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REVIEW

Navigating tradition and innovation: a mixed-methods study of Palestinian women's engagement with AI in domestic spaces

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Abstract
As artificial intelligence (AI) technologies increasingly permeate daily life, understanding adoption in marginalized contexts is vital to ensuring equitable and responsible use. This mixed-methods study examines Palestinian women's engagement with AI, focusing on how demographic factors, cultural norms, and personal perceptions shape adoption. A survey of 162 participants revealed that while more than 70% viewed AI as useful for household and educational tasks, only 38% expressed strong behavioral intention to adopt it, exposing a notable gap between perceived usefulness and willingness to use. One-way ANOVA analyses showed statistically significant differences across educational levels ($p < .01$), employment status ($p < .05$), and prior technology experience ($p < .01$), whereas marital status and number of children had no significant effect. Complementing these results, semi-structured interviews with 12 women highlighted both empowering and cautionary dimensions: participants reported AI's role in streamlining domestic responsibilities and supporting children's learning, but also voiced concerns about privacy, fairness in design, and technological overdependence. These findings underscore the importance of responsible AI practices through targeted digital literacy programs, culturally sensitive design, and awareness initiatives. By situating AI adoption within a marginalized and gendered context, the study advances debates on fairness, trust, and human-centered design in responsible AI.

Keywords AI adoption · Palestinian women · Housewives · Technology acceptance · Cultural perceptions

1 Introduction

The rapid advancement of artificial intelligence (AI) technologies has driven profound transformations across nearly all aspects of contemporary life—reshaping education, healthcare, communication, and, increasingly, the domestic sphere. From voice-activated assistants such as Amazon's Alexa and Google Assistant to AI-powered appliances, personalized recommendation systems, and automated home security, intelligent technologies are now firmly embedded in households worldwide (Porcheron et al. 2018). These innovations promise to streamline daily routines, reduce labor burdens, and enhance quality of life by automating tasks once considered time-consuming and physically demanding (Rožman et al. 2023; Lau et al. 2018). As smart homes become more widespread, AI is no longer a futuristic concept but a tangible presence in kitchens, living rooms, and bedrooms—redefining how individuals manage personal and familial responsibilities (Wilson et al. 2017).

An expanding body of scholarship has examined the diverse implications of AI adoption, including public perceptions (Çetin 2024; Karunanayake 2025; Rashid and Kausik 2024), gender-based responses to technology (Al Balushi et al. 2025), and applications in healthcare (Viberg Johansson et al. 2024), and parenting (Jabali and Ayyoub 2024; Tan et al. 2025). Yet notable gaps remain—particularly in understanding how women in specific cultural, religious, and geopolitical contexts engage with AI in their private, domestic lives. This is especially relevant in Arab and

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Muslim communities across the Middle East, where social norms, economic conditions, and political realities mediate both access to and experiences with emerging technologies. Among these groups, Palestinian women constitute a critical yet understudied demographic, whose navigation of AI at home offers valuable insights into the intersection of technology, gender, and resilience.

In Palestine, women frequently occupy the central role in household management, carrying the primary responsibility for caregiving, child-rearing, and sustaining domestic stability. According to the International Labour Office (2023), unpaid domestic labor—predominantly undertaken by women—remains essential to family survival, particularly under conditions of economic hardship, political instability, and weak institutional support. These duties are embedded in traditional gender roles and societal expectations (Sabbah-Karkabi 2020), which not only define women's positions within the home but also constrain their access to education, employment, and personal autonomy. The physical, emotional, and temporal toll of such responsibilities is further compounded by structural challenges, including inadequate infrastructure, restricted mobility, and intermittent access to essential services (Hassoun et al. 2025). In this context, the introduction of AI-driven tools into domestic spaces is not merely a matter of convenience—it may represent a transformative avenue for reducing burdens and expanding women's agency.

Indeed, AI holds considerable potential to support Palestinian women in navigating complex domestic responsibilities. As Jabali and Ayyoub (2024) observe, technologies such as virtual assistants, educational applications, automation tools, and smart home systems can help women organize time more efficiently, monitor children's development, and ease the weight of routine chores. By lessening cognitive and physical demands, these tools may free time and energy for education, income-generating activities, or personal well-being—key factors for enhancing independence and resilience. Similarly, Itair et al. (2023) highlight that, when thoughtfully integrated, AI can serve as a supportive force in the home, offering practical solutions to everyday challenges faced under difficult sociopolitical conditions.

Nevertheless, this potential is accompanied by significant complexities and risks. Integrating AI into intimate domestic spaces raises pressing ethical and practical concerns. Borenstein and Howard (2021) caution that AI may exacerbate stress and inequality, particularly when systems reproduce algorithmic bias, compromise data privacy, or fail to reflect users' cultural and linguistic contexts. For Palestinian women, barriers such as limited digital literacy, unreliable internet access, and unequal ownership of smart devices (Novianti et al. 2021, 2023) risk leaving the promise of AI unfulfilled. Moreover, the design of many AI systems—developed primarily in Western contexts and often personified with subservient female voices—can reinforce gender stereotypes and feel culturally alienating, raising broader questions about representation, autonomy, and trust.

Thus, while AI has the potential to empower women in domestic life, its impact is highly context-dependent, shaped by issues of access, inclusivity, and cultural fit. For Palestinian women negotiating overlapping layers of social, economic, and political constraint, the adoption of smart technologies is neither neutral nor straightforward. Women whose primary responsibilities center on household management and family care—often described in this study as housewives—alongside those combining domestic labor with paid work, engage with AI through ongoing processes of negotiation, adaptation, and resistance. It requires ongoing processes of negotiation, adaptation, and resistance—mediated by personal needs, family dynamics, and structural realities. These experiences highlight the urgent need for AI systems that are not only technologically advanced but also culturally sensitive, ethically grounded, and equitable in accessibility (Borenstein and Howard 2021; Novianti et al. 2023).

