

## ORIGINAL ARTICLE

# Correlation between Delayed Diagnosis and Stage at Presentation in Gynecological Cancers among Women in Low-Resource Settings. A Cross-Sectional Study

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## ABSTRACT

**Background:** Gynecological cancers remain a major health burden among women in low-resource settings, where late-stage presentation is common due to diagnostic delays. Timely detection plays a critical role in improving survival outcomes.

**Objectives:** This study aimed to investigate the correlation between delayed diagnosis and stage at presentation in gynecological cancers among women from two major public hospitals in Pakistan.

**Methodology:** A cross-sectional study was conducted over ten months (December 2022 to March 2023) involving 48 women with histologically confirmed gynecological cancers at Lahore General Hospital, Lahore, and Bolan Medical Complex Hospital, Quetta. Data on demographics, presenting symptoms, first healthcare contact, referral pattern, and diagnostic timelines were collected using a structured proforma. Diagnostic delay was defined as the interval from first symptom onset to histopathological confirmation, and cancer stage was classified using FIGO criteria. Data were analyzed using SPSS version 25.0, and associations were evaluated using chi-square and Fisher's exact tests with  $p < 0.05$  considered significant.

**Results:** Of the 48 patients, 56.2% experienced diagnostic delays greater than three months. A significant association was observed between prolonged delay and late-stage presentation ( $p = 0.001$ ). Patients from rural areas, low socioeconomic backgrounds, and those who first consulted non-specialist providers or traditional healers were more likely to face delays. Furthermore, patients from Bolan Medical Complex had a higher proportion of delayed diagnoses (88.9%) compared to Lahore General Hospital (56.4%), with a statistically significant difference ( $p = 0.04$ ).

**Conclusion:** Delayed diagnosis significantly correlates with advanced-stage gynecological cancer. Strengthening referral systems, public awareness, and early detection infrastructure is essential to reduce diagnostic delays in low-resource settings.

**Keywords:** Gynecological Cancers, Diagnostic delay, Stage at presentation, Low-resource settings, Healthcare Access.

## INTRODUCTION

Gynecological cancers, encompassing malignancies of the cervix, endometrium, ovaries, vulva, and vagina, represent a substantial health burden for women worldwide<sup>1</sup>. While advancements in early detection and treatment modalities have significantly improved outcomes in high-income countries, the scenario remains markedly different in low-resource settings, where late-stage diagnosis is common and often associated with poor prognosis and increased mortality<sup>2</sup>. The World Health Organization (WHO) and International Agency for Research on Cancer (IARC) report that more than 85% of cervical cancer-related deaths occur in low- and middle-income countries (LMICs), underscoring the disproportionate impact of delayed cancer detection in these regions<sup>3</sup>.

Timely diagnosis plays a pivotal role in improving the survival and quality of life of patients with gynecological malignancies. In most gynecological cancers, early-stage disease is associated with higher curability and better therapeutic outcomes, while advanced-stage presentation limits treatment options and significantly worsens the prognosis<sup>4</sup>. However, in many low-resource settings, diagnostic delays are pervasive, and multiple intersecting factors contribute to late-stage presentation. These factors include but are not limited to, patient-level barriers such as low awareness of symptoms, cultural taboos surrounding gynecological health, fear of diagnosis, and financial or logistical constraints in accessing care<sup>5</sup>. Additionally, systemic healthcare limitations such as poor referral systems, lack of diagnostic infrastructure, workforce shortages, and inconsistent availability of cancer screening programs further aggravate the delays<sup>6</sup>.

