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# Pathways to care for patients in Pakistan experiencing signs or symptoms of breast cancer

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ABSTRACT

Multiple social and financial barriers exist to breast cancer detection in Pakistan, which may cause a delay in seeking care and the final diagnosis. This analytical study documents the pathways and time courses associated with referral to diagnostic centres to evaluate the clinical signs and symptoms of breast cancer. This report also verifies the association between socio-demographic and clinical indicators concerning the length of time spent before reaching diagnostic facilities. A purposive sample of 200 patients was selected from two tertiary care hospitals in Lahore, Pakistan, for the interviews. Descriptive statistics (that is, percentages, frequencies, and measures of central tendencies) and a multiple linear regression model were used to achieve the study objectives. The descriptive model showed 31–128 days interval between a patient's awareness of a clinical sign or symptom and receiving care. The healthcare system, including traditional healers, took from 7 to 194 days, and the time to diagnosis ranged from 15 to 30 days. Pain severity, larger tumour size, lack of clinical improvement, and the desire to obtain better treatment were reasons given for seeking care, but lack of awareness and fear of financial burden related to accessing healthcare facilities were identified as barriers. Moreover, socio-demographic and other predictive clinical factors were potentially associated with and substantially influenced the likelihood of the increased length of breast cancer patients' time to reach diagnostic centres. In conclusion, referrals by multiple healthcare providers, especially traditional healers and general practitioners, was a significant predictor for delay in diagnosis. Therefore, increased awareness and a responsive healthcare system may reduce the time from the recognition of symptoms to the early detection of breast cancer among women, thus improving outcomes in a developing country.



## 1. Introduction

At the 2011 United Nations General Assembly Summit on non-communicable diseases [1], breast cancer was reported as the most prevalent cause of cancer mortality (12.7%) among women in low- and middle-income countries [2]. Moreover, 1.67 million incident cases in 2012 make breast cancer the second most common cancer among women worldwide (25% of all cancers) [3].

Breast cancer is also a major cause of death among Pakistani women [4], with approximately 90,000 new cases diagnosed each year [5]. Unfortunately, exact figures for cancer incidence and mortality are unknown in Pakistan because of limited surveillance and lack of a national cancer registry [6]. However, one report on breast cancer mortality among Pakistani women stated that there were 16,170 deaths per year [7]. Despite the public health burden of breast cancer in Pakistan, there are no public or private mechanisms to support women in obtaining diagnostic care or timely treatment. Thus, 83.5% of patients present to diagnostic centres with advanced-stage disease [8].

According to the World Bank, the government of Pakistan spends only US $37.99 per capita per annum on healthcare, which is lower than the US $44 recommended by the World Health

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Organisation for essential health services [9]. Pakistan spends more per capita on health services than Bangladesh (US $31.84) but less than all other South Asian countries (Bhutan [US $91.11], India [US $63.32], the Maldives [US $943.94], Nepal [US $44.42], and Sri Lanka [US $117.87]) [9].

In addition to the low levels of healthcare expenditures, there are multiple barriers to the early detection of breast cancer in Pakistan. As in many other developing countries, Pakistanis have longstanding cultural traditions and religious beliefs that places decision-making in the hands of the family [10]. People live in extended families with well-defined power structures wherein familial relationships are not merely horizontal but also vertical across generations. Therefore, in case of illness, the family rather than the patient is involved in the process of medical decision-making [10]. On the other hand, physicians are also held in high esteem by a society that respects authority and overlooks hierarchal systems similar to other Asian societies, such as Japan [11]. Moreover, screening and early detection services for breast cancer are poor [12]. Most Pakistanis (63.62%) live in rural areas [13] that have few basic and rural health centres. Thus, people often rely on traditional treatments, including herbal medicines and spiritual healing [14,15]. Cultural beliefs and practises often influence the patients to indulge in self-care, use home remedies, or consult traditional healers [14]. Moreover, 42% of the Pakistani population is illiterate [13]; thus, many struggle to gain access to diagnostic facilities. However, there are no systems to provide patient navigation or care coordination to assist symptomatic patients to access facilities that can provide diagnostic and treatment services. Cancer treatment is often unaffordable in Pakistan due to lack of governmental support. Consequently, patients and their families may feel that obtaining medical care is a devastating financial burden [8].