This study foregrounds the lived realities of Palestinian women to underscore a broader imperative: the future of domestic AI must be shaped by the voices of those who use it most. By examining how women in Palestine perceive, adopt, and adapt AI within their homes, the study contributes to a more nuanced understanding of technology's role in everyday life—one that recognizes both its emancipatory potential and its capacity to reproduce existing inequalities. As smart homes continue to proliferate globally, ensuring that AI serves all users—particularly those historically marginalized in technological discourse—is not merely a question of innovation but one of justice.

1.1 Literature review

Artificial Intelligence (AI) has become an integral component of contemporary life, particularly within domestic settings. It has transformed how individuals manage routine tasks such as cooking, cleaning, vacuuming, meal planning, home security, and shopping (Ezugwu et al. 2025). The promise of greater efficiency, time savings, enhanced performance, and convenience drives the adoption of technologically advanced, AI-powered products, which continue to evolve and expand (Hassan et al. 2022).

Existing research on AI in the home highlights both benefits and challenges. This study focuses specifically on Palestinian women's experiences with AI, examining the perceived advantages and difficulties of its use and its impact on daily routines and productivity. To contextualize this focus, the following review synthesizes global scholarship on AI,

with attention to gender dynamics, parenting, healthcare, and public perceptions.

1.2 Gender and AI: empowerment and perception

A growing body of scholarship investigates the intersection of gender and AI, particularly regarding empowerment, autonomy, and perception. Ramanath (2024) conducted a qualitative study on the potential of AI to advance feminist objectives, arguing that AI applications can enhance women's autonomy by reducing reliance on traditional domestic labor and broadening opportunities for decision-making in both private and public spheres. The study suggested that household automation could help reconfigure gendered divisions of labor, thereby supporting women's agency. However, methodological limitations—such as a small sample size and potential sampling bias—restricted the generalizability of the findings.

Rahman et al. (2025) extended this inquiry through comparative research across the Gulf Cooperation Council (GCC) countries and the United Kingdom, focusing on gender and age as demographic variables. Their results revealed significant disparities: older individuals in the UK expressed heightened concerns about AI, particularly regarding surveillance and job displacement, while women across both regions were more sensitive to issues of data privacy and ethical implications. Interestingly, in the Gulf States, cultural trust in state-led digital modernization appeared to mitigate such concerns, underscoring the importance of cultural context in shaping AI perceptions.

Similarly, Badran and Seker (2025) analyzed gender and cultural orientation in the United Arab Emirates. Contrary to assumptions that men exhibit higher technological affinity, their study showed that women reported more favorable attitudes toward AI. Furthermore, individuals less bound by traditional cultural norms demonstrated higher acceptance of AI, highlighting the role of sociocultural orientation alongside gender in determining trust and receptivity toward technology.

1.3 AI in parenting and domestic life

The integration of AI into domestic and caregiving practices has redefined parenting in technologically advanced contexts. Jabali and Ayyoub (2024) conducted a quantitative study on Palestinian families' attitudes toward AI-assisted parenting tools, finding generally positive responses. Participants reported that AI technologies supported children's educational and social development. Importantly, the study found no significant variation in acceptance based on gender, family size, or educational attainment, indicating broad applicability across household types.

In South Korea, Yoo and Kim (2024) surveyed 400 participants to assess preferences for domestic service robots, identifying childcare and eldercare as key areas of demand, particularly among dual-income households. These findings illustrate AI's role in alleviating labor-intensive domestic responsibilities. Complementing this, Atout et al. (2021) examined traditional parenting practices in Palestine, offering essential cultural context for understanding how AI may disrupt or reinforce existing familial roles within conservative socio-religious environments.

1.4 AI in healthcare: opportunities and ethical considerations

Healthcare is one of the most promising yet contested domains for AI adoption. Viberg Johansson et al. (2024) studied Swedish women's perspectives on AI in breast cancer screening through semi-structured interviews. Participants expressed cautious optimism, recognizing the potential of AI to improve diagnostic accuracy but insisting on the irreplaceable role of clinicians. AI was generally viewed as a supplementary tool rather than a substitute for medical expertise, reflecting concerns about accountability and depersonalization in care.

In Germany, Gnambs et al. (2025) conducted a large-scale study assessing public attitudes toward AI in healthcare, education, and employment. Respondents expressed high levels of acceptance in healthcare, where AI was strongly associated with efficiency and reliability. Nevertheless, apprehensions about transparency, data governance, and job displacement persisted, revealing the complexities of public trust in medical AI.

1.5 Public perceptions of AI: a global duality

Public opinion on AI is characterized by ambivalence, reflecting both optimism about technological progress and anxiety about risks. Jabali et al. (2025) and Hick and Ziefle (2022) found perceptions ranging from enthusiasm for AI's potential to improve quality of life to concerns over surveillance, loss of control, and diminished human agency. This duality reflects AI's symbolic role as both an innovation and a societal challenge.

In Turkey, Bozkurt and Gursoy (2023) captured similar contradictions through a nationwide survey: 63% of respondents believed AI would enhance productivity and simplify daily life, while 62.2% simultaneously perceived it as a threat, particularly if AI surpassed human intelligence. These attitudes were influenced by exposure to technology, religious beliefs, and educational background, underscoring the multidimensional factors shaping AI acceptance.

1.6 Study objective

This study investigates the experiences and perspectives of Palestinian women in their use of AI technologies within domestic environments. Specifically, it examines how AI influences the management of routine responsibilities—including scheduling, household chores, child supervision, and the operation of smart devices—while also exploring women's perceptions, emotional responses, and decision-making processes regarding AI adoption. For some, AI may represent a tool for enhancing efficiency, autonomy over time, and personal agency; for others, it may evoke resistance due to concerns about privacy, dependency, or lack of cultural congruence, reflecting the degree of alignment between a technology and the prevailing cultural values, norms, and socio-contextual expectations within a given community (Teixeira et al. 2024). By centering the voices of Palestinian women, this research provides a culturally grounded perspective that enriches the global discourse on gender, technology, and domestic labor. In doing so, it offers critical insights into both the benefits and the barriers associated with AI adoption in resource-constrained and sociopolitically complex environments.

