https://doi.org/10.35845/kmuj.2025.24120

ORIGINAL ARTICLE

Exploring acceptance of COVID-19 vaccination among breast cancer patients: a qualitative study in a tertiary care hospital in Rawalpindi, Pakistan

Asmara Ahmed Malik [1], Syed Fawad Mashhadi [1], Zubaida Rashid [1], Syeda Rifaat Qamar Naqvi [2,3], Mommana Ali Rathore [1], Imdad Ali Khushk [4]

1: Department of Community Medicine, National University of Medical Sciences (NUMS), Rawalpindi, Pakistan
2: Department of Surgery, Combined Military Hospital (CMH), Rawalpindi, Pakistan
3: Department of Surgery, National University of Medical Sciences (NUMS), Rawalpindi, Pakistan
4: Health Services Academy, Islamabad, Pakistan

Email: asmara.malik@gmail.com
Contact #: +92-333-5366076

Date Submitted: August 21, 2025
Date Revised: December 22, 2025
Date Accepted: December 23, 2025

ABSTRACT

Objective: To explore the factors influencing belief formation regarding COVID-19 vaccine acceptance among women diagnosed with breast cancer in Pakistan.

Methods: This exploratory qualitative study, guided by an interpretivist paradigm, was conducted at a tertiary care hospital in Rawalpindi, Pakistan. Semi-structured, in-depth interviews were conducted between December-2021 and March-2022 among adult breast cancer patients receiving active treatment, using typical case sampling. Interviews were audio-recorded with informed consent and continued until data saturation. Transcripts were analysed concurrently using reflexive thematic analysis based on Braun and Clarke's six-phase framework, with trustworthiness ensured through reflexivity, audit trails, team discussions, and inclusion of verbatim quotations.

Results: Eleven female participants (mean age 49.4±11.3 years) were interviewed. One overarching theme, Belief Formation Regarding COVID-19 Vaccination, emerged, supported by five inter-related themes: psychosocial concerns during the pandemic, cancer- and COVID-19-related beliefs, vaccination experiences, interactions with healthcare providers, and coping and support mechanisms. Vaccine acceptance was shaped by emotional distress following cancer diagnosis, fear of immunosuppression, religious and familial influences, trust in healthcare workers, prior vaccine experiences, and exposure to misinformation and conspiracy beliefs. Supportive healthcare interactions and adaptive coping strategies facilitated acceptance, while financial stress, social isolation, and distrust in authorities contributed to hesitancy.

Conclusion: Beliefs regarding COVID-19 vaccination among breast cancer patients are complex and deeply embedded within psychosocial, cultural, and healthcare contexts. Resilience grounded in faith, family support, trust in healthcare providers, and active coping facilitated acceptance, whereas conspiracy beliefs, distrust of rapid vaccine development, fear of treatment-related immunosuppression, and social isolation contributed to hesitancy.

Keywords: Breast Neoplasms (MeSH); Vaccination (MeSH); Pandemics (MeSH); COVID-19 (MeSH); COVID-19 Vaccines (MeSH); Vaccine Hesitancy (MeSH); Health Promotion (MeSH); Health Personnel (MeSH); Qualitative Research (MeSH); Pakistan (MeSH).

THIS ARTICLE MAY BE CITED AS: Malik AA, Mashhadi SF, Rashid Z, Naqvi SRQ, Rathore MA, Khushk IA. Exploring acceptance of COVID-19 vaccination among breast cancer patients: a qualitative study in a tertiary care hospital in Rawalpindi, Pakistan. Khyber Med Univ J 2025;17(4):448-55. https://doi.org/10.35845/kmuj.2025.24120

INTRODUCTION

Over the past two decades, vaccine acceptability for several vaccine-preventable diseases has increasingly been challenged by public scepticism, mistrust, and hostility, affecting populations in both high-income and low- and middle-income countries.[1,2] The rapid spread of misinformation surrounding vaccines further undermined public confidence, and acceptance of COVID-19 vaccines was initially low worldwide, often provoking strong resistance, particularly in settings where vaccination was mandated by health authorities.[3]

Pakistan, a lower-middle-income country with a long-standing struggle against endemic poliomyelitis, partly driven by misinformation and low health literacy, also faced substantial challenges related to COVID-19 vaccine hesitancy.[4] Concurrently, the country is experiencing a rising burden of non-communicable diseases, including cancer and cardiometabolic disorders.[5,6] Breast cancer is the most common malignancy among women in Pakistan,[7] and during national lockdowns many underprivileged patients experienced significant disruptions in diagnosis, treatment, and continuity of care.