Understanding patient experiences is crucial for developing useful health interventions to address these problems. Therefore, the primary objective of this study was to use time assessments to document various pathways that patients experience prior to access/referral to diagnostic centres for evaluation of signs and symptoms suspicious for breast cancer. Moreover, time to access diagnostic centres for tests and procedures to establish the diagnosis of breast cancer were also assessed. The reasons for initially choosing an alternative medical approach (e.g., homeopathic, *hikmat*, or spiritual treatment) and subsequently modern science-based medicine were explored. This study also verifies the association of various socio-demographic and clinical indicators on the length of breast cancer patients' time before reaching diagnostic facilities.

## 2. Materials and methods

### 2.1. Study design

This analytical study was conducted between August and December 2015.

### 2.2. Ethical approval

The Institutional Review Board (IRB) at Lahore/Mayo Hospital of King Edward Medical University reviewed and approved this study (No. 348/RC/KEMU).

### 2.3. Study setting

This study was conducted in Lahore, the provincial capital of Punjab, Pakistan. Two major public tertiary care hospitals in this area provide comprehensive breast cancer care: Jinnah Hospital and Mayo Hospital. The surgery, radiotherapy, chemotherapy, and oncology departments at these locations were chosen as sites from which patients were selected for study participation.

### 2.4. Participant recruitment

One researcher and one physician reviewed hospital medical records for 274 patients to identify 200 potential participants who met the inclusion and exclusion criteria. Prior to data collection, introductory leaflets were provided to patients in the local language, Urdu. These leaflets described the benefits and risks of the research, the IRB approval, and provisions to maintain confidentiality. All of the participants then provided written informed consent.

Patients were eligible if they were 18 years of age or older and female, had primary malignant breast cancer (as staged by the American Joint Committee on Cancer [16]), had been under treatment for at least 3 months but not more than 2 years [8], and were able to provide informed consent. Those who could not understand and speak English, Urdu, Saraiki, or Punjabi were excluded from this study. The time interval in the inclusion criteria was selected because it was recent enough for patients to have comprehensive recall of their experiences in detail [8,17].

### 2.5. Sample size and sampling technique

The patients were selected based on the inclusion and exclusion criteria as previously described. A purposive sampling technique was used to identify 200 patients with breast cancer. Over a study period of five months, 42.5% (n = 85) of the participants were recruited from Jinnah Hospital and 57.5% (n = 115) from Mayo Hospital.

### 2.6. Study instrument development

Development of the study instrument was informed by findings from a previous study [8] and created under the direction of a multi-disciplinary research team. The survey instrument was further pre-tested with 10 patients with breast cancer who were receiving care at Jinnah Hospital to assess question presentation, face validity, acceptability, and ease of understanding. The questionnaire required little modification, and data were collected on several variables.

### 2.7. Demographic characteristics

Ten survey items assessed demographic information. The participants were asked their age (confirmed using the national identity card), highest educational level attained, marital status (single, married, or other), highest educational level attained by the patient's spouse (if married), family size, monthly household income (in Pakistani rupees), patient employment status at time of diagnosis (self-employed, employed, or housewife), patient current employment status (employed or unemployed), geographical area (rural or urban), and distance from the patient's home to the nearest public tertiary care hospital (less than 10, 10–29, 30–99, 100–199, or 200 or more kilometres). The distances between patient residences and the nearest hospitals were determined using a Global Positioning System. To preserve participant anonymity, locations were deleted from the Global Positioning System log in real time.

