders, and mental health conditions. Additionally, while qat chewing remains a deeply entrenched cultural practice, there is growing awareness of its negative health impacts, reflected in the participants' reluctance to encourage others to engage in the practice.

### Health impacts of qat chewing

The study found a strong association between qat chewing and several health problems, with 77% of respondents reporting at least one health issue related to qat use. Dental problems, including gum disease, tooth decay, and oral lesions, were the most commonly reported, affecting 41% of participants. These findings are consistent with previous studies that highlighted the detrimental effects of qat on oral health [1]. The tannins and alkaloids in qat contribute to the development of oral lesions and periodontal diseases, exacerbated by prolonged chewing sessions, often lasting several hours.

Weight loss, reported by 32% of participants, was another major health concern associated with qat use. This is likely due to the appetite-suppressant effects of qat, which lead to reduced food intake and, over time, significant weight loss. This finding is in line with research conducted by Widmann et al., which demonstrated that qat use leads to decreased appetite and may contribute to malnutrition, particularly in younger populations [13].

Gastrointestinal problems, such as gastritis and peptic ulcers, affected 22% of respondents. These findings are supported by studies that have shown that the chemical compounds in qat can irritate the gastrointestinal mucosa, leading to digestive issues [3].

Gastrointestinal problems were most common among participants who chewed qat for extended periods, often exceeding four hours, suggesting that the duration of qat sessions plays a role in exacerbating these issues.

Mental health issues, particularly depression and anxiety, were reported by 23% of respondents, with daily chewers more likely to experience these symptoms. This aligns with research indicating that the stimulant effects of qat, while initially inducing feelings of euphoria, can lead to long-term mental health problems, including anxiety, depression, and insomnia. The study also found that 10% of respondents experienced insomnia, further highlighting the disruptive effects of qat on sleep patterns.

The relationship between qat chewing and high blood pressure was another critical finding, with 13% of participants reporting hypertension as a consequence of qat use. These findings support existing literature on the cardiovascular effects of qat, which show that qat's stimulant properties increase heart rate and blood pressure, contributing to cardiovascular strain [5].

### Demographic patterns of qat chewing

The study revealed significant demographic patterns in qat chewing behavior. Younger adults (aged 18-24) were the most frequent qat chewers, with 66% of participants in this age group reporting daily or regular qat use. This is consistent with previous research that highlights the increasing normalization of qat chewing among youth in Yemen and other qat-consuming regions [7]. The findings suggest that qat use may be seen as a social activity among younger populations, particularly students, who comprised the largest proportion of the study sample.

Men were more likely than women to chew qat, with 67% of male respondents reporting regular qat use compared to 33% of females. This gender disparity aligns with cultural norms in Yemen, where qat chewing is more socially accepted among men and is often conducted in gender-segregated environments [7]. The lower prevalence of qat use among women could also be attributed to social stigma, as women who chew qat may face criticism for engaging in what is perceived as a male-dominated activity.



Education played a significant role in qat chewing behavior and health outcomes. Participants with higher education (college/university) were more likely to report weight loss and gastrointestinal issues, while those with no formal education or primary education reported fewer health issues. This paradox may be explained by differences in awareness and reporting; individuals with higher education levels may be more likely to recognize and report health problems. However, it is also possible that those with higher education engage in longer qat sessions, leading to more pronounced health consequences.

## Attempts to quit and health outcomes

A notable finding of this study was the attempts to quit qat and the associated health outcomes. 42% of participants had successfully reduced or quit qat chewing, while 32% had tried and failed. Participants who successfully quit qat reported fewer health issues, particularly in relation to mental health and gastrointestinal problems. This suggests that cessation of qat use leads to improvements in overall health and well-being, as observed in other studies [14]. However, some former users continued to report dental problems, indicating that certain health effects, particularly oral health issues, may persist even after quitting qat.

## Socio-cultural dimensions of qat chewing

The cultural significance of qat chewing was evident in the study, with 61% of respondents indicating that qat was an important or very important part of social gatherings. This finding highlights the deep-rooted nature of qat in Yemeni culture, where it serves not only as a stimulant but also as a facilitator of social interaction. The 32% of respondents who strongly agreed that qat chewing was an important part of their cultural identity reflects the challenges that public health interventions face in addressing qat use. Cultural practices, particularly those linked to social norms and traditions, are difficult to change, and any health intervention must take these cultural dimensions into account.

However, despite the cultural significance of qat, there is growing awareness of its negative health impacts. 75% of respondents stated that they would not encourage others to chew qat, and 27% of participants viewed qat chewing as a growing addiction problem in their community. These findings suggest that while qat remains culturally embedded, there is increasing recognition of its harmful effects, particularly among younger generations. The study also revealed that 80% of respondents believe qat chewing is becoming more common, raising concerns about its potential long-term effects on public health.