1.7 Theoretical implications

This study contributes to theory by illustrating that AI adoption among Palestinian women cannot be fully captured by conventional models such as the Technology Acceptance Model (TAM) without incorporating broader sociocultural, gendered, and infrastructural dimensions (Aagaard and Madsen 2022). While constructs such as Perceived Usefulness, Ease of Use, and Behavioral Intention remain influential, the findings reveal that adoption is also mediated by family expectations, household power dynamics, and prevailing cultural norms. Structural factors—including infrastructural limitations, digital literacy gaps, and economic constraints—further shape women's engagement with AI, demonstrating that technology adoption is not solely an individual or cognitive process but a socially and politically embedded practice.

Importantly, this study highlights a divergence from findings in technologically advanced contexts such as Germany and Sweden, where adoption is often driven by efficiency and innovation. In the Palestinian context, necessity-driven use, caregiving responsibilities, and pragmatic optimism emerge as equally critical motivators. By situating adoption within relational, gendered, and resource-constrained realities, this research extends TAM and related frameworks, underscoring the need for theoretical models that account for intersectional influences, practical constraints, and culturally specific motivations. Only by embedding these contextual dimensions can technology adoption theories adequately explain engagement in under-resourced and conflict-affected settings.

2 Methodology

2.1 Study design

This study adopts a mixed-methods convergent parallel design, integrating quantitative and qualitative approaches to examine how Palestinian women engage with AI technologies in domestic contexts. The design combines a descriptive-analytical survey with exploratory qualitative interviews, enabling the capture of both broad adoption patterns and nuanced experiences and perspectives.

The quantitative component utilized a structured, culturally adapted Arabic-language questionnaire grounded in the Technology Acceptance Model (TAM) and the General Attitudes toward Artificial Intelligence Scale (GAAIS). Data were collected from 162 Palestinian women across diverse regions and analyzed using SPSS. Descriptive and inferential statistics were employed to examine adoption rates, Perceived Usefulness, Ease of Use, and the influence of demographic factors. The mixed-methods approach enhanced the validity and depth of the findings by allowing triangulation between numerical patterns and narrative insights. The quantitative component also provides broad contextualization of AI adoption patterns among Palestinian women.

2.2 Study population and sample

The study population comprised Palestinian women residing in diverse geographic and social contexts, including urban centers, rural villages, refugee camps, and Arab communities within Israel (often referred to locally as "'48," denoting Palestinian communities residing within the 1948 borders of Israel). In this study, the term "housewife" refers to a woman who primarily manages household responsibilities and family care—including cooking, cleaning, childcare, and financial management—without engaging in paid employment outside the home. In the Palestinian context, this role is influenced by educational attainment, socioeconomic status, and empowerment debates, as some women choose to combine paid work with household management.

Access to participants was facilitated through women's community networks, social media platforms, and university communication channels, which enabled outreach across diverse geographic and social contexts. Participation was voluntary, and informed consent was obtained from all participants prior to data collection, with anonymity and confidentiality assured. Participants represented varying levels of technological experience and were selected as the primary

target group for investigating AI adoption in the domestic sphere.

For the quantitative phase, a non-probability convenience sampling approach was employed due to the sociopolitical and logistical challenges of reaching participants across Palestine. Ongoing mobility restrictions, fragmented infrastructure, and safety-related concerns—particularly in certain geographic areas—made the implementation of probabilistic or fully random sampling impractical. The survey, administered in Arabic, was distributed electronically through social media platforms, women's community networks, and university communication channels. A total of 165 questionnaires were distributed, and 162 were completed and validated for statistical analysis, yielding a response rate of 98.1%. Although the sample cannot be considered statistically representative of all Palestinian women, its geographic and social diversity provides meaningful insights into women's everyday engagement with artificial intelligence under differing access conditions.

For the qualitative phase, purposive sampling was used to recruit participants capable of offering rich, in-depth perspectives on the research topic. The qualitative sample included 12 participants to allow in-depth exploration of diverse experiences with domestic AI use. Purposive sampling ensured representation across key subgroups, and thematic saturation was achieved, supporting the adequacy of this smaller, focused sample within the mixed-methods design. The final sample included 12 Palestinian women from various regions of the West Bank. All participants were Palestinian nationals, were regular users of smart home technologies (such as voice assistants, smart appliances, or AI-powered parenting applications), and consented to participate in recorded semi-structured interviews. Interviews were conducted via multiple platforms, including online video calls, phone calls, and in-person meetings, to accommodate participants' preferences and accessibility. All interviews followed a consistent semi-structured protocol to ensure methodological rigor. The use of different platforms did not affect the validity or reliability of the qualitative findings.

These contextual constraints are widely recognized in research conducted in conflict-affected settings and necessitate adaptive, ethically sensitive sampling strategies.

Table 1 presents the sociodemographic profile of the study participants ($N = 162$). More than half of the respondents were married (56.8%), while 2.5% were single and 40.7% were divorced or separated. For analytical purposes, divorced and separated participants were grouped into a single category, as both statuses reflect post-marital living arrangements and comparable social and familial dynamics within the Palestinian context. A considerable proportion (38.9%) had no children, and one-third (32.7%) had four or more children. It is important to note that domestic AI use in this study extends beyond child-related applications to include other household management tasks, such as scheduling, cooking, cleaning, and financial management, meaning that even participants without children may engage with AI technologies. In terms of residence, half of the participants lived in villages (50.6%), followed by those in cities (40.1%). The majority (59.9%) resided in independent houses, and most held a bachelor's degree (63.6%).

The employment distribution shows that only 20.4% of participants identified as housewives, while 42.0% were students and 37.7% were employed either full- or part-time. This indicates that the majority of respondents are active outside the household, either through work or study, rather than being full-time homemakers. Consequently, while the study initially targeted Palestinian housewives, the final sample represents a broader segment of Palestinian women, reflecting diverse socioeconomic and occupational backgrounds. In this study, the term *'housewife'* refers to a woman who primarily manages household responsibilities and family care, including cooking, cleaning, childcare, and financial management, without engaging in paid employment outside the home. In the Palestinian context, this role is influenced by educational attainment, socioeconomic status, and empowerment debates, as some women choose to work alongside managing a household. Finally, most participants reported intermediate levels of technology experience (66.0%), with only 10.5% identifying as beginners.