### 2.8. Medical characteristics

Three survey items assessed patient medical characteristics: family history of breast cancer (yes or no), time (in days) between

breast cancer diagnosis and treatment initiation, and breast cancer stage as determined by the American Joint Committee on Cancer staging system [16].

### 2.9. Routes taken to obtain care from health consultants and at cancer diagnostic centres

Two open-ended questions addressed the choice of initial practitioner for the evaluation of the signs and symptoms suspicious for breast cancer. The first question asked the patients to list all types of practitioners consulted, and the second asked the amount of time spent obtaining treatment from that practitioner (in days). Three additional survey items requested the name of the referring health consultant, the reasons for choosing alternative medical treatment (e.g., homeopathic, *hikmat*, or spiritual treatment), and the reasons for choosing modern science-based medicine.

### 2.10. Time between presentation to diagnostic centre and breast cancer diagnosis

Three open-ended questions assessed the time between presentation to various diagnostic centres and the receipt of a breast cancer diagnosis. The patients were questioned about the number of cancer diagnostic centres visited, the time (in days) required to complete diagnostic procedures, and any reasons for diagnostic intervals.

### 2.11. Data collection

The principal investigator conducted all interviews at the two hospitals. The interviews ranged from 30 to 40 min and were conducted in the respondent's preferred language, Saraiki, Urdu, or Punjabi.

### 2.12. Study measures

The time interval between experiencing signs and symptoms and seeking first treatment was designated as the “patient interval,” and the time between presentation and referral to a diagnostic centre as the “referral interval” [18,19]. The time interval from presentation at a diagnostic centre to receipt of a diagnosis of breast cancer was designated as the “diagnostic interval” [20]. According to Hoth et al. [21], the term “illness uncertainty” (IU) refers to ambiguity or complexity related to treatment. Ambiguity concerns patients' uncertainty about physical cues and symptoms, whereas complexity concerns patients’ uncertainty about treatment and the medical system. IU was used to describe cases in which a patient visited one or more health practitioners but remained uncertain as to her diagnosis. The patients who sought care at the diagnostic centre upon recommendation of a healthcare practitioner were classified as “patient referred.”

### 2.13. Type of health practitioner

Health practitioners were classified into one of five categories corresponding to the local health-seeking behaviours in Pakistan [22]. “*Pir*” from the Persian word for “old man” or “respected elder” [23] is a general term for a spiritual guide, holy man, or wielder of spiritual power and blessing. “*Hakim*” is defined as a traditional healthcare provider or drug vendor practising Greek/Unani medicine (that is, medical practise that originally started in Greece and was later adopted and further developed by Arabs) [24]. A “homeopathic doctor” is defined as one who practises an alternative medicine in which specific health problems are treated by the ingestion of small amounts of substances that, in larger amounts, may cause the same problem in a healthy person [25,26]. A “general practitioner” (GP) is a modern science-based medicine-trained physician who does not specialise in a single medical area but who provides routine healthcare, assessment, and treatment of many different conditions, including illnesses and injuries. A “consultant” is defined as a senior physician who practises in one of several medical specialties and who typically works in his/her private clinic. This latter form of care is frequently unaffordable for patients.

### 2.14. Local healthcare system

This measure was coded based on patient preference for initial practitioner consultation for the evaluation of breast cancer signs and symptoms.

### 2.15. Descriptive model

Using the study variables, a descriptive model was developed to determine patient preferences for selecting health practitioners for the initial assessment of signs and symptoms suspicious for breast cancer. Based on the data obtained in the current study, six routes were identified. The first route was direct care-seeking at a diagnostic centre without first consulting a local health practitioner. The five other routes involved the patients first seeking care from one of five types of health practitioners: *pir*, *hakim*, homeopathic doctor, GP, or consultant. For patients who visited more than one health practitioner, the sequence of care-seeking was mapped in chronologic order. Referral by a non-healthcare provider to a tertiary care hospital or diagnostic centre was designated as a post-route. This post-route group also included women who were influenced to visit diagnostic centres by husbands, friends, or family members. Furthermore, the time taken by the diagnostic centres to confirm the diagnosis of breast cancer was also included in the model.