Given limited access to reliable health information, it is critical that women with breast cancer do not become vulnerable to COVID-19 vaccine hesitancy, as this may increase their risk of adverse outcomes, including mortality due to co-infection.[8] Vaccination therefore assumes heightened importance for immuno-compromised populations, such as patients with cancer, who already face an elevated risk of severe infection and death, risks that are further compounded by advanced age, comorbid conditions, and malnutrition.[9,10]

Despite this, there remains a significant gap in the published literature, with a lack of in-depth qualitative research exploring COVID-19 vaccine acceptance among breast cancer

patients in Pakistan. Most existing national and international studies focus on the general population or healthcare workers, rely predominantly on quantitative designs, and often use online data collection tools involving younger, non-cancer cohorts. Consequently, this study aimed to explore how the cancer journey, gender roles, faith, and psychosocial contexts shape COVID-19 vaccine-related beliefs and acceptance among women with breast cancer in Pakistan. Insights from this population may inform adult and booster vaccination strategies for immunocompromised patients, refine communication approaches within oncology services, and strengthen preparedness for future epidemics that may again disrupt cancer care.

METHODS

This exploratory qualitative study was conducted using an interpretivist (interpretivist–constructivist) paradigm to explore how breast cancer patients construct beliefs regarding COVID-19 vaccination. The study was initiated after obtaining formal approval from the Institutional Ethics Review Committee (ERC/ID/198). Data collection was undertaken between December 2021 and March 2022, followed by analysis and reporting from April to August 2022, spanning a total duration of ten months. Confidentiality and anonymity were strictly maintained throughout the study. Participation was voluntary, and written informed consent was obtained prior to interviews. Participants were informed of their right to decline questions or withdraw at any time without consequences for their clinical care. During interviews, participants were monitored for emotional distress, and interviews were paused or terminated if required, with appropriate clinical support offered through the treating oncologist or the relevant clinical team.

Semi-structured interviews were conducted among adult women (≥18 years) diagnosed with breast cancer and receiving treatment at Combined Military Hospital (CMH), Rawalpindi, Pakistan. Of 25 patients approached, 12 consented to audio-recorded interviews; data saturation was achieved after 11 interviews, and no further recruitment was undertaken. Inclusion criteria required current engagement in one or more treatment modalities, including surgery (lumpectomy or mastectomy), breast reconstructive surgery, chemotherapy, immunotherapy, targeted therapy, or radiotherapy, to capture a representative sample of patients undergoing diverse treatment regimens. Individuals with active, severe COVID-19 infection, defined by hospitalization or oxygen requirement, were excluded to avoid confounding effects of acute illness on treatment-related outcomes. Patients scheduled for transplant surgery within the subsequent three months, and therefore ineligible for COVID-19 vaccination during the study period, were also excluded to minimize bias related to immunosuppression or delayed vaccination timelines.

For the semi-structured interviews, typical case sampling[11-13] was employed, focusing on middle-aged women with breast cancer attending a tertiary care hospital who were predominantly married, had varying educational backgrounds, and represented different disease stages and treatment modalities. This approach was used to capture commonly encountered, clinically relevant experiences rather than extreme or atypical cases. Within this framework, diversity in age, disease stage, education, occupation, and vaccination status was deliberately sought to enhance depth and contextual understanding. As the study aimed for qualitative insight rather than statistical generalizability, the sample size was considered appropriate for in-depth exploration. Data collection and analysis proceeded concurrently, with preliminary coding initiated after the initial interviews. Data saturation was deemed to have been achieved when no new codes or concepts emerged and subsequent interviews merely reinforced existing themes; this occurred after the eleventh interview, following which no additional participants were recruited.

The predominance of female participants introduced an apparent gender selection bias; however, this reflected the underlying pathophysiology and epidemiology of breast cancer, as no male patients presented to the outpatient department during the study period.[14-18] Cancer diagnoses were verified by the researcher prior to participant enrolment, and, in keeping with local cultural norms, permission was also sought from accompanying household members when appropriate. Semi-structured interviews were conducted using an interview guide, with probes flexibly adapted according to participants' responses.

An interview guide was developed by the researcher following an extensive literature review[14-26] and expert consultation with senior faculty, qualitative research specialists, and a surgical oncologist experienced in breast cancer care. Each interview lasted approximately 30-40 minutes, with questions framed neutrally to elicit insights into multiple dimensions of participants' lived experiences. Data were analyzed using reflexive thematic analysis as described by Braun and Clarke,[27] progressing through six phases: familiarization with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. Audio-recorded interviews were transcribed verbatim, after which a coding framework comprising descriptive categories was developed inductively from the data. Transcripts were then systematically coded, mapped, and interpreted to identify core themes related to COVID-19 vaccine acceptance.

To ensure researcher reflexivity and trustworthiness, interviews were conducted by a female community medicine trainee with prior experience in qualitative interviewing and no direct clinical role in participants' cancer care, thereby minimising role-related coercion while facilitating rapport. The interviewer shared the cultural and linguistic background of participants and entered the study with acknowledged assumptions regarding the influence of gender roles, faith, and structural barriers on vaccine hesitancy; reflexive notes were maintained after each interview to document and critically reflect on these assumptions and their potential impact on data collection and interpretation. Credibility was

strengthened through concurrent data collection and analysis, iterative coding, multidisciplinary team discussions of emerging themes, and the use of verbatim quotations. Dependability and confirmability were supported through maintenance of an audit trail documenting coding decisions and theme refinement, alongside reflexive memos. Transferability was enhanced by providing a thick description of the study setting, participant characteristics, and contextual factors pertinent to breast cancer care and COVID-19 vaccination in Pakistan.