2.3 Research tools

This study utilized a structured, self-administered Arabic-language questionnaire developed on the basis of two established theoretical frameworks: the Technology Acceptance Model (TAM) (Davis 1989) and the General Attitudes toward Artificial Intelligence Scale (GAAIS) (Schepman and Rodway 2020). The methodological validity and transparency of the study were ensured through rigorous adaptation and documentation procedures. To ensure cultural appropriateness and methodological rigor, the instrument underwent a process of translation into Arabic, expert review by specialists in linguistics, translation, and educational technology, and pilot testing with a small group of Palestinian women. These procedures enhanced clarity, contextual relevance, and psychometric reliability within the Palestinian setting, and ensured the instrument's reproducibility across similar Arabic-speaking populations.

The questionnaire consisted of two principal sections:

Table 1 Demographic distribution of the study sample ($N = 162$)

Variable	Category	Frequency (*f*)	Percentage (%)
Marital status	Married	92	56.8
	Divorced or separated	66	40.7
	Single	4	2.5
Number of children	None	63	38.9
	One child	16	9.9
	Two children	9	5.6
	Three children	21	13.0
	Four or more children	53	32.7
Place of residence	Village	82	50.6
	City	65	40.1
	Refugee camp	7	4.3
	Arab communities in Israel ("48")	8	4.9
Type of housing	Independent house	97	59.9
	Apartment	52	32.1
	Villa	13	8.0
Educational level	Secondary school or below	21	13.0
	Bachelor's degree	103	63.6
	Diploma	7	4.3
	Master's or PhD	31	19.1
Employment status	Housewife	33	20.4
	Full-time employee	50	30.9
	Part-time employee	11	6.8
	Student	68	42.0
Technology experience	Beginner	17	10.5
	Intermediate	107	66.0
	Advanced/professional	38	23.5

2.4 Technology acceptance model (TAM)

This section comprised 14 items organized into 3 constructs, each rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree):

- Perceived Usefulness (5 items), assessing the extent to which AI technologies are viewed as enhancing the efficiency of household tasks.
- Perceived Ease of Use (5 items), evaluating participants' perceptions of the effort required to learn and operate AI tools.
- Behavioral Intention to Use (4 items), measuring willingness to adopt, recommend, and continue incorporating AI technologies into domestic routines.

2.5 General attitudes toward artificial intelligence scale (GAAIS)

This section included 20 items that captured cognitive and affective orientations toward AI, including trust, curiosity, ethical concerns, anxiety, and willingness to engage with AI technologies. Responses were recorded on the same five-point Likert scale.

The instrument demonstrated strong internal consistency, with Cronbach's alpha values of 0.89 for TAM and 0.91 for GAAIS, confirming its reliability. All materials—including the Arabic questionnaire and English translation—are available upon request or as supplementary data to ensure methodological transparency and enable replication. A total of 165 questionnaires were distributed electronically and 162 were validated for analysis, clarifying an earlier inconsistency in reporting. As such, this culturally adapted and psychometrically validated tool provided a robust, transparent, and replicable means of assessing Palestinian women's perceptions, acceptance, and attitudes toward AI use in domestic environments.

Complementing the survey, qualitative data were collected through in-depth, semi-structured interviews with 12 women (Table 2). Interviews were conducted either face-to-face or remotely via social networking platforms such as Messenger and WhatsApp video calls, depending on participants' preferences and logistical feasibility. The interview guide was developed in Arabic and translated into English to maintain linguistic and cultural fidelity, and

Table 2 Demographic characteristics of the 12 qualitative study participants

Participant	Ag range	Marital status	Education level	Employment status	Place of residence
P1	25–34	Married	Bachelor's degree	Full-time employee	Village
P2	35–44	Divorced	Master's degree	Housewife	City
P3	19–24	Single	Bachelor's degree	Student	City
P4	45–54	Married	Diploma	Part-time employee	Refugee camp
P5	25–34	Married	Bachelor's degree	Full-time employee	Village
P6	35–44	Divorced	Secondary school	Housewife	City
P7	19–24	Single	Bachelor's degree	Student	Village
P8	25–34	Married	Master's degree	Full-time employee	City
P9	45–54	Married	Secondary school	Housewife	Refugee camp
P10	35–44	Divorced	Bachelor's degree	Part-time employee	City
P11	19–24	Single	Bachelor's degree	Student	Village
P12	25–34	Married	Bachelor's degree	Full-time employee	City

both versions are available for verification and replication. The guide was carefully designed to align with the study's research objectives, focusing on open-ended questions that elicited women's experiences and perspectives with AI, perceived benefits, and challenges in domestic contexts. Each interview lasted approximately 25–40 min, providing sufficient scope for depth while maintaining participant engagement and comfort.

To foster openness, interviews were conducted in Arabic by a female researcher familiar to participants, adopting an empathetic and conversational approach that encouraged candid reflection. All interviews were audio-recorded with informed consent, transcribed verbatim, and subsequently translated into English by professional translators, ensuring preservation of linguistic nuance and meaning.

2.6 Data analysis

Quantitative data were analyzed using SPSS (version 26). Descriptive statistics summarized participant responses and assessed levels of AI adoption. Reliability of the survey instruments was evaluated using Cronbach's alpha. One-way ANOVA tested for statistically significant differences across demographic groups with three or more categories, while Pearson correlation analysis examined relationships between the Technology Acceptance Model (TAM) dimensions and the General Attitudes toward Artificial Intelligence Scale (GAAIS). Additionally, regression analysis was conducted to identify significant predictors of AI adoption within domestic contexts. All statistical tests were conducted at a 95% confidence level ($p < 0.05$), and assumptions of normality and homogeneity of variance were checked prior to analysis. Where applicable, measures of variability are presented as means ± standard deviations (SD), and no graphical figures with error bars were included.