### 2.16. Statistical analysis

All of the data were entered into a Microsoft Excel database (Microsoft Corporation, Redmond, WA, USA) and analysed using the Statistical Package for Social Sciences 22.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics (i.e., percentages, frequencies, and measures of central tendency) were used to summarise socio-demographic and medical-related indicators. Microsoft Word was used to draw figures delineating the routes.

A multiple linear regression model was used to verify the association of the various socio-demographic and medical-related indicators (patient age in years, stages of breast cancer (that is, stage II = 1, stage III = 2, and stage IV = 3), employment status of the patients prior to the diagnosis of breast cancer (that is, self-employed = 1, employed = 2, and housewife = 3), and the patient's time spent obtaining treatment from *pir*, *hakim*, and GPs in days) with the patients' time spent from self-evaluation of symptoms suspicious of breast cancer until presentation to a diagnostic centre. The data for the multiple linear regression model were analysed using SAS statistical software (version 8.1; SAS Institute, Cary, NC, USA).

## 3. Results

The participants’ medical and demographic characteristics are presented in Table 1. The median age of the study subjects was 45 years (range, 22–70 years), and the median length of school attendance was 2 years (range, 0–16 years). Most of the

**Table 1**
Demographic and medical characteristics of the participants (n = 200).

| Characteristics | Median (IQR) | Range | Frequency | Percentages |
|---|---|---|---|---|
| Patient's age | 45.0 (14.25) | 22–70 | – | – |
| Patient's education | 2.0 (10.0) | 0–16 | – | – |
| Husband's education | 8.0 (7.0) | 0–16 | – | – |
| Family size | 7.0 (5.0) | 2–21 | – | – |
| Monthly household income (PKR) | 15,250 (20,000) | 0.0–150,000 | – | – |
| *Marital status* | | | | |
| Married | – | – | 169 | 84.5 |
| Single | – | – | 3 | 1.5 |
| Widowed | – | – | 25 | 12.5 |
| Separated | – | – | 3 | 1.5 |
| *Employment status before breast cancer diagnosis* | | | | |
| Self-employed | – | – | 19 | 9.5 |
| Employed | – | – | 35 | 17.5 |
| Housewife | – | – | 146 | 73.0 |
| *Area of residence* | | | | |
| Urban | – | – | 95 | 47.5 |
| Rural | – | – | 105 | 52.5 |
| *Distance of residential district from tertiary care (km)* | | | | |
| <10 | – | – | 41 | 20.5 |
| 10–29 | – | – | 39 | 19.5 |
| 30–99 | – | – | 35 | 17.5 |
| 100–199 | – | – | 48 | 24.0 |
| ≥200 | – | – | 37 | 18.50 |
| *Stage of breast cancer* | | | | |
| Stage II | – | – | 36 | 18.0 |
| Stage III | – | – | 108 | 54.0 |
| Stage IV | – | – | 56 | 28.0 |
| *Family history of breast cancer* | | | | |
| Yes | – | – | 40 | 20.0 |
| No | – | – | 160 | 80.0 |

participants (85%) were married and the husbands had attended school for 8 years on average (range, 0–16 years). At diagnosis, 27% of the participants were employed, but that rate decreased to 3.5% at the time of interview. The median household size was 7 persons (range, 2–21), and the median monthly income was 23,552 Pakistani rupees (range, 0–150,000). One in five of the participants (20%) reported a family history of breast cancer. The median length of treatment was 6 months (range, 3–28 months; interquartile range [IQR], 8.0 months) at the time of the survey.

