Understanding Nighttime Digital Behavior During Ramadan: A Case Study on Saudi Women

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ARTICLE INFO

ABSTRACT

This paper explores how women in Saudi Arabia engage online during the holy month of Ramadan, focusing on when their digital activity peaks and how it shifts throughout the day. Drawing on 300 timestamped survey responses, the research identifies a distinct nocturnal shift in online behavior, with 42% of responses submitted between midnight and 5:59 AM. Peak online engagement among Saudi women during Ramadan occurs between 10:00 PM and 3:00 AM, shaped by cultural routines like Taraweeh prayers and Suhoor preparations. Using descriptive analysis in Microsoft Excel by focusing on time segmentation, pivot tables and frequency charts, the study mapped when users are most active. An ANOVA test confirmed significant differences in engagement frequency across age groups $F_{(4, 115)} = 18.94$, $p < 0.0000000000055$. Participants were also grouped by age and preferred platform, revealing that women aged 18-24 were the most active, specifically in Instagram and Twitter/X during nighttime hours. These insights offer three key takeaways for marketers: (1) schedule Ramadan campaigns between 10:00 PM and 2:00 AM for better reach, (2) Tailor content by age group and platform. (3) adjust team hours to match consumers' online activity. This paper contributes to Islamic consumer behavior research by applying timestamp analytics to capture daily engagement rhythms and offers marketers a practical, culturally informed approach to digital strategy during Ramadan.

1. Introduction

Ramadan, a central tradition month rooted in Islamic faith, observed across the globe with participation spanning more than 1.8 billion Muslims (Pew Research Center, 2022). In Saudi Arabia, a country where Islamic values deeply shape its social and economical life, the month of Ramadan introduces distinct shifts in behavioural patterns, work routines and commercial activities. One of the most noticeable shifts during Ramadan is how consumer engagement, especially online, moves from daytime to late-night hours. This shift is particularly evident among women, who play a central role in household purchasing and digital interactions, making them a key target for time-sensitive marketing strategies during the holy month (Damayanti et al., 2024). Moreover, Saudi Arabia's socio-economic environment during

Ramadan experiences marked shifts, business hours shorten, family life intensifies, and shopping behaviours change in line with religious observances. Social norms and gender roles, influenced by Vision 2030, have increased women's presence in the digital marketplace. This makes it essential to examine how these women, as both consumers and content creator's, engage online during culturally significant timeframes.

During Ramadan, daily life takes on a different rhythm. With fasting from dawn to sunset, much of the activity shifts to nighttime, from shopping to socializing often peaking between iftar and suhoor, when people are most active and engaging. Previous research by Abdou et al. (2022) highlights notable behavioural shifts during the month, particularly how people engage socially and digitally, but there remains a lack of precise, hour-by-hour analysis of these changes. For businesses and marketers, these changes are not merely behavioural curiosities but strategical insights into when and how to engage with a key demographic: female consumers.

While the role of Saudi women in the digital space continues to grow, there is still little research that looks closely at *when* they're most active online during Ramadan. This paper takes a closer look at nighttime engagement patterns among women in the Kingdom by analysing timestamped survey data. The goal is to understand their peak activity times and explore how businesses can use these insights to better align their digital strategies during the holy month. While earlier studies have explored general lifestyle changes during Ramadan, including shifts in eating and sleep patterns (Alzhrani et al., 2022), this research takes a more targeted approach by examining the temporal dynamics of consumer engagement and how religious routines shape digital activity cycles.

Understanding these nighttime engagement patterns is important for several reasons. First, Saudi Arabia had made a clear national commitment to empowering women in the workforce, particularly by expanding their role in the digital economy, a focus that directly aligns with patterns observed in this study (Digital Government Authority, 2023). Second, the Kingdom's e-commerce market is growing rapidly, with revenues projected to reach 20$ billion by 2025 (Walid, 2025). Third, both local businesses and global brands need to align their Ramadan campaigns with real consumer behaviour, rather than assumptions based on traditional business hours. By analysing timestamped data from 300 responses, this paper contributes to the literature on Islamic consumer behaviour and provides actionable insights for marketers, strategies and digital platform designers. It offers evidence-based answers to when, how and why women in Saudi Arabia engage online during Ramadan and what businesses must do to meet them there.