2.7 Qualitative analysis

Qualitative data were analyzed using thematic analysis, following Braun and Clarke's six-phase framework (2006). The process began with familiarization, involving multiple readings of interview transcripts and repeated listening to audio recordings to gain an in-depth understanding of participants' narratives. Initial codes were then generated to identify recurring patterns and concepts. Related codes were subsequently grouped to form broader themes, which were reviewed and refined to ensure coherence and alignment with the research objectives. Each theme was defined and named, and the findings were systematically organized into a report that addressed the study's research questions. This approach enabled the researchers to capture Palestinian women's lived experiences, perceptions, and challenges regarding AI use within their homes.

2.8 Study limitations.

This study is subject to several limitations. The qualitative sample was relatively small ($n = 12$) and purposively selected from specific social categories, which may limit the generalizability of the findings. Self-reported data may also reflect social desirability bias, given the sensitivity of discussing household dynamics and gender relations in the Palestinian context. Additionally, the cross-sectional design does not capture changes in perceptions or practices over time, which could be significant as AI technologies and local socioeconomic conditions evolve.

3 Results

This section presents an integrated analysis of Palestinian women's engagement with artificial intelligence (AI) in domestic contexts. Quantitative survey findings and

qualitative interview data are synthesized thematically to provide a comprehensive understanding of adoption patterns, attitudes, predictors, and lived experiences.

3.1 Adoption and use of AI in domestic settings

Palestinian women demonstrated a moderate overall level of AI adoption in domestic settings ($M = 3.65$, SD = 0.616). The highest agreement was observed for items reflecting practical utility, such as *"Using AI at home will make tasks easier"* ($M = 3.96$), indicating that women recognize the functional benefits of AI for household management. Perceived Ease of Use scored moderately ($M = 3.53$), suggesting that some participants may experience challenges interacting with AI technologies, particularly regarding technical support ($M = 3.23$). Behavioral Intention to Use was also moderate ($M = 3.61$), highlighting willingness to adopt AI, but with some reservations (Table 3).

These quantitative findings are reinforced by participants' narratives. Women described AI devices—including smart appliances, voice assistants, and AI scheduling tools—as enhancing autonomy, efficiency, and self-efficacy. For example, Participant 5, a 29-year-old married full-time employee from a village, said:

> *"I use the smart home system mainly to organize our family schedule and set reminders. It really reduces my need to ask for help all the time, which makes me feel more in control of my daily tasks."*

Participant 10, a 35-year-old divorced part-time employee living in the city, added:

> *"Since I started using the voice assistant, I've saved so much time. It allows me to juggle my part-time job and still have moments for myself."*

Participant 8, a married full-time employee with a master's degree, reflected:

> "Even though things are tough financially, I take pride in using these smart devices. It feels like being connected to the world and shows that we can be modern and resilient."

Together, these findings indicate that while AI adoption is generally positive, practical utility drives engagement more than ease of use, and lived experiences confirm the quantitative patterns.

3.2 Descriptive analysis of AI attitudes

Participants' general attitudes toward AI were moderately positive (GAAIS mean = 3.51, SD = 0.60), reflecting recognition of AI's usefulness and potential benefits for well-being and economic opportunities ($M = 3.76$–3.85). Ethical and privacy concerns were noted, such as apprehension about organizational misuse ($M = 3.04$) or over-reliance on AI ($M = 3.59$), indicating cautious optimism (Table 4).

Table 3 Means and standard deviations for the technology adoption domain ($N = 162$)

No	Item	*M*	SD	Level
1	Using AI at home will make tasks easier	3.96	0.891	High
2	AI tools will help me complete tasks faster	3.87	0.927	High
3	AI will improve my efficiency in daily routines	3.73	0.964	High
4	I find AI useful in managing household tasks	3.71	0.995	High
5	Using AI will increase my productivity at home	3.76	1.002	High
	Perceived Usefulness (dimension mean)	**3.81**	**0.858**	**High**
6	Learning to use AI tools will be easy for me	3.72	0.716	High
7	AI tools are clear and understandable	3.64	0.817	Moderate
8	Interacting with AI (e.g., voice assistants, apps) is intuitive	3.48	0.790	Moderate
9	I will need limited technical support to use AI at home	3.23	1.031	Moderate
10	AI technologies are generally easy to operate	3.56	0.755	Moderate
	Perceived Ease of Use (dimension mean)	**3.53**	**0.573**	Moderate
11	I intend to use AI tools in my daily routine	3.65	0.851	Moderate
12	I plan to use AI frequently in the future	3.67	0.863	High
13	I would recommend AI tools to other women	3.67	0.841	High
14	I prefer homes that use AI over those that do not	3.45	0.919	Moderate
	Behavioral Intention to Use (dimension mean)	**3.61**	**0.762**	Moderate
	Overall technology adoption mean	**3.65**	**0.616**	Moderate

Note: Levels are interpreted based on the following score ranges: 1.00–2.33 (low), 2.34–3.66 (moderate), 3.67–5.00 (high)

Bold rows indicate dimension means and the overall mean, representing aggregated scores across items within each domain.

Table 4 Means and standard deviations for items on the General Attitudes toward AI Scale (GAAIS) ($N = 162$)

Statement	*M*	SD	Attitude level
I admire what AI can do	3.88	0.72	High positive
I think artificial intelligent systems make many mistakes	3.34	0.91	Moderate
I am interested in using AI systems in my daily life	3.67	0.81	High positive
I find AI to be suspicious	2.73	0.94	Low moderate
AI might control people	3.21	0.89	Moderate
I believe AI is dangerous	2.92	0.88	Moderate
AI can have positive effects on people's well-being	3.76	0.79	High positive
AI is exciting	3.81	0.74	High positive
I think a smart AI agent would be better than a human in many routine jobs	3.54	0.85	Moderate
There are many useful AI applications	3.94	0.68	High positive
I feel uneasy thinking about the future uses of AI	2.67	0.92	Low negative
AI systems can perform better than humans	3.59	0.87	Moderate
Many social groups will benefit from an AI-filled future	3.73	0.78	High positive
I would like to use AI in my own work	3.68	0.80	High positive
AI is used to spy on people	3.15	0.91	Moderate
Organizations use AI unethically	3.04	0.88	Moderate
I prefer interacting with a smart system rather than a human	2.83	0.93	Low moderate
AI can create new economic opportunities for this country	3.85	0.75	High positive
Smart systems can help people feel happier	3.64	0.82	Moderate
Overall GAAIS mean	**3.51**	**0.60**	**Moderate positive**

Participants acknowledged the beneficial potential of AI but raised concerns about privacy, cultural norms, and social interactions. Participant 2, a divorced housewife with a master's degree, noted: *"I'm worried about how much these devices listen to us. Sometimes I feel like we're being watched, and that makes me uncomfortable, especially here where privacy is a big issue."*

The bold row represents the overall scale mean, calculated by aggregating all items in the GAAIS.