RESULTS

Eleven female participants, with mean age 49.40±11.27 years, were interviewed using the structured interview guide until data saturation was reached. None were in any physical or psychological distress at the time of participation in these interviews. Demographic characteristics of the enrolled participants are listed in Table I.

Qualitative thematic analysis yielded one overarching theme, 'Belief Formation Regarding COVID-19 Vaccination', and five inter-related themes that described psychosocial concerns, cancer and COVID-19 related beliefs, vaccination experiences, interactions with healthcare providers, and coping and support systems (Figure 1). Figure 2 presents a conceptual framework inductively derived from these themes, illustrating how psychosocial distress, religious and familial coping, prior vaccine experiences, and healthcare interactions converge with structural conditions to shape vaccine acceptance or hesitancy among women with breast cancer. Qualitative thematic analysis identified several data-rich themes acting as barriers and facilitators of COVID-19 vaccine acceptance. The core theme identified was "Belief Formation Regarding COVID-19 Vaccination". Subthemes developed are listed in Table II.

Participants universally described profound emotional distress upon receiving a breast cancer diagnosis. Resilience emerged through familial support, faith, and prior adversity, though systemic gaps exacerbated vulnerabilities. Fear was amplified by the stigma of the term "cancer," heightened anxiety about hospital-acquired COVID-19 infections, and delays in treatment due to lockdowns.

P1, F: "It's just the name, 'cancer'-it is what it is. So, in the beginning (of being diagnosed during COVID-19 pandemic) it was a bit tough."

The diagnosis disrupted participants' familial roles as mothers, wives, and caregivers. Many feared losing emotional connections with their children or being unable to fulfil caregiving duties. School closures and quarantines intensified psychological strain.

P7, F: "I'm a single parent… my siblings are supporting a lot, but I don't have my parents, no husband, no in-laws. It's really very difficult."

Employed participants faced acute anxiety about job loss and catastrophic treatment costs, worsened by pandemic-related disruptions and healthcare delays. Economic instability and unemployment in Pakistan amplified distress, with some participants balancing treatment costs against basic living expenses.

P7, F: "Each biopsy costs upwards of Rs. 15,000… I'm paid Rs. 25,000 a month. What can you do in Rs. 20,000? It's very difficult financially."

Some participants minimized their diagnosis (e.g., rejecting the term "cancer") or expressed disbelief at its severity, with younger participants and those in prior good health were more prone to denial.

P7, F: "Stage 3? There's been no cancer in my family… I got diagnosed so suddenly!"

P2, F: "All illness comes from Allah's Will… I don't feel it much."

Fear of chemotherapy's physical and mental toll shaped vaccination decisions, as participants perceived weakened immunity during treatment. Family support played a critical role in encouraging treatment adherence despite pandemic-related logistical challenges.

P1, F: "I have reservations about chemo… people say it's tough. Otherwise, surgery or COVID-19? I'm not scared."

Scepticism centred on perceived

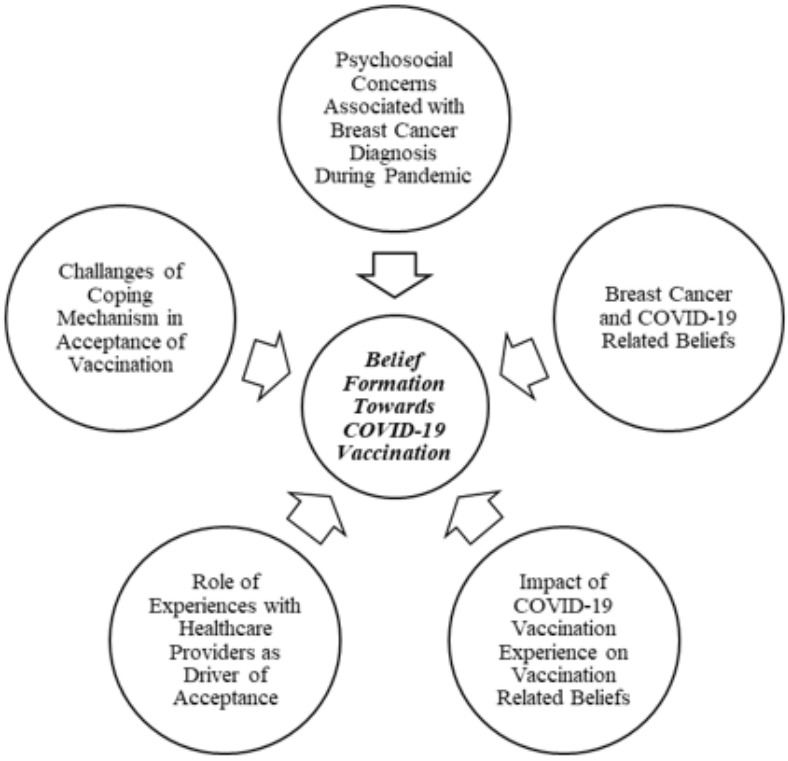

Figure 1: Identified themes through thematic analysis (n=11)