2. Literature Review

Ramadan is a month that brings a unique shift in daily Muslims lives, especially in Muslim majority countries like Saudi Arabia. As people fast from dawn to sunset, the evenings become prime time for socializing, shopping and other various activities. This change transforms the usual daytime hustle into vibrant nighttime gatherings, with markets bustling and online shopping peaking after iftar. It's a yearly period where Muslims rhythm of life adjusts, reflecting a spiritual and communal essence of the month. These behavioural shifts during Ramadan are deeply rooted in religious practices. Fasting from dawn until sunset naturally alters daily routines, leading to increased activity in the evenings (Ipsos, 2023).

In Saudi Arabia, these behavioural shifts during Ramadan are further shaped by the country's strong religious traditions and its evolving social landscape. Women, in particular, are taking on increasingly active roles in the digital economy. This growing presence is closely tied to the Saudi national reform that support women's participation in economics and technological

development, as highlighted in recent research on Vision 2030's alignment with women's empowerment and inclusion in national progress (Alghamdi et al., 2022). These women are not just passive consumers; they actually represent an active group that shapes that digital economy. Many of them are in fact launching online businesses, participating in social commerce and influencing buying decisions through content shared on platforms like Instagram and TikTok. Their growing presence in sectors such as beauty, fashion and lifestyle reflect both cultural engagement and new digital opportunities in Saudi Arabia's evolving e-commerce landscape (Alotaibi & Aljaafari, 2024).

While it's widely acknowledged that digital activity increases during Ramadan, most existing studies focus on broad usage trends rather than the specific times of day when people are most active. Yet, behavioural data suggests that online engagement tends to spike after iftar and again just before suhoor, reflecting the distinct daily rhythm of the holy month. In Saudi Arabia, this pattern is particularly evident, with many users browsing, shopping, or engaging on social platforms during late-night hours. These insights highlight the importance of not just message content but also timing in Ramadan marketing. Recent research emphasizes that digital engagement is shaped by cultural rhythms, especially during religious seasons. TGM reported that 84% of Saudi users browse or shop online during Ramadan nights, primarily after iftar. Similarly, Zawya (2025) found TikTok, Snapchat and YouTube usage increases during these hours, with a 214% rise in social conversations. These patterns emphasize the value of precision timing in campaign planning, especially for female audiences whose online habits reflect both spiritual and social routines during Ramadan. By analysing hourly engagement through timestamped data, this study offers a more detailed view of consumer behaviour and supports more targeted digital strategies (Abdou et al., 2022).

Building on these observations about timing and platform behaviour, it is important to examine how such factors play out in the specific online habits of Saudi women during Ramadan. Digital marketing studies have shown that consumer behaviour is not only platform-specific but also highly time-sensitive. Platforms like TikTok, Instagram and Twitter/X engage with its users differently across the day and it's imperative to understand these rhythms can drastically enhance campaign effectiveness (Jin et al., 2019). For marketers, platforms and time synchronization is now as important as message design.

Finally, while advanced statistical tools like SPSS, R, or AMOS are common in academic research, many marketing professionals and applied researchers rely on more accessible platforms like Microsoft Excel to analyse data and draw meaningful insights, as it offers practical features for organizing, segmenting and visualizing data, specifically in studies where the focus is on identifying patterns and trends rather than running complex statistical models. Its built-in tools for time-series analysis and demographic breakdowns make it particularly useful for timestamp-based research like this one. As noted by Kumar (2023), Excel remains a vital tool for research due to its flexibility, ease of use and its capacity to support high-quality data interpretation in both academic and industry settings. In short, this research shines a light on a gap that's often overlooked, the connection between consumer habits, time and how Saudi women engage online during Ramadan. By looking at when they're most active and which platforms they use, the study adds to our understanding of consumer behaviour in Islamic context and offers practical guidance for businesses looking to connect more effectively during the holy month.

3. Method

This section describes how the data was prepared and analysed to better understand nighttime engagement during Ramadan. The survey was conducted online during the 30-day period of

the holy month of Ramadan 2025 using Google forms. Participants were recruited via platforms often used by Saudi women, including Twitter/X, Instagram, Reddit and Snapchat. Respondents were asked to report their age group and preferred social media platform. Each response was automatically timestamped upon submission. No personally identifiable information was collected, ensuring participants' anonymity and ethical compliance.