These integrated findings indicate that positive attitudes are tempered by contextual factors such as trust, social norms, and technological literacy.

3.3 Predictors of AI attitudes

Regression analyses revealed a moderate-to-strong positive relationship between technology adoption and attitudes toward AI ($R = 0.551$, $R^2 = 0.303$, $p < 0.001$), suggesting that higher engagement with AI is associated with more positive perceptions (Table 5, Fig. 1).

3.4 Barriers, inequalities, and contextual factors

Analysis across demographic variables indicated that education, employment status, and prior technology experience significantly influenced AI adoption. For example, participants with higher education and advanced technology experience scored higher on Perceived Ease of Use and Behavioral Intention to Use, whereas marital status, number of children, type of housing, and place of residence were not significant predictors (Tables 6, 7).

Educational level demonstrates a significant impact on *Perceived Ease of Use* ($F = 3.740$, $p = 0.012$) and *Behavioral Intention to Use* ($F = 2.719$, $p = 0.046$). Post hoc Scheffé analyses (Table 7) reveal that participants holding a bachelor's degree report significantly higher *Perceived Ease of Use* compared to those with a secondary education or lower ($p = 0.037$). These findings suggest that formal education plays a meaningful role in shaping both the usability perception and the willingness to engage with AI technologies among Palestinian women.

Table 5 Simple linear regression results for the effect of technology adoption on General Attitudes toward AI

Statistical indicator	Value
Correlation coefficient (R)	0.551
Coefficient of determination (R^2)	0.303
Adjusted R^2	0.299
F value (ANOVA test)	69.707
Significance (Sig.)	0.000
Standard error of estimate	0.381

Participant narratives corroborate this finding. Women with prior digital experience expressed greater confidence and openness toward AI. Participant 3, a single student, explained: *"Because I studied and worked with computers, I feel more comfortable exploring and using these smart devices. It makes me more confident to integrate them into daily life."*

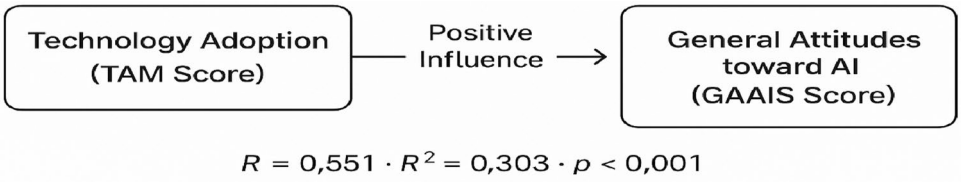

Fig. 1 Relationship between Technology Adoption Model (TAM) and General Attitudes toward AI Scale (GAAIS). No error bars are included, as the figure depicts a regression model summary rather than group mean comparisons

Similarly, employment status significantly influences *Perceived Ease of Use* ($F = 4.350$, $p = 0.006$), with students reporting higher perceived ease of use compared to women ($p = 0.031$), as indicated by post hoc analyses.

Table 6 One-Way ANOVA results for AI adoption across demographic and experiential variables ($N = 162$)

Demographic variable	Dimension	*F*	Sig.
Marital status	Perceived usefulness	0.440	0.645
	Perceived ease of use	1.538	0.218
	Behavioral intention to use	0.893	0.412
	Overall technology adoption	1.084	0.341
Number of children	Perceived usefulness	1.278	0.282
	Perceived ease of use	1.415	0.231
	Behavioral intention to use	1.945	0.106
	Overall technology adoption	1.678	0.157
Place of residence	Perceived usefulness	0.587	0.624
	Perceived ease of use	1.570	0.199
	Behavioral intention to use	0.465	0.707
	Overall technology adoption	0.236	0.871
Type of housing	Perceived usefulness	2.055	0.132
	Perceived ease of use	1.173	0.312
	Behavioral intention to use	1.376	0.256
	Overall technology adoption	1.982	0.141
Educational level	Perceived usefulness	2.281	0.081
	Perceived ease of use	3.740	0.012
	Behavioral intention to use	2.719	0.046
	Overall technology adoption	2.633	0.052
Employment status	Perceived usefulness	0.597	0.618
	Perceived ease of use	4.350	0.006
	Behavioral intention to use	1.013	0.389
	Overall technology adoption	1.766	0.156
Technology experience	Perceived usefulness	4.988	0.008
	Perceived ease of use	11.373	0.000
	Behavioral intention to use	7.589	0.001
	Overall technology adoption	10.663	0.000

Technology experience emerges as the most robust predictor of AI adoption, showing significant differences across all TAM dimensions: *Perceived Usefulness* ($F = 4.988$, $p = 0.008$), *Perceived Ease of Use* ($F = 11.373$, $p < 0.001$), *Behavioral Intention to Use* ($F = 7.589$, $p = 0.001$), and overall technology adoption ($F = 10.663$, $p < 0.001$). Post hoc Scheffé tests confirm that participants with advanced or professional technology experience score significantly higher than beginners on *Perceived Ease of Use* ($p = 0.003$) and *Behavioral Intention to Use* ($p = 0.028$). These results underscore the critical role of prior technological familiarity in shaping both the perception and adoption of AI technologies among Palestinian women.