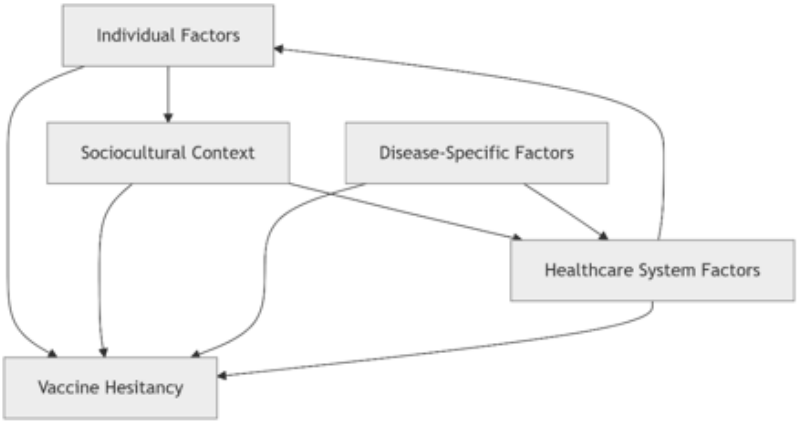

Figure 2: Conceptual framework for exploring vaccine acceptance among breast cancer patients in Pakistan

Table I: Demographic characteristics of participants included in qualitative interviews (n=11)

S. No	Age (years)	Occupation	Education	Ethnicity	Marital Status	Breast CA Status
1	45	Housewife	Master's	Pathan	Married	Stage 2
2	55	LHW	FA	Kashmiri	Married	Stage 2
3	49	Housewife	F.Sc	Punjabi	Married	Stage 4
4	58	Housewife	F. Sc	Punjabi	Married	Stage 3
5	42	Teacher	Master's	Kashmiri	Married	Remission
6	60	Housewife	F. Sc	Punjabi	Married	Stage 1
7	42	Teacher	Master's	Punjabi	Widowed	Stage 3
8	62	Housewife	Bachelor's	Punjabi	Married	Stage 1
9	51	Housewife	Bachelor's	Sindhi	Married	Stage 2
10	53	Housewife	Matric	Pathan	Married	Stage 2
11	53	Researcher	Mphil	Punjabi	Single	Stage 2

LHW=Lady Healthcare Worker

"artificial" immunity versus "natural" exposure, with some linking distrust to religious beliefs. Others dismissed COVID-19 as comparable to influenza, reducing urgency for vaccination.

P5, F: "Every illness and cure is from Allah… our immune system should be strong on its own."

P11, F: "Why booster shots every six months? … Why not boost immunity naturally?"

Mothers emphasized disruptions to children's routines and advocated for paediatric vaccination to restore normalcy. Personal losses to COVID-19 indirectly influenced vaccine decisions, heightening awareness of vulnerability among immunocompromised patients.

P4, F: "My sister-in-law's husband died… I feel the fear killed him."

Participants were divided on compulsory vaccination. Vaccine-accepting individuals emphasized collective safety, citing Pakistan's limited healthcare resources and the need to curb COVID-19's spread. Conversely, hesitant participants prioritized personal autonomy, distrusting government mandates and fearing long-term harm.

P1, F: "Vaccination should be compulsory… it's spreading so fast, and control needs everyone's effort."

P7, F: "Vaccination should not be forced. Those who refuse are also correct."

Trust stemmed from prior positive experiences with vaccines, advocacy from healthcare workers, and smooth vaccination processes. Participants who advocated for vaccines often linked their trust to familial responsibility and observed benefits. However, distrust arose from adverse experiences, such as Participant 7, who blamed her breast cancer on vaccination.

P7, F: "After my diagnosis, I stopped advocating vaccines. How can I recommend something that gave me cancer?"

Urban participants noted logistical barriers while rural residents faced misinformation gaps. Vaccine-accepting participants relied on family, social media, or employer training for information, whereas hesitant individuals often lacked support networks. Employed participants cited workplace mandates as a motivator.

P4, F: "Some centres ran out of doses; others faced delays."

P3, F: "I depend on family and TV for information-I can't read myself."

Hesitant participants linked vaccines to health crises (e.g., cancer, heart disease) and global conspiracies. Some viewed rapid vaccine development as reckless, while others accused Western powers of targeting Muslim populations. Trauma from personal losses (e.g., Participant 11's father dying post-vaccination) deepened distrust.

P7, F: "Why are vaccines free? Are we lab rats? My cancer appeared three months post-jab!"

P9, F: "This is a plot to weaken Muslim families-our genes, our strength."

P11, F: "Vaccines took decades before… COVID-19 shots were rushed. Deaths like my father's prove it."