Fig. 1 shows the timeline from sign and symptom awareness to breast cancer diagnosis. Of the 200 participants, 16% followed a direct route to diagnostic centres with a patient interval of 150 days (IQR, 299.50 days). The remaining 168 patients (84%) sought a health practitioner to evaluate signs or symptoms suspicious for breast cancer. Patients who reported to a health practitioner had a shorter patient interval (range, 31–128 days) compared with those who pursued a direct route for obtaining diagnostic services (i.e., 150 days [IQR, 299.50 days]). Of the 168 patients who did not pursue a direct route, 95 (56.55%) sought care from a *pir* and experienced a referral interval of 180 days (IQR, 332 days). All of the patients who received care from a *pir* experienced IU and 77 (81.05%) subsequently obtained care from another health practitioner. The remaining 18 (18.95%) patients presented for tertiary care without referral from the *pir*. Those who sought care from a *hakim* (24) also failed to receive a diagnosis and, consequently, received no referral to appropriate healthcare facilities. Of patients who received care from a homeopathic doctor (14), 2 (14.29%) were referred to diagnostic centres. GPs were visited by 55 patients, of whom 35 (63.64%) were referred to diagnostic centres. Only 15 patients visited consultants; however, 12 of those (80%) were then referred to diagnostic centres.

On average, those seeking care from a *hakim* experienced the longest referral interval (median, 194 days; IQR, 360 days). Of the 11 patients who pursued this route initially, 3 (27.27%) experienced IU and 8 (72.73%) later consulted GPs or consultants. The referral interval experienced by those who first visited a homeopathic doctor was 90 days (IQR, 78.5 days) and all of these patients experienced IU. Those who initially visited a GP had a referral interval of 30 days (IQR, 88 days) but were referred for diagnostic services in 69.23% of cases. The patients who visited a consultant experienced a referral interval of only 7 days on average (IQR, 23 days), with 100% being referred to diagnostic centres.

Fig. 1 shows that 63.69% of the patients who presented to diagnostic centres were referred by their health practitioners. The 36.31% of patients who arrived at diagnostic centres directly did so by self-referral (22.95%) or upon accepting guidance from others, such as relatives (22.9%) and neighbours (16.39%).

Fig. 2 shows the time taken at different diagnostic centres to confirm breast cancer diagnosis by the number of patients visiting each facility. Of the 200 patients, 161 (80.5%) experienced diagnostic intervals of 30 days (IQR, 45.00 days). A further 39 patients (19.5%) visited a second facility, where 33 (84.62%) were diagnosed after a median interval of 15 days (IQR 23.00). The remaining 6 patients had to visit a third diagnostic centre to obtain a diagnosis after a 22.5-day interval (IQR, 34.75 days).

Table 2 shows the patient responses regarding why they sought treatment with traditional health practitioners (that is, *pir* and *hakim*). Lack of disease awareness (26.32%), fear of surgery (21.93%), older family members' traditional beliefs about spiritual treatment (15.79%), and advice from friends and family (14.91%) to consult *pir* and *hakim* were commonly reported. The most common responses to the follow-up question, "What was the reason for approaching the modern science-based medicine practitioners later," was answered as a desire for health practitioner counselling (51.75%) and to address pain severity (30.70%).

Table 3 shows the direction and strength of the relationships between the outcome variables (that is, delay in diagnosis due to patient and referral intervals) and the number of predictor