3.5 Negotiation within household and cultural contexts

Adopting AI also involved negotiation within households. Some participants reported supportive spouses, while others faced resistance or concern about family dynamics. Participant 4 reflected

> "My husband is often skeptical about using these smart tools, especially when I try to make decisions based on them. There's a sense of control that he doesn't want to give up." Participant 6 noted: "I worry that relying too much on technology might weaken family bonds or reduce the personal care that we traditionally provide for each other."

These insights underscore that AI adoption is situated within gendered, cultural, and social contexts, complementing quantitative findings regarding adoption rates and attitudes.

4 Discussion

4.1 AI adoption levels

The findings indicate that Palestinian women exhibit a moderate-to-high level of AI adoption in domestic contexts ($M = 3.65$), consistent with Jabali and Ayyoub (2024), who reported a generally positive reception of AI-assisted tools

Table 7 Post hoc Scheffé test results for significant differences in AI adoption dimensions by demographic factors

Comparison category	(*I*) Group	(*J*) Group	Mean difference (*I*–*J*)	(Sig.)
Employment status	Student	Housewife	0.48	0.031*
	Full-time employee	Housewife	0.42	0.067
	Part-time employee	Housewife	0.39	0.091
Technology experience	Advanced/professional	Beginner	+0.62	0.003*
	Advanced/professional	Intermediate	+0.37	0.028*
	Intermediate	Beginner	+0.25	0.091
Educational level	Bachelor's degree	Secondary or below	0.45	0.037*
	Master's or PhD	Secondary or below	0.39	0.091
	Diploma	Secondary or below	0.41	0.074

Qualitative narratives highlight financial constraints, digital literacy, and infrastructure as additional barriers. Participant 9, a 54-year-old housewife, said: *"I would love to have a better smart system at home, but the costs are just too high for us."* Participant 1 added: *"Living in the village, the internet is often slow or unstable, which makes using these smart devices frustrating."*

in Palestinian households, particularly for parenting and time management. Regional studies, such as Bozkurt and Gursoy (2023), similarly found that a majority of Turkish respondents perceived AI as enhancing productivity and simplifying daily life, suggesting a shared optimism regarding AI's practical utility.

However, the moderate Perceived Ease of Use score ($M = 3.53$) and expectations of requiring technical support contrast with findings from technologically advanced contexts, such as Germany (Gnambs et al. 2025), where participants reported greater confidence in AI usability. Participant narratives highlight this gap: for instance, Participant 9, a housewife from a refugee camp, stated: "I would love to have a better smart system at home, but the costs are just too high for us," while Participant 1, from a village, noted unreliable internet as a barrier. These observations align with Novianti et al. (2023), emphasizing that limited digital literacy and infrastructural constraints can restrict practical AI adoption in resource-limited contexts.

4.2 Perceived usefulness and Behavioral intention

Participants rated Perceived Usefulness highly ($M = 3.81$), reflecting recognition that AI can streamline household work, reduce cognitive and physical burdens, and support multitasking. This resonates with Porcheron et al. (2018) and Rožman et al. (2023), as well as Itair et al. (2023), who highlight AI's capacity to provide critical support in contexts of economic hardship and restricted mobility—conditions highly relevant to Palestinian women with disproportionate domestic responsibilities.

Similarly, Behavioral Intention to Use AI was moderate-to-high ($M = 3.61$), consistent with Badran and Seker (2025), who found that women less constrained by traditional norms express greater openness to AI adoption. In the Palestinian context, this willingness persists despite infrastructural limitations, suggesting that perceived functional value often outweighs operational concerns. For example, Participant 5 described using AI to organize family schedules and set reminders: "It really reduces my need to ask for help all the time, which makes me feel more in control of my daily tasks."

4.3 Attitudes toward AI

Overall, participants exhibited moderate-to-positive attitudes toward AI ($M = 3.51$), reflecting the global duality described by Hick and Ziefle (2022), in which optimism for efficiency coexists with ethical caution. While participants acknowledged AI's benefits—particularly in productivity, well-being, and economic opportunities—moderate concerns were raised about privacy ($M \approx 3.15$) and potential misuse ($M \approx 3.04$), aligning with Rahman et al. (2025), who documented heightened sensitivity among women to ethical and surveillance issues.

Interestingly, participants reported low discomfort with future AI use ($M = 2.67$), contrasting with findings in Turkey (Bozkurt and Gursoy 2023), where a majority feared AI surpassing human capabilities. This difference likely reflects the home-focused applications of AI in Palestine, emphasizing practical benefits over advanced autonomous functionalities.

4.4 Predictors of AI attitudes

Regression analyses indicated a moderate-to-strong positive relationship between technology adoption and AI attitudes ($R = 0.551$, $R^2 = 0.303$), confirming that hands-on engagement enhances confidence and enthusiasm for AI. This supports the Technology Acceptance Model (TAM) and aligns with Ezugwu et al. (2025) and Badran and Seker (2025),

who link cultural receptivity and prior experience with more favorable AI perceptions. Participants with higher digital literacy or prior computer experience expressed greater comfort and openness, echoing Participant 3's reflection: "Because I studied and worked with computers, I feel more comfortable exploring and using these smart devices."

4.5 Sociodemographic and experiential influences

Post hoc analyses revealed that educational attainment, student status, and advanced technology experience significantly enhanced Perceived Ease of Use and adoption intentions. These results are consistent with Hassan et al. (2022) and Gnambs et al. (2025), highlighting education and digital literacy as critical drivers of AI adoption. Conversely, marital status, number of children, and type of housing did not significantly affect adoption, suggesting that AI's perceived utility transcends household composition, consistent with Jabali and Ayyoub.

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4.6 Structural and contextual barriers

Despite positive adoption and attitudes, Palestinian women face persistent structural barriers, including financial constraints, digital literacy gaps, and limited infrastructure. Participants from refugee camps and villages reported restricted access to devices and unstable internet, highlighting inequalities that reinforce a digital divide across social and geographic lines. These findings align with Hassoun et al. (2025) and Itair et al. (2023), who argue that technology adoption is shaped by broader socioeconomic conditions.