Participants acknowledged Pakistan's efforts to provide free COVID-19 vaccines despite economic and logistical challenges. However, distrust persisted among hesitant participants, who questioned transparency, motives, and abrupt shifts in public health messaging.

P1, F: "Having vaccines free of cost in a

Table II: Themes and subthemes identified through qualitative thematic analysis of COVID-19 vaccine acceptance (n=11)

Themes	Subthemes
Psychosocial Concerns Associated with Breast Cancer Diagnosis During Pandemic	I. Fears After Being Diagnosed with Breast Cancer During Pandemic ii. Familial Stress iii. Financial Issues
Breast Cancer and COVID-19 Related Beliefs	I. Cancer Diagnosis and Fears ii. Vaccination related Decision Making iii. COVID-19 Disease Awareness vi. Psychosocial Concerns
Impact of COVID-19 Vaccination Experience on COVID-19 Vaccination Acceptance	I. Mandatory Mass Vaccination ii. Enablers of Trust iii. Psychosocial Concerns vi. Conspiracy Beliefs
Role of Experiences with Healthcare Providers as Driver of Acceptance	I. Acknowledgement of Govt HS ii. Trust in HCW
Challenges of Coping Mechanisms in Acceptance of Vaccination	i. Personal level ii. External Support

developing country like Pakistan… was really, really good. We desperately needed that."

P9, F: "The government should address people's concerns… but they're failing to create trust."

Participants valued healthcare workers' expertise, frank communication, and empathetic care, which fostered hope and compliance. Even vaccine-hesitant participants expressed gratitude for providers' reassurance.

P2, F: "Scientists must be correct-not laymen. Vaccination is the only way to control this."

P3, F: "I let the doctors decide what's better for me. Open communication makes treatment easier."

P11, F: "Online consultations aren't effective-doctors can't examine you properly. It was hectic during the pandemic."

Participants who accepted their breast cancer diagnosis and employed adaptive coping strategies demonstrated higher COVID-19 vaccine acceptance. Educated participants leveraged research skills to understand their diagnosis, fostering a sense of control. Conversely, those in denial or resistant to their diagnosis were more vaccine hesitant.

P11, F: "I've read every report, researched online-knowledge helps me cope."

P6, F: "I pray namaaz five times a day. Faith keeps me strong."

Participants with engaged spouses, children, or siblings felt empowered to prioritize health decisions, including vaccination. Isolation or lack of support (e.g., loss of parents/spouses) exacerbated distress and hesitancy.

P3, F: "My husband took me to the hospital in an ambulance… he did everything."

P7, F: "My siblings support me, but I have no parents or husband. It's very difficult."

DISCUSSION

This qualitative study adds to the growing body of literature on COVID-19 vaccination by examining a clinically vulnerable yet under-studied population, women with breast cancer in Pakistan. In contrast to most national and international studies on COVID-19 vaccine hesitancy, which have predominantly relied on quantitative designs and online surveys targeting the general population or healthcare workers, this study provides in-depth insights into how breast cancer diagnosis, gendered caregiving roles, religious faith, and structural vulnerabilities intersect to shape vaccine-related beliefs. The findings indicate that vaccination decisions were not driven solely by biomedical risk–benefit considerations but were strongly influenced by psychological adaptation to cancer diagnosis, sociocultural norms, faith, family support, and interactions with healthcare providers. By situating vaccine decision-making within the lived realities of cancer treatment amid pandemic-related disruptions, the findings move beyond individual attitudes to highlight the complex emotional, social, and contextual processes underpinning vaccine acceptance and hesitancy.[28,29]

The COVID-19 vaccine-related concerns identified in this study are consistent with findings from research conducted among breast cancer patients in Germany, which reported lower willingness to accept COVID-19 vaccination among breast cancer patients (61.2%) compared with other cancer populations nationally (72.6%), despite the absence of reported vaccine-related adverse events.[30] The authors concluded that the benefits of COVID-19 vaccination in breast cancer patients substantially outweighed the potential risks. Similarly, a systematic assessment of COVID-19 vaccine acceptance in Pakistan found that although pooled estimates suggested higher acceptance (65%) than hesitancy (35%) in the general population, these findings were affected by considerable bias, largely attributable to self-administered and online study designs.[31] This underscores the value of qualitative, context-sensitive approaches, such as the present study, in capturing nuanced vaccine per-ceptions among vulnerable populations.

The largely self-administered, online design of many previous studies led to the overrepresentation of younger participants, typically aged 18-30 years, with limited inclusion of married individuals and parents, groups highly relevant to vaccine decision-making. In contrast, the qualitative approach of the present study allowed a more contextual exploration of vaccine

hesitancy among Pakistani women with breast cancer, highlighting spousal and child-related concerns as key influences, with maternal responsibility strongly shaping perceptions of COVID-19 vaccination.