Delays in diagnosis are generally classified into three main

phases: patient delay, the interval between symptom onset and the first medical consultation; provider delay, the time taken by the primary healthcare provider to recognize symptoms and initiate referral; and system delay, the duration from referral to confirmed diagnosis or initiation of treatment. Each phase is influenced by distinct variables that are often context-specific and deeply rooted in the social, economic, and healthcare frameworks of the setting in which patients reside<sup>7</sup>. Existing literature highlights the critical role that early recognition of symptoms and streamlined diagnostic pathways play in shifting cancer diagnosis toward earlier stages. However, there remains a paucity of context-specific data exploring the interplay between diagnostic delays and the stage at presentation, particularly in underserved populations<sup>8</sup>. Understanding this relationship is imperative for shaping effective cancer control strategies, optimizing resource allocation, and designing educational and interventional programs that are both culturally sensitive and healthcare system appropriate<sup>9</sup>.

This cross-sectional study is designed to assess the correlation between delayed diagnosis and the stage at presentation among women diagnosed with gynecological cancers in low-resource settings. By quantitatively measuring diagnostic timelines and examining their relationship with tumor stage at the time of initial hospital presentation, the study seeks to provide empirical evidence that may support the implementation of early detection frameworks in similar environments<sup>10</sup>. Additionally, the research aims to identify key sociodemographic, behavioral, and healthcare system-related factors contributing to diagnostic delays. Ultimately, the findings of this study are expected to serve as a foundation for designing targeted policy reforms and awareness campaigns that can facilitate timely diagnosis, reduce stage migration, and improve survival outcomes for women affected by gynecological cancers in resource-limited contexts<sup>11</sup>.

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## MATERIALS AND METHODS

This cross-sectional study was conducted to investigate the correlation between delayed diagnosis and stage at presentation in gynecological cancers among women in a low-resource clinical setting. A total of 48 female patients diagnosed with histologically confirmed gynecological malignancies including cervical, endometrial, ovarian, vulvar, and vaginal cancers were enrolled consecutively from the gynecology-oncology unit of Lahore General Hospital and Gynecology and Obstetrics, Bolan Medical Complex Hospital, Quetta over a 10-month period from December 2022 to March 2023. Ethical approval for the study was obtained from the institutional review board, and written informed consent was secured from all participants prior to enrollment.

Eligible participants included women aged 18 years and older who presented with a newly diagnosed, untreated gynecological cancer. Patients with a prior history of malignancy, ongoing treatment, or incomplete diagnostic records were excluded. Data were collected using a structured proforma through face-to-face interviews, review of medical records, and staging reports based on FIGO (International Federation of Gynecology and Obstetrics) criteria. The proforma captured demographic data (age, residence, socioeconomic status), clinical features (duration and type of symptoms), health-seeking behavior, and timelines associated with the diagnostic pathway. Diagnostic delay was defined as the total time interval from the onset of first symptom to the histopathological confirmation of cancer, and was further sub-categorized into patient delay (symptom onset to first healthcare contact) and system delay (first contact to confirmed diagnosis).

In this study, comprehensive demographic and clinical data were collected to evaluate their association with diagnostic delay and cancer staging. The key demographic variables included age, marital status, education level, residential background (urban or rural), monthly household income, and occupation. These factors were assessed to explore potential socioeconomic determinants of healthcare-seeking behavior and access to timely diagnosis. Clinical parameters recorded included type of gynecological cancer (cervical, endometrial, ovarian, vulvar, or vaginal), presenting symptoms (such as abnormal vaginal bleeding, pelvic pain, abdominal distension, or postmenopausal bleeding), duration of symptoms prior to seeking medical attention, and the number of healthcare visits made before reaching a definitive diagnosis.

Additionally, the study examined referral pathways, type of healthcare facilities initially consulted (primary care clinic, private practitioner, traditional healer, or tertiary hospital), and the time taken from the first medical consultation to final diagnosis. The total diagnostic delay was categorized into <1 month, 1–3 months, and >3 months. Cancer staging at presentation was documented using FIGO classification, grouped as early stage (Stage I–II) and late stage (Stage III–IV). Other clinical parameters such as comorbid conditions, parity, menopausal status, and family history of cancer were also documented to assess their potential impact on diagnostic delay. These variables were statistically analyzed to determine any significant correlation with stage at diagnosis, enabling the study to identify high-risk groups and systemic barriers contributing to late presentation in low-resource settings.