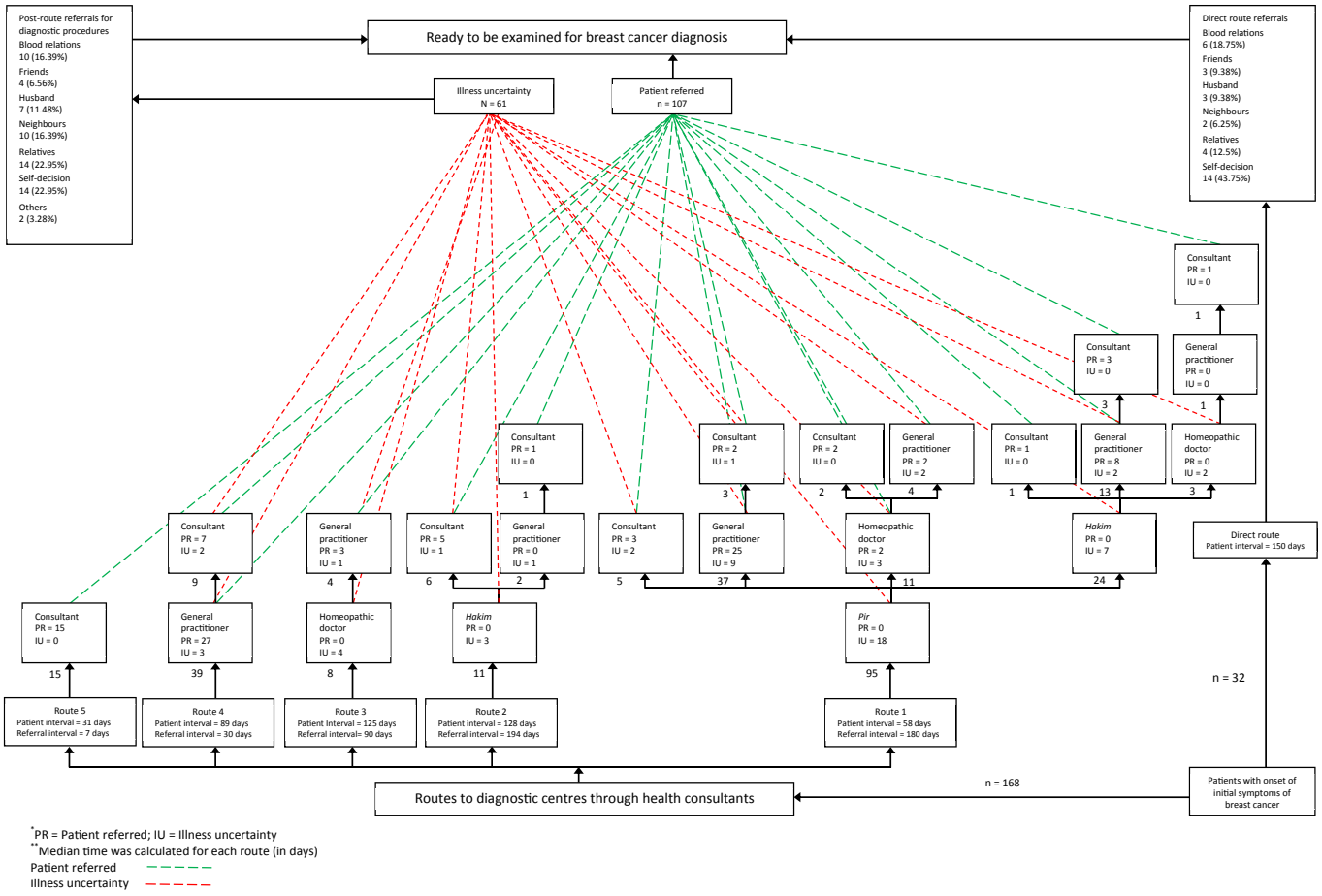


**Fig. 1.** Routes to diagnostic centres through health consultants.

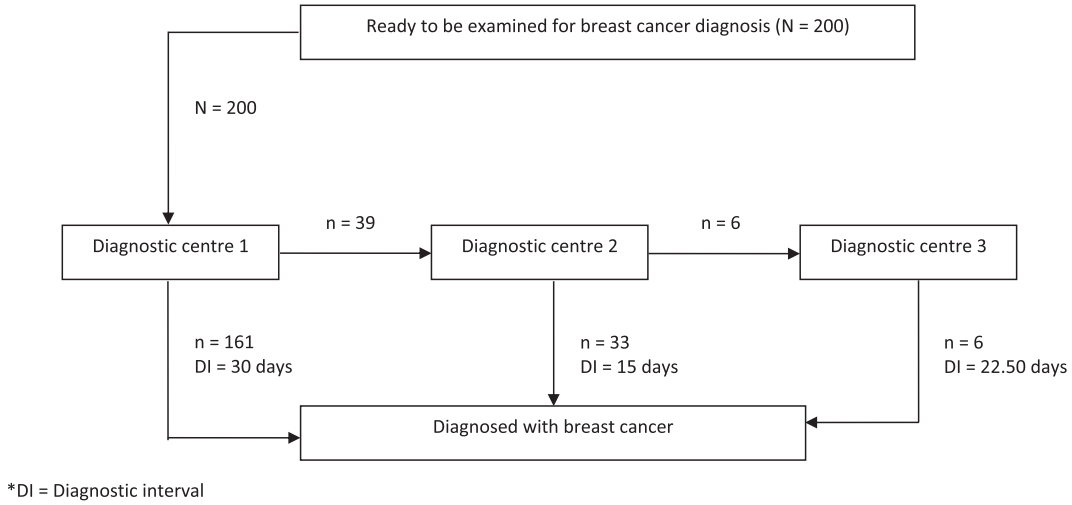


**Fig. 2.** Time taken by the diagnostic centres to confirm breast cancer.

variables in the econometric model. The results delineate positive relationships between all of the independent variables and the dependent variable except for the employment status of the patients, which showed a negative direction. Analysis also indicated that a one-year increase in the age of the target patients caused an approximately five and half day increase in the time toward the diagnosis of breast cancer due to the patient and referral intervals. Moreover, advancement in each breast cancer stage took an average 84.7 days' time in breast cancer diagnosis. As per the observations and results of the regression analysis, employment status also plays an important role in timely disease diagnosis due to patient employment status. A negative relationship between employment

**Table 2**
Reasons to opt/follow up the treatment methods with health practitioners other than modern science-based medicine (N = 114).

| Reasons | Frequency | Percentage |
|---|---|---|
| *Reasons to opt/follow up the treatment endeavours other than modern science-based medicine* | | |
| Lack of awareness | 30 | 26.32 |
| Fear of surgery | 25 | 21.93 |