Trust in information provided by healthcare workers emerged as another important theme, with many participants adopting a paternalistic view of clinicians while simultaneously expressing distrust toward the pharmaceutical industry. This finding is concerning, as vaccine hesitancy among healthcare workers themselves has been reported,[16,32] and could further exacerbate inequities in healthcare access and utilisation for women in Pakistan. Additionally, as a Muslim-majority country, religious faith played a significant supportive role for many participants, who reported drawing comfort and resilience from Islamic beliefs during the pandemic and their cancer journey. These findings are consistent with a qualitative study from Turkey, which reported that although cancer patients experienced substantial psychosocial, financial, and physical challenges, enhanced family support and religious coping strategies were instrumental in fostering resilience.[33] Similar patterns have also been documented in a multicounty qualitative study involving cancer patients, further reinforcing the relevance of faith and family support as key coping mechanisms across diverse cultural contexts. [34]

With the emergence of the COVID-19 "new normal," telemedicine was rapidly adopted to maintain continuity of care. Although telemedicine services were available at the study site, vaccine-hesitant participants expressed dissatisfaction with the absence of physical examination during virtual consultations. Similar challenges were reported in a qualitative study from Denmark, which highlighted barriers to effective telemedicine use among cancer patients experiencing anxiety and distress, including older age, limited digital access, financial constraints, low technological literacy, and language difficulties.[35] These challenges closely mirror those identified in the present study, where Pakistan's multi-ethnic and multicultural context, coupled with gender norms in a male-dominated society, further constrained women's access to screen-based consultations, particularly when mediated by male physicians or household caretakers. Collectively, these findings underscore the value of qualitative approaches in public health research for uncovering the complex socioeconomic, emotional, and healthcare vulnerabilities underlying vaccine hesitancy.

Although data were collected during the active rollout of COVID-19 vaccination in 2021–2022, the findings remain highly relevant in the post-emergency phase. They highlight enduring determinants of vaccine confidence and hesitancy among immunocompromised populations, with implications for booster doses and other adult immunization initiatives beyond COVID-19, particularly in the context of persistently low coverage in programs such as HPV vaccination. Moreover, the study illustrates how women with breast cancer navigated the dual challenges of cancer diagnosis and pandemic-related disruption, offering important lessons for strengthening resilient cancer care pathways during future infectious disease outbreaks. Finally, the findings provide a contextual baseline for understanding evolving vaccine beliefs among oncology populations in settings characterized by ongoing structural and informational barriers.

Limitations of study

This study has several limitations that should be considered when interpreting its findings. First, it was conducted at a single tertiary military hospital in Rawalpindi, which may limit transferability to other oncology settings and regions of Pakistan. Second, the small, all-female sample of eleven participants-although appropriate for in-depth qualitative inquiry-restricts the range of perspectives captured; male breast cancer patients were not included, as none presented during the study period. Third, interviews were conducted within a healthcare setting by a researcher with a health professional background, introducing the potential for social desirability bias in participants' narratives regarding vaccination decisions. Additionally, data collection occurred during a specific phase of the COVID-19 pandemic, when vaccination policies and public perceptions were rapidly evolving; beliefs and attitudes may have shifted since that time, although emerging evidence from Pakistan's HPV vaccination campaign suggests that vaccine hesitancy remains a persistent challenge. Finally, as with most qualitative research, the findings are context-specific and are intended to generate hypotheses and deepen contextual understanding rather than to provide statistically generalisable estimates.

CONCLUSION

COVID-19 vaccine acceptance among women with breast cancer in this study was shaped by the interplay of cancer-related psychosocial distress, religious and familial coping mechanisms, prior vaccination experiences, trust or mistrust in healthcare providers, and prevailing structural barriers. These findings suggest that oncology services in Pakistan and similar contexts can enhance vaccine confidence by integrating tailored vaccination counselling into routine cancer care, leveraging trusted healthcare providers and faith-congruent messaging, and addressing structural constraints that disproportionately affect women with cancer. The conceptual framework derived from this study may inform the design of future interventions for immunocompromised populations and contribute to preparedness strategies for public health emergencies that risk disrupting cancer care.

ACKNOWLEDGEMENT

The authors gratefully acknowledge the women with breast cancer and the staff of the Breast Cancer Outpatient Department who, despite physical challenges and time constraints, generously shared their experiences and supported this research throughout its conduct.

REFERENCES

1. Sallam M. COVID-19 vaccine hesitancy worldwide: a concise systematic review of vaccine

acceptance rates. Vaccines 2021;9(2):160.https://doi.org/10.3390/vaccines9020160

2. Sallam M, Dababseh D, Eid H, Al-Mahzoum K, Al-Haidar A, Taim D, et al. High rates of COVID-19 vaccine hesitancy and its association with conspiracy beliefs: a study in Jordan and Kuwait among other Arab countries. Vaccines (Basel) 2021;9(1):42.https://doi.org/10.3390/vaccines9010042

3. Coustasse A, Kimble C, Maxik K. COVID-19 and vaccine hesitancy: a challenge the United States must overcome. J Ambul Care Manage 2021;44(1):71-5. https://doi.org/10.1097/JAC.0000000000000367