## Impact of qat chewing on productivity and academic performance

The impact of qat chewing on productivity and academic performance was mixed. While 38% of respondents reported that qat had a positive impact on their work or academic performance, primarily due to increased concentration during qat sessions, 22% reported that qat chewing had a negative effect on their productivity. These negative effects were often linked to insomnia, fatigue, and lack of focus when not chewing qat. This suggests that while qat may provide short-term cognitive stimulation, its long-term effects may impair overall productivity, particularly when users develop dependence on the stimulant effects of the plant.

## Limitations

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design limits the ability to establish causal relationships between qat chewing and health outcomes. While associations were identified, the study cannot definitively conclude that qat use causes the health issues reported. Longitudinal studies would be necessary to determine the long-term effects of qat and track the progression of health problems over time. Additionally, the study relied on self-reported data, which can introduce bias. Participants may have underreported or overreported their qat use or health problems due to social desirability, recall bias, or personal perceptions. For example, some individuals might not accurately assess their mental or physical health, leading to potential inaccuracies in the findings.

There was also the potential for sampling bias due to the reliance on social media posts and university mini-lectures for participant recruitment. This approach may have skewed the sample toward younger, more educated, and urban populations, possibly underrepresenting older individuals, rural communities, or those without access to digital platforms. This could limit the generalizability of the results to the broader Yemeni population or other qat-chewing communities.

Cultural sensitivity may have influenced participants' responses, particularly on questions related to the negative aspects of qat chewing. Given the cultural significance of qat in Yemen, participants may have underreported behaviors like attempts to quit or perceptions of qat addiction due to social stigma or pressure. This could have led to a more favorable portrayal of qat use than what actually occurs in the population. Additionally, the reliance on participants' memory introduces the possibility of recall bias, particularly in remembering when they started chewing qat, how frequently they chewed, and any related health issues.

Another limitation is the reliance on self-reported health outcomes, which were not validated by medical assessments. While participants reported specific issues like dental problems, gastrointestinal disorders, and mental health conditions, these reports were based on personal perception and not clinical diagnosis, which could result in misclassification or inaccuracies. This study's findings, while valuable, may not be entirely representative or generalizable to other qat-chewing populations outside of Yemen due to the specific cultural, social, and economic context within the country. Finally, other confounding factors such as tobacco use, alcohol consumption, or pre-existing health conditions were not controlled for in this study, and these factors may have contributed to the health issues reported.

While this study provides important insights into the health and social impacts of qat chewing, these limitations highlight the need for further research, particularly longitudinal studies and objective health assessments, to better understand the long-term consequences of qat use.

## Strengths

This study possesses several strengths that enhance the validity and relevance of its findings. First, the use of a large and diverse sample size of 920 participants allowed for comprehensive analysis across multiple demographic groups, including age, gender, education level, and occupation. This diverse sampling increased the





representativeness of the study, providing a more accurate picture of qat chewing behavior and its associated health and social impacts across various subgroups in Yemeni society. By including both urban and rural participants, as well as a range of educational and occupational backgrounds, the study was able to capture a broad spectrum of qat-related behaviors and outcomes.

Another strength of the study is the multi-modal data collection approach, which combined in-depth interviews, mini-lectures at universities, and online social media posts. This strategy ensured that the study reached a wide range of participants, including younger populations and those in academic settings, while also gathering rich qualitative data through interviews. The in-depth interviews provided deeper insights into personal experiences with qat chewing, adding depth to the quantitative survey results. This mixed-methods approach enriched the data and provided a more nuanced understanding of the socio-cultural dimensions of qat use.

The study also benefited from a well-structured and pilot-tested questionnaire, which was carefully designed to capture both the frequency and intensity of qat chewing, as well as its physical and mental health impacts. The inclusion of Likert-scale and open-ended questions enabled participants to express their views on the social and cultural significance of qat, offering valuable context for interpreting the findings. The use of standardized questions across participants also facilitated a consistent and reliable data collection process, allowing for robust statistical analysis.

Another significant strength of this research is the focus on both health and social impacts of qat chewing. Previous studies often concentrated solely on the medical or public health aspects of qat use. In contrast, this study also examined the broader social implications, such as the role of qat in cultural identity, its perceived impact on productivity, and its integration into social gatherings. This dual focus provides a more holistic view of qat's effects, making the findings relevant for both health professionals and policymakers interested in public health and social dynamics.

Lastly, the study's ability to identify demographic patterns in qat chewing behaviors and associated health outcomes is another strength. By analyzing data across various demographic factors (e.g., age, gender, education level), the study provided specific insights into how different groups are affected by qat use. This level of granularity is valuable for designing targeted public health interventions aimed at reducing qat consumption and addressing its health risks among particular groups, such as younger adults and those with lower education levels.