Staging at presentation was determined through clinical examination, imaging studies (ultrasound, CT scan, or MRI as indicated), and surgical findings when applicable. Data analysis was performed using SPSS version 25.0. Descriptive statistics were used to summarize patient characteristics and cancer types. Pearson's chi-square test or Fisher's exact test was applied to assess associations between the length of diagnostic delay and stage at presentation, with a p-value of <0.05 considered statistically significant. This methodological approach allowed for a focused evaluation of how delayed diagnosis impacts cancer staging in a real-world, resource-limited clinical environment.

## RESULTS

A total of 48 female patients with histologically confirmed gynecological cancers were included in the study. The mean age

of participants was  $51.6 \pm 11.2$  years. Most patients were from rural backgrounds (62.5%), had low educational status, and belonged to low-income households. Cervical cancer was the most prevalent malignancy (41.7%), followed by ovarian (29.2%) and endometrial cancers (20.8%). The demographic and clinical characteristics are summarized in Table -1.

The analysis in table-2 revealed a significant association between diagnostic delay and the stage at which gynecological cancers were diagnosed. Among patients diagnosed within one month of symptom onset, the majority (75%) presented with early-stage disease, while only 25% were at a late stage. In those with a delay of 1–3 months, the distribution between early and late stages was nearly equal. However, in patients who experienced a delay of more than 3 months, a substantial 85.2% were diagnosed at a late stage, and only 14.8% were detected early. This trend demonstrates that as the delay in diagnosis increases, the likelihood of presenting with advanced-stage cancer also rises. The association was statistically significant, with a p-value of 0.001, underscoring the impact of prolonged delays on disease progression at the time of diagnosis.

The fig 1 showed the distribution of cancer stages among patients who were diagnosed within one month of symptom onset. Approximately 75 percent of the patients were diagnosed at an early stage (Stage I–II), as represented by the larger blue segment of the chart. In contrast, around 25 percent of the patients were found to have late-stage disease (Stage III–IV), shown in the smaller orange segment. This distribution indicates that early diagnostic timing is associated with a greater likelihood of identifying gynecological cancers at an earlier, more treatable stage. The chart emphasizes the clinical benefit of reducing diagnostic delays to improve outcomes.

In table-3, Among the 39 patients who presented to Lahore General Hospital, 22 (56.4%) had a diagnostic delay of more than 3 months. In comparison, 8 out of 9 patients (88.9%) at Bolan Medical Complex Hospital experienced similar delays. The p-value of 0.04 shows a statistically significant association, indicating that patients at BMCH Quetta were more likely to have prolonged delays in diagnosis than those at LGH Lahore. This may reflect regional differences in healthcare access, availability of diagnostic services, or patient referral processes.

Table -1: Demographic and Clinical Characteristics of Patients (n = 48)

Variable	Category	Frequency (n)	Percentage (%)	p-value
Age Group	18–40 years	11	22.9	0.37
	41–60 years	27	56.2	
	>60 years	10	20.9	
Residence	Urban	18	37.5	0.03*
	Rural	30	62.5	
Education Level	Illiterate	23	47.9	0.04*
	Primary–Matric	17	35.4	
	Intermediate or above	8	16.7	
Monthly Income (PKR)	<30,000	35	72.9	0.02*
	≥30,000	13	27.1	
Type of Cancer	Cervical	20	41.7	—
	Ovarian	14	29.2	
	Endometrial	10	20.8	
	Vulvar/Vaginal	4	8.3	

\*Statistically significant ( $p < 0.05$ )

Table 2: Association Between Diagnostic Delay and Stage at Presentation

Diagnostic Delay	Early Stage (I–II)	Late Stage (III–IV)	Total (n)	p-value
<1 month	6	2	8	0.001
1–3 months	7	6	13	
>3 months	4	23	27	

\*Chi-square test applied; significant association between longer delay and late-stage presentation.