4. Khan B, Khan A, Khan R. Measuring the intention in favour and against getting vaccinated from COVID-19 using the health belief model: cross-sectional study of Pakistan. Illn Crisis Loss 2022;1054137321118149. https://doi.org/10.1177/10541373221118149

5. Ali M, Ahmad N, Khan H, Ali S, Akbar F, Hussain Z. Polio vaccination controversy in Pakistan. Lancet 2019;394(10202):915-6. https://doi.org/10.1016/S0140-6736(19)32101-4

6. Ali A, Manzoor MF, Ahmad N, Aadil RM, Qin H, Siddique R, et al. The burden of cancer, government strategic policies, and challenges in Pakistan: a comprehensive review. Front Nutr 2022;9:940514. https://doi.org/10.3389/fnut.2022.940514

7. Sultana R, Tahir S, Ali D. Knowledge, attitude and practices of Pakistani women regarding breast cancer. Pak Armed Forces Med J 2018;68(5):1272-7.

8. Saeed S, Asim M, Sohail MM. Fears and barriers: problems in breast cancer diagnosis and treatment in Pakistan. BMC Women's Health 2021;21:151. https://doi.org/10.1186/s12905-021-01235-2

9. Assaad S, Avrillon V, Fournier ML, Mastroianni B, Russias B, Swalduz A, et al. High mortality rate in cancer patients with symptoms of COVID-19 with or without detectable SARS-CoV-2 on RT-PCR. Eur J Cancer 2020;135:251-9. https://doi.org/10.1016/j.ejca.2020.05.028

10. Brodziak A, Sigorski D, Osmola M, Wilk M, Gawlik-Urban A, Kiszka J, et al. Attitudes of patients with cancer towards vaccinations-results of online survey with special focus on the vaccination against COVID-19. Vaccines 2021;9(5):411. https://doi.org/10.3390/vaccines9050411

11. Villarreal-Garza C, Vaca-Cartagena BF, Becerril-Gaitan A, Ferrigno AS, Mesa-Chavez F, Platas A, et al. Attitudes and factors associated with COVID-19 vaccine hesitancy among patients with breast cancer. JAMA Oncol 2021;7(8):1242-4. https://doi.org/10.1001/jamaoncol.2021.1962

12. Saini KS, Tagliamento M, Lambertini M, McNally R, Romano M, Leone M, et al. Mortality in patients with cancer and coronavirus disease 2019: a systematic review and pooled analysis of 52 studies. Eur J Cancer 2020;139:43-50. https://doi.org/10.1016/j.ejca.2020.08.011

13. Desai A, Gainor JF, Hegde A, Schram AM, Curigliano G, Pal S, et al. COVID-19 vaccine guidance for patients with cancer participating in oncology clinical trials. Nat Rev Clin Oncol 2021;18(5):313-9. https://doi.org/10.1038/s41571-021-00487-z

14. Kelkar AH, Blake JA, Cherabuddi K, Cornett H, McKee BL, Cogle CR. Vaccine enthusiasm and hesitancy in cancer patients and the impact of a webinar. Healthcare (Basel) 2021;9(3):351.https://doi.org/10.3390/healthcare9030351

15. Yusuf A, Sarfati D, Booth CM, Pramesh CS, Lombe D, Aggarwal A, et al. Cancer and COVID-19 vaccines: a complex global picture. Lancet Oncol 2021;22(6):749-51. https://doi.org/10.1016/S1470-2045(21)00244-8

16. Malik A, Malik J, Ishaq U. Acceptance of COVID-19 vaccine in Pakistan among health care workers. PLoS One 2021;16(9):e0257237. https://doi.org/10.1371/journal.pone.0257237

17. Jamal D, Zaidi S, Husain S, Orr DW, Riaz A, Farrukhi AA, et al. Low vaccination in rural Sindh, Pakistan: a case of refusal, ignorance or access? Vaccine 2020;38(30):4747-54. https://doi.org/10.1016/j.vaccine.2020.05.028

18. Khattak FA, Rehman K, Shahzad M, Arif N, Ullah N, Kibria Z, et al. Prevalence of Parental refusal rate and its associated factors in routine immunization by using WHO Vaccine Hesitancy tool: A Cross sectional study at district Bannu, KP, Pakistan. Int J Infect Dis 2021;104:117-124. https://doi.org/10.1016/j.ijid.2020.12.029

19. Abdulsattar B. Ipsos survey on vaccine hesitancy in Pakistan. Ipsos; 2021. [Accessed on: August 20, 2025]. Available from URL: https://www.ipsos.com/en-pk/ipsos-survey-vaccine-hesitancy-pakistan-9th-march-2021

20. Shaukat Khanum Memorial Cancer Hospital & Research Centre. COVID-19 vaccines in Pakistan and cancer patients. 2020. [Accessed on: August 20, 2025]. Available from URL:https://shaukatkhanum.org.pk/about-us/blog/covid-19-vaccines-in-pakistan-and-cancer-patients/