## Conclusion

This study provides a comprehensive examination of the health and social consequences of qat chewing among Yemeni adults, offering valuable insights into the patterns of qat use and its impact across various demographic groups. The findings indicate that qat chewing remains a prevalent practice, particularly among younger adults and males, and is deeply integrated into Yemeni culture. However, the results also underscore the significant health risks associated with qat use, including dental problems, weight loss, gastrointestinal disorders, and mental health issues such as depression and anxiety. These health problems were particularly pronounced among daily qat chewers and those who engaged in prolonged qat chewing sessions.

The study also highlights the complex relationship between qat chewing and social dynamics. While qat is viewed as an important part of social gatherings and cultural identity by a substantial portion of the population, there is growing awareness of its negative health effects. A significant number of participants expressed concern over the addictive nature of qat and indicated that they would not encourage others to engage in the practice. Despite its cultural significance, qat chewing is increasingly being recognized as a public health issue, particularly among younger generations who are more aware of its potential harms.

The findings suggest that targeted public health interventions are urgently needed to address the health risks associated with qat use, particularly among younger populations and those from lower socio-economic backgrounds. These interventions must be culturally sensitive and take into account the deep-rooted social and cultural significance of qat in Yemeni society. Public health campaigns that promote the health benefits of reducing or quitting qat, coupled with educational initiatives in schools and universities, may help reduce the prevalence of qat chewing and mitigate its long-term health effects.

While qat chewing continues to play a significant cultural and social role in Yemeni society, its health impacts cannot be ignored. Policymakers and health professionals must work together to create strategies that respect cultural traditions while promoting healthier behaviors. Further research, particularly longitudinal studies, is necessary to better understand the long-term health effects of qat use and to develop effective public health interventions.

## Competing Interests

The authors report no conflicts of interest in this work.

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## Appendix: Survey Questions

Below are the questions used in the survey to assess qat chewing behaviors, health impacts, and social perceptions among participants.

### Section 1: Demographic information

1. **What is your age?**
  - Under 18
  - 18-24
  - 25-34
  - 35-44
  - 45-54
  - 55 and above
2. **What is your gender?**
  - Male
  - Female
3. **What is your highest level of education?**
  - No formal education
  - Primary education
  - Secondary education
  - Higher education (College/University)
4. **What is your occupation?**
  - Student
  - Employed (Government)
  - Employed (Private Sector)
  - Unemployed
5. **What is your income level?**
  - Low
  - Medium
  - High

### Section 2: Qat chewing behavior

6. How often do you chew qat?
  - Daily
  - Several times a week
  - Weekly
  - Occasionally
  - Never
7. **At what age did you start chewing qat?**
  - Under 18

- 18-24
- 25-34
- 35-44
- 45 and above

### 8. How much time do you typically spend chewing qat in one session?

- Less than 1 hour
- 1-2 hours
- 2-4 hours
- More than 4 hours

### 9. Where do you usually chew qat?

- At home
- At a friend's house
- At work
- Public places (e.g., parks, cafes)

### 10. Why do you chew qat? (Select all that apply)

- Tradition
- Socializing with friends and family
- Relaxation
- Increased alertness/concentration
- Peer pressure
- Coping with stress or anxiety
- Habitual/feeling addicted

### Section 3: Health issues

### 11. Have you experienced any health issues related to qat chewing? (Select all that apply)

- None
- Insomnia
- Weight loss
- Dental problems
- High blood pressure
- Depression or anxiety
- Gastrointestinal issues (e.g., gastritis, peptic ulcers)
- Heart palpitations
- Fatigue or chronic tiredness
- Reduced appetite
- Mouth sores or oral lesions
- Difficulty concentrating
- Headaches
- Dizziness or lightheadedness

### 12. Do you feel that qat chewing has affected your work or academic performance?

- Yes, positively
- Yes, negatively
- No impact

### 13. Have you ever tried to quit or reduce qat chewing?

- Yes, successfully
- Yes, but unsuccessfully
- No, never tried

### Section 4: Social and cultural perceptions

### 14. Do you believe qat chewing is an important part of your cultural identity?



- Strongly agree
  - Agree
  - Neutral
  - Disagree
  - Strongly disagree
- 15. How important is qat in social gatherings?**
- Very important
  - Important
  - Neutral
  - Not important
- 16. Do you believe qat chewing is socially acceptable in your community?**
- Strongly agree
  - Agree
  - Neutral
  - Disagree
  - Strongly disagree
- 17. Do you think qat chewing is becoming more or less common in your community?**
- More common
  - Less common
  - No change
- 18. Would you encourage others to chew qat?**
- Yes
  - No
- 19. Do you plan to continue chewing qat in the future?**
- Yes
  - No
  - Undecided
- 20. In your opinion, which of the following best describes qat chewing in your community?**
- A deeply rooted tradition
  - A growing addiction problem
  - A common social norm
  - A mix of tradition and social habit
  - A practice in decline