3.1 Data Processing in Excel

To explore the survey data, we used descriptive statistical technique in Microsoft Excel, due to its versatility and accessibility. Timestamps from the 300 responses were first converted into 24-hour format, the grouped into four-time bands: Morning (6:00-11:59), Afternoon (12:00-17:59), Evening (18:00-23:59) and Night (0:00-05:59). Using pivot tables, data was organized by the hour, age group and preferred social media platform to uncover when and where users were most active. Line and bar charts then were created to visualize engagement trends and highlight key differences across demographic groups. This approach allowed for a clear, time-based view of digital behaviour during Ramadan, revealing patterns that might be missed with broader daily summaries.

3.2 Statistical Testing (ANOVA)

In addition to descriptive analysis, a one-way ANOVA (Analysis of Variance) was conducted to determine whether engagement times significantly differed across the four age groups (18-24, 25-34, 35-44, 45+). This analysis was performed in Microsoft Excel's Data Analysis Toolpak, which supports basic inferential statistics and is widely used in applied marketing research. This test allowed for a straightforward comparison of mean engagement hours across demographic segments (n=300). The results are presented in the Results section.

4. Results

4.1 Temporal Engagement Patterns

Analysis of the timestamped survey data reveals a clear shift toward nighttime digital activity during Ramadan. Out of 300 valid responses, over a third (35%) were submitted between midnight and 6:00 AM, while only a small fraction (3.6%) came in during the morning hours. Notably, engagement tends to spike late at night with sharp rises around 2:00 AM, 3:00 AM and again in the final hour before midnight.
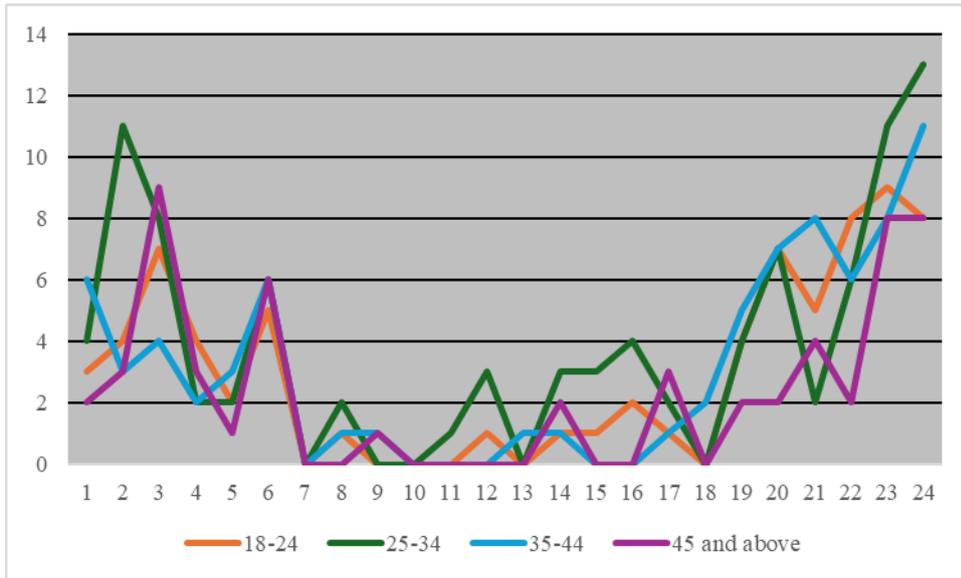
Figure 1: Hourly Engagement by Age Group During Ramadan

Source: Author's dataset, 2025 Ramadan survey

As shown in Figure 1, This pattern reflects the rhythm of Ramadan nights in Saudi Arabia, where digital engagement is highest after iftar and leading up to suhoor. All age groups follow this trend, though 25-34 segment shows the most sustained engagement throughout the evening. These findings support prior research indicating heightened evening media use during Ramadan (Abdou et al., 2022), offering a more precise, hour-by-hour insights into when digital engagement peaks.

4.2 Demographic Profiles and Platform Preferences

Understanding who participated in the survey and which platform they prefer provides useful context in order to interpret their engagement behaviour. This section breaks down the respondents by age and their platform of choice.