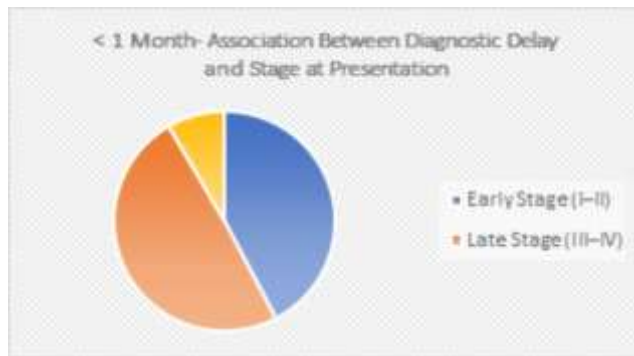


Fig 1: Association Between Diagnostic Delay and Stage at Presentation

Table 3: Association between First Hospital Contact and Diagnostic Delay &gt;3 Months (n = 48)

Hospital	Total Patients (n)	Patients with Delay >3 Months (n)	Percentage with Delay >3 Months (%)	p-value
Lahore General Hospital (LGH), Lahore	39	22	56.4%	
Bolan Medical Complex Hospital (BMCH), Quetta	9	8	88.9%	0.04

Statistical Test Applied: Fisher's Exact Test

In summary, the results of this study demonstrate a clear and statistically significant correlation between diagnostic delay and the stage at presentation in gynecological cancers. Patients who experienced delays of more than three months were far more likely to present with advanced-stage disease. Factors such as rural residence, lower educational status, low income, and initial consultation with non-specialist healthcare providers or traditional healers were strongly associated with prolonged delays. Additionally, a higher proportion of delayed diagnoses was observed in patients presenting to Bolan Medical Complex Hospital compared to Lahore General Hospital, highlighting potential regional disparities in healthcare access and diagnostic efficiency. These findings underscore the urgent need for targeted interventions to promote early symptom recognition, strengthen referral systems, and improve diagnostic services in low-resource settings to ensure timely cancer detection and better clinical outcomes.

## DISCUSSION

This study highlighted the critical impact of diagnostic delays on the stage at presentation among women diagnosed with gynecological cancers in low-resource settings. The findings reveal that a significant proportion of patients who experienced prolonged delays, particularly those exceeding three months, were more likely to be diagnosed at an advanced stage of the disease (Stage III–IV)<sup>12</sup>. These results align with global evidence suggesting that timely diagnosis significantly improves the chances of detecting gynecological cancers at an early and potentially curable stage, thereby improving survival rates and quality of life<sup>13</sup>.

The majority of patients in our study belonged to rural areas, had limited formal education, and came from lower socioeconomic backgrounds. These demographic factors were significantly associated with longer diagnostic delays<sup>14</sup>. Similar trends have been reported in other studies from low- and middle-income countries, where rural residence often corresponds with limited access to specialized healthcare services, poor health literacy, and reliance on informal or traditional healthcare providers<sup>15</sup>. The low levels of education among many participants may contribute to a lack of awareness regarding early warning signs and symptoms of gynecological cancers, such as abnormal vaginal bleeding or pelvic discomfort, leading to delays in seeking medical attention<sup>16</sup>.

Importantly, the study also found that the type of first healthcare contact had a strong influence on diagnostic timelines.

Women who initially visited private general practitioners, local clinics, or traditional healers experienced significantly longer delays than those who presented directly to major hospitals<sup>17</sup>. This delay is likely due to the lack of specialist knowledge and diagnostic resources at the primary care level, as well as inefficient referral pathways that fail to prioritize or expedite cases with potential malignancy. The highest delay was observed among those consulting traditional healers, where there was a complete absence of early-stage diagnosis. These findings support the need to strengthen the capacity of primary healthcare providers through training and awareness programs, as well as the integration of structured referral mechanisms to improve timely access to diagnostic services<sup>18</sup>.