4.7 Gendered and cultural negotiations

AI adoption is embedded within gender norms and household hierarchies. While tools can enhance autonomy, some participants experienced resistance from male family members or concerns about privacy and familial intimacy. Participant 4 described skepticism from her husband: "There's a sense of control that he doesn't want to give up." These dynamics illustrate how AI is negotiated within cultural and moral frameworks, consistent with Alqahtani (2025). Adoption is, thus, not solely functional but also social, mediated by expectations and authority structures within Palestinian households.

4.8 Education and digital literacy

Education emerged as a strong predictor of confidence and competence with AI. Participants with higher education and prior computer experience expressed adaptive strategies, openness, and proactive engagement, whereas less-educated women exhibited hesitation or reliance on others for support. These findings highlight the importance of targeted interventions to enhance digital literacy and reduce inequalities in technology access and use (Novianti et al. 2021; Ervianti et al. 2023).

4.9 AI adoption in the Palestinian context

Palestinian women's engagement with AI is situated within overlapping social, economic, and political constraints. Beyond domestic functionality, AI serves as a coping mechanism, mitigating unpaid labor, facilitating multitasking, and providing a sense of control amid constrained mobility and sociopolitical uncertainty. This localized perspective extends global debates on gender and technology by emphasizing the socially embedded, negotiated nature of technological empowerment. AI's transformative potential is, therefore, moderated by structural inequalities, gendered norms, and infrastructural challenges, echoing Borenstein and Howard (2021) regarding the need for culturally sensitive and context-aware AI design.

4.10 Situating AI adoption in the Palestinian context

Beyond personal and household factors, the findings point to broader sociopolitical conditions shaping AI adoption. Economic instability, occupation-related infrastructure disruptions, and cultural expectations collectively frame how women experience digital technologies. AI, therefore, is not only a domestic convenience but also a coping mechanism within a constrained environment. This localized perspective extends global debates on gender and technology by situating them in a context of political occupation, limited mobility, and enduring socioeconomic pressures.

Overall, the qualitative results demonstrate that Palestinian women's engagement with AI technologies is complex, negotiated, and deeply contextual. While AI can enhance autonomy and self-efficacy, its transformative potential is moderated by structural inequalities, gendered expectations, and infrastructural challenges. These findings contribute to a growing body of research emphasizing that technological empowerment must be understood not merely as access or

use, but as a socially embedded process shaped by intersecting power relations and material conditions.

4.11 Practical implications

The findings of this study highlight several important considerations for promoting equitable and meaningful AI adoption among Palestinian women. Culturally tailored interventions are essential to ensure that awareness campaigns and training programs address the gendered barriers, household dynamics, and caregiving responsibilities that influence women's engagement with technology. Programs that are sensitive to local traditions and family hierarchies can better encourage acceptance and reduce resistance within households, particularly when they involve spouses and elders as active participants.

Equally important are community-based digital literacy initiatives designed to enhance women's confidence and technical competence. Such initiatives should specifically target women with limited prior experience or access to technology, providing hands-on training that emphasizes practical applications relevant to daily life. By integrating these efforts within community centers and local organizations, programs can also help overcome structural obstacles such as poor internet connectivity, high device costs, and unequal access between urban, rural, and refugee settings.

From a technological standpoint, user-centered design is crucial. Developers should engage Palestinian women directly in the creation and testing of AI tools to ensure that technologies reflect their actual domestic and social realities. Co-design approaches can make AI systems more usable, culturally appropriate, and empowering by taking into account household decision-making structures, privacy concerns, and shared device use.

Finally, education remains a key driver of successful AI integration. Embedding digital literacy into school curricula and adult education programs can equip women across generations with the necessary skills to navigate an increasingly digital environment. Collaborative efforts between policymakers, educators, and technology developers can, thus, foster an ecosystem that supports women's technological empowerment, bridges digital divides, and transforms AI from a functional household convenience into a meaningful tool for independence, inclusion, and resilience.

5 Conclusion

This study aimed to explore how Palestinian women perceive and engage with AI technologies in domestic settings and what social, cultural, and structural factors influence their adoption and use. The findings reveal that AI engagement is shaped by a complex interplay of technological, social, and gendered elements.

The study found that women generally perceive AI technologies as tools that enhance autonomy, efficiency, and time management in daily life. Many participants associated AI use with modernity and connectedness, particularly in balancing professional and domestic responsibilities.

Furthermore, the results indicate that adoption is deeply mediated by cultural norms, family expectations, and gendered power relations. Financial limitations, unstable internet infrastructure, and varying levels of digital literacy further constrain access and consistent use. Yet, despite these challenges, many women expressed agency and resilience—negotiating technology use within traditional household hierarchies and limited resources.

Overall, the study demonstrates that AI adoption among Palestinian women cannot be separated from broader sociocultural and political realities. Effective technology integration, therefore, requires not only technical support but also policies and interventions that recognize gendered roles, household structures, and cultural sensitivities.

5.1 Recommendations for future research

Future research could expand the scope of inquiry by including women from more diverse socioeconomic, educational, and geographic backgrounds to enhance representativeness. Comparative studies across urban, rural, and refugee camp settings could clarify how spatial and infrastructural inequalities shape AI use. Longitudinal research would provide insight into how attitudes and practices evolve over time with technological and policy developments. Furthermore, incorporating men's perspectives could enrich understanding of household negotiations and shared decision-making around AI adoption.

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Declarations

Conflict of interest The authors declare no competing interests.

Ethics approval Ethical approval for this study was obtained from the Institutional Review Board (IRB) of An-Najah National University in March 2025. The approval covered all aspects of the research, including participant recruitment, data collection, and data analysis. All procedures adhered to the ethical principles outlined in the Declaration of Helsinki to ensure the safety, confidentiality, and rights of the participants throughout the study.

Informed consent Since this article involves data collection through semi-structured interviews and an online questionnaire, informed consent was obtained from all participants prior to their involvement. Participants were provided with clear information about the study's purpose and their role, ensuring that their participation was voluntary and based on informed decision-making. No sensitive or personally identifiable information was collected.

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