4.2.1 Age Group Distribution

Respondents were divided into four age groups: 18-24, 25-34, 35-44 and 45 and over. The largest group was 25–34-year-olds (accumulating a number of 94 respondents), followed by 35-44 (76 respondents), 18-24 (73 respondents) and finally 45 and over (57 respondents). Younger female participants, particularly those between 18 to 34 (Group 1 and 2) were more active during late-night hours, while older respondents tended to engage earlier in the evening, (See Table1).

Table 1: Respondents Age Group Distribution

Age Group	Number of Respondents
18-24	73
25-34	94
35-44	76
45 and over	57
Total number of respondents	300

Source: Author's dataset, 2025 Ramadan survey

These findings provide useful context for interpreting platform usage and engagement trends across age groups.

4.2.2 Platform Preferences

Participants were asked which social media platform they use most during Ramadan. The results reveal distinct preferences across age groups, providing insights into where digital attention is most concentrated during Ramadan evenings. Twitter/X emerged as the most popular overall, with particularly strong engagement among 25-34 (54 users) and 18-24 (49 users) age groups. Instagram followed closely, leading among 18-24 (45 users) and 25-34 (44 users), but its usage declined significantly among older respondents. YouTube was more evenly used across all age groups, while Snapchat showed greater popularity among participants aged 35-44 (33 users). TikTok stood out for its sharp age divide, with engagement ranking highest among 25-34-year-olds (26 users), but also surprisingly steady among the 45 and over group (24 users), reflecting its growing cross-generational appeal (See Figure 2).
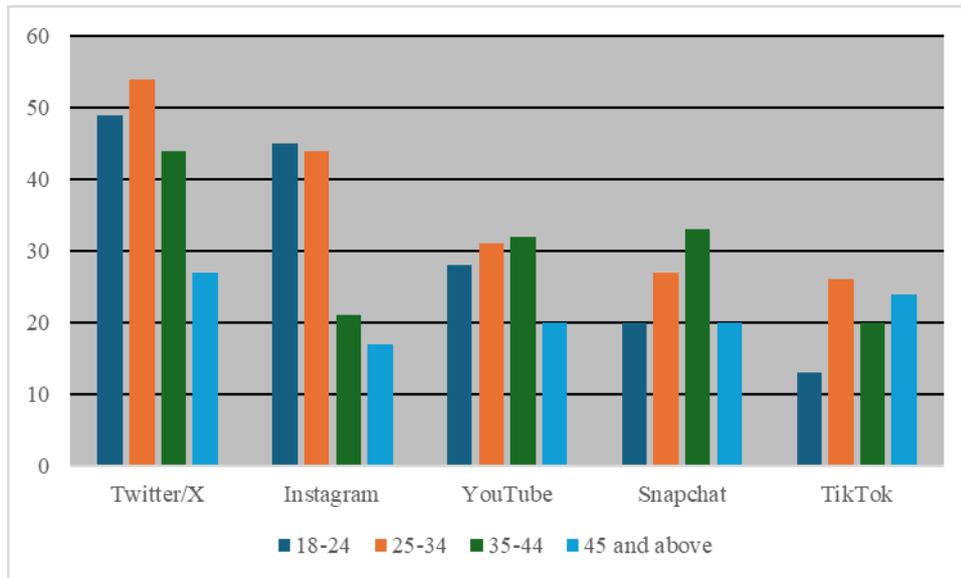

Figure 2: Platform Preferences by Age Group

Source: Author's calculations from multi-response survey data

These results highlight how platform strategies must be both age-sensitive and time-aware. Marketers targeting women in Saudi Arabia during Ramadan should recognize that while Instagram and Twitter/X have broad appeal, platforms like TikTok and Snapchat offer unique opportunities for more segmented outreach.

4.3 Statistical Significance of Engagement Time Differences by Age

While descriptive analysis indicates that younger respondents, particularly 18-24 age group tend to be more digitally active during the night, a one-way ANOVA test was conducted to determine whether these observed differences in engagement frequency across age groups were statistically significant.