21. Baffert KA, Darbas T, Lebrun-Ly V, Pestre-Munier J, Peyramaure C, Descours C, et al. Quality of life of patients with cancer during the COVID-19 pandemic. In Vivo 2021;35(1):663-70. https://doi.org/10.21873/invivo.12306

22. Polack FP, Thomas SJ, Kitchin N, Absalon J, Gurtman A, Lockhart S, et al. Safety and efficacy of the BNT162b2 mRNA COVID-19 vaccine. N Engl J Med 2020;383(27):2603-15. https://doi.org/10.1056/NEJMoa2034577

23. Al-Mozaini M, Noman ASM, Al-otaibi J, Karim MR, Zahed ASM, Karim ATMR, et al. SARS-CoV-2 viral load is correlated with the disease severity and mortality in patients with cancer. Front Oncol 2021;11:741343.https://doi.org/10.3389/fonc.2021.741343

24. Breast Cancer Now. I lived in a bubble through breast cancer. 2019. [Accessed on: August 20, 2025]. Available from URL: https://breastcancernow.org/about-us/news-personal-stories/i-lived-

in-bubble-through-breast-cancer

25. Kabamba Nzaji M, Kabamba Ngombe L, Ngoie Mwamba G, Banza Ndala DB, Mbidi Miema J, Luhata Lungoyo C, et al. Acceptability of vaccination against COVID-19 among healthcare workers in the Democratic Republic of the Congo. Pragmat Obs Res 2020; 11:103-9. https://doi.org/10.2147/POR.S271096

26. Loulergue P, Mir O, Alexandre J, Ropert S, Goldwasser F, Launay O. Low influenza vaccination rate among patients receiving chemotherapy for cancer. Ann Oncol 2008;19(9):1658. https://doi.org/10.1093/annonc/mdn371

27. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol 2006;3(2):77-101. https://doi.org/10.1191/1478088706qp063oa

28. Ariza-Heredia EJ, Azzi J, Shah DP, Nesher L, Ghantoji SS, Michailidis L, et al. Influenza vaccination in patients with cancer: factors associated with vaccination practices for patients and their household members. Infect Control Hosp Epidemiol 2015;36(10):1239-41.https://doi.org/10.1017/ice.2015.166

29. Moser A, Korstjens I. Series: practical guidance to qualitative research. Part 3: sampling, data collection and analysis. Eur J Gen Pract 2018;24(1):9-18. https://doi.org/10.1080/13814788.2017.1375091

30. Forster M, Wuerstlein R, Koenig A, Amann N, Beyer S, Kaltofen T, et al. COVID-19 vaccination in patients with breast cancer and gynecological malignancies: a German perspective. Breast 2021;60:214-22. https://doi.org/10.1016/j.breast.2021.11.006

31. Khalid S, Usmani BA, Siddiqi S. COVID-19 vaccine hesitancy in Pakistan: a mini review of the published discourse. Front Public Health 2022;10:841842. https://doi.org/10.3389/fpubh.2022.841842

32. Adane M, Ademas A, Kloos H. Knowledge, attitudes, and perceptions of COVID-19 vaccine refusal among healthcare workers in Ethiopia. BMC Public Health 2022;22(1):128.https://doi.org/10.1186/s12889-021-12472-3

33. Göral Türkcü S, Uludağ E, Serçekuş P, Özkan S, Yaren A. Experiences and coping strategies of women receiving treatment for breast and gynecological cancers during the COVID-19 pandemic: a qualitative study. Eur J Oncol Nurs 2021;54:102045.https://doi.org/10.1016/j.ejon.2021.102045

34. Colomer-Lahiguera S, Ribi K, Dunnack HJ, Cooley ME, Hammer MJ, Miaskowski C, et al. Experiences of people affected by cancer during the COVID-19 pandemic: an exploratory qualitative analysis of public online forums. Support Care Cancer 2021;29(8):4971-80. https://doi.org/10.1007/s00520-021-06062-7

35. Savard J, Jobin-Théberge A, Massicotte V, Banville C. How did women with breast cancer experience the first wave of the COVID-19 pandemic? a qualitative study. Support Care Cancer 2021;29(9):5721-7. https://doi.org/10.1007/s00520-021-06178-w

AUTHORS' CONTRIBUTION

The Following authors have made substantial contributions to the manuscript as under:

AAM: Acquisition, analysis and interpretation of data, drafting the manuscript, approval of the final version to be published

SFM & ZR: Conception and study design, analysis and interpretation of data, critical review, approval of the final version to be published

SRQN: Conception and study design, acquisition of data, drafting the manuscript, critical review, approval of the final version to be published

MAR & IAK: Analysis and interpretation of data, drafting the manuscript, approval of the final version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest, whether financial or otherwise, that could influence the integrity, objectivity, or validity of their research work.

GRANT SUPPORT AND FINANCIAL DISCLOSURE

Authors declared no specific grant for this research from any funding agency in the public, commercial or non-profit sectors

DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request