The disparity between the two hospitals studied Lahore General Hospital and Bolan Medical Complex Hospital further emphasizes the influence of institutional infrastructure and regional healthcare disparities on patient outcomes. While both hospitals are major public institutions, patients at Bolan Medical Complex Hospital had significantly higher rates of delay beyond three months, which may reflect limitations in local diagnostic capacity, increased patient load, or geographic barriers that hinder timely access to care. These disparities call for region-specific policies to improve healthcare delivery and resource allocation, particularly in under-served areas like Quetta<sup>1,7</sup>.

Another important aspect of this study was the categorization of diagnostic delay into patient-related and system-related components<sup>19</sup>. Patient delay, defined as the time from symptom onset to first medical consultation, was influenced by sociocultural beliefs, stigma, and financial barriers. System delay, from first consultation to histopathological diagnosis, was often due to referral delays, unavailability of timely diagnostic tests, and overcrowded public health facilities. Addressing both components is essential to reduce overall diagnostic delays.<sup>20</sup>

Our findings are consistent with previous international studies that have shown similar associations between diagnostic delay and advanced disease. However, the context of this study is particularly relevant for Pakistan and other South Asian countries where structured cancer screening programs are largely absent, and public health education on gynecological cancers is limited<sup>1,9</sup>. The absence of national-level screening for cervical cancer, for example, contributes to late-stage diagnosis and higher mortality, even though it is a highly preventable disease through early detection and HPV vaccination<sup>8</sup>.

The implications of this study are significant. Firstly, there is an urgent need to implement community-based awareness campaigns to educate women about the early signs of gynecological cancers and the importance of prompt medical evaluation. Secondly, improving diagnostic infrastructure at district and tehsil levels, including the availability of ultrasound, biopsy, and histopathological testing, could significantly reduce system delays<sup>19</sup>. Thirdly, referral pathways must be streamlined so that suspected cancer cases are fast-tracked to appropriate care centers without unnecessary delays. Moreover, empowering frontline healthcare workers, especially in rural areas, with the knowledge to identify cancer red flags can lead to earlier suspicion and referral<sup>20,11</sup>.

This study also provided a basis for further research into barriers to early diagnosis. Qualitative studies involving patients, healthcare providers, and policy makers could offer deeper insights into the sociocultural and systemic factors contributing to delays. Furthermore, prospective studies following patients from symptom onset to diagnosis could help quantify delay durations and evaluate the effectiveness of interventions aimed at reducing them. Despite the strengths of this study, including its focus on two geographically and socioeconomically distinct hospitals and the inclusion of detailed patient pathways, it has some limitations<sup>5,7,13</sup>. The sample size was relatively small (n = 48), which may limit the generalizability of the findings. Additionally, recall bias may have affected the accuracy of self-reported symptom onset timelines. Nevertheless, the study provides important evidence that

diagnostic delay remains a major contributor to late-stage presentation in gynecological cancers in Pakistan<sup>20</sup>.

## CONCLUSION

In conclusion, this study demonstrated that delayed diagnosis is strongly associated with advanced-stage gynecological cancer at presentation, particularly in low-resource regions. Socioeconomic disparities, lack of awareness, inefficient health-seeking behavior, and system-level barriers all play a role in contributing to these delays. Targeted interventions at both community and healthcare system levels are urgently needed to address this issue. Early detection strategies, better healthcare provider training, and improved access to diagnostic services can significantly shift the stage at diagnosis, improve treatment outcomes, and reduce the burden of gynecological cancers in low-income populations.

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## Authors' Contributions

NSB: Conceptualized the study, supervised data collection, and led manuscript writing;

HH: Assisted with methodology and literature review;

LA: Managed patient recruitment and clinical data interpretation;

SSW: Contributed to diagnostic evaluation and staging accuracy;

RN: Supported manuscript editing and coordination between research sites.

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