Using hourly engagement data for each of the four age groups (18-24, 25-34, 35-44 and 45 and over), the ANOVA test revealed a highly significant result:

$F_{(4, 115)} = 18.94$, $p < 0.0000000000055$

This means that the differences in engagement levels among the age groups are not due to chance. The 18-24 age group recorded the highest average hourly engagement, scoring (M =

11.5), while the 45 and over group had the lowest score (M = 2.33), highlighting a notable generational gap in nighttime digital activity during Ramadan, (See Table 2).

Table 2: ANOVA Summary of Hourly Digital Engagement by Age Group

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1380.33	4	345.08	18.99	5.50E-12	2.45
Within Groups	2095.56	115	18.22			
Total	3475.79	119				

Source: Author's calculations using Microsoft Excel (Data Analysis ToolPak)

These findings affirm that although all age groups tend to engage during the same late-night window (10:00 PM to 3:00 AM), the intensity of activity varies significantly. Therefore, age-specific targeting should not only focus on content but also reflect the volume and frequency of digital engagement to optimize campaign effectiveness during Ramadan.

5. Discussion

The following section reflects on key findings, linking them to earlier studies and outlining what they mean for marketers looking to make the most of Ramadan campaigns in Saudi Arabia.

Our analysis clearly shows that Saudi women shift their digital engagement into the late-night hours during Ramadan, most actively between 10:00 PM to 3:00 AM. This pattern is consistent with the cultural rhythm of the holy month, shaped by nightly Taraweeh prayers, late social gatherings and Suhoor gatherings. These findings echo prior research that highlights how daily routines shift during Ramadan, especially among women balancing spiritual, family and social responsibilities (Alshammari, 2025; Ipsos, 2022).

Interestingly, while younger women (ages 18-34) were more active overall, the ANOVA test revealed significant differences in engagement volume across age groups, with younger respondents, especially those aged 18 – 24 recorded the highest frequency of nighttime digital activity. While all groups were active during the same window (10 PM to 3 AM), the intensity of engagement differed. In other words, regardless of age, most women are online at similar late-night hours. This suggests that marketers should prioritize timing strategies that align with this shared behaviour, while still customizing content to fit the preferences and lifestyles of different age segments.

Beyond when users are most active, it is equally critical to understand where they direct their attention. Platform preferences added another layer to this picture. Instagram continues to dominate across all age groups, making it a key channel for wide-reaching campaigns. However, TikTok and Twitter/X stood out as especially popular among younger users, who were also more active on these platforms during peak late-night hours. This supports earlier findings about platform habits of younger consumers (Jin et al., 2019), emphasizing the importance of matching content not only to audience age but also platform context.

Together, these insights call for a more precise and culturally aware approach to Ramadan marketing. Rather than relying on generic daytime posts or one-size-fits-all messaging, brands can benefit from scheduling content, influencer activity, and live interactions during the actual peak hours of engagement. Doing so enhances cultural relevance and can lead to better returns on investment. Teams that align their workflows, such as customer service or community management with late-night activity may also improve responsiveness and consumer satisfaction.

For instance, Brands targeting Gen Z women may benefit from running TikTok or Instagram Reels campaigns around 2:00 Am, aligning with peak browsing hours. Meanwhile, businesses seeking a broader reach can schedule cross-platform posts (e.g., on Twitter/X and YouTube) between 10:30 PM and 12:30 AM to capture all active segments. Partnering with Saudi female influencers active during these hours can also amplify campaign effectiveness, especially when promoting time-sensitive products like flash sales or limited-edition Ramadan items.

6. Conclusion

This study explored the nighttime digital behaviour of Saudi women during Ramadan using timestamp analytics from 300 online survey responses. Findings reveal a distinct shift toward late-night activity, particularly between 10:00 PM and 3:00 AM. This behaviour aligns with religious, cultural and lifestyle patterns in the Kingdom and carries significant implications for how businesses design their campaigns.

By using Excel-based descriptive analytics alongside a simple inferential test (ANOVA), the study demonstrated a particular method for uncovering actionable trends. It contributes to marketing scholarship by linking time-specific behaviour with demographic and platform-based segmentation and offers both practical strategies for marketers and a methodological model for future Islamic consumer behaviour research.

The ANOVA analysis further confirmed that mean engagement hours significantly differ across age groups, validating the need for age-specific strategies during Ramadan.

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