| Ancestors' and self-belief in spiritual treatment | 18 | 15.79 |
| Friends and family advice to consult *pir* and *hakim* | 17 | 14.91 |
| Family pressure to avoid modern science-based medicine | 10 | 8.77 |
| Fear of expensive treatment | 7 | 6.14 |
| Misconception of evil spirit attack | 3 | 2.63 |
| Someone previously cured successfully | 3 | 2.63 |
| Misguided by the doctor | 1 | 0.88 |
| *Reasons for approaching modern science-based medicine afterward* | | |
| Health practitioner counselling | 59 | 51.75 |
| Pain severity | 35 | 30.70 |
| Increase in tumour size | 10 | 8.77 |
| No improvement was observed in ongoing treatment | 5 | 4.39 |
| To seek better treatment | 5 | 4.39 |

**Table 3**
Predictors of the patients' time spent from self-evaluation of symptoms suspicious of breast cancer until presentation to a diagnostic centre (days).

| Variable | Parameter estimate | Standard error | t value | Pr > \| t \| |
|---|---|---|---|---|
| Age (years) | 5.46618 | 1.68597 | 3.24 | 0.0014 |
| Stage of breast cancer | 84.68542 | 24.14649 | 3.51 | 0.0006 |
| Employment status before breast cancer diagnosis | −67.01857 | 24.90286 | −2.69 | 0.0077 |
| Time spent obtaining treatment from *pir* | 1.00125 | 0.06753 | 14.83 | <.0001 |
| Time spent obtaining treatment from *hakim* | 1.21073 | 0.17173 | 7.05 | <.0001 |
| Time spent obtaining treatment from general practitioner | 1.13605 | 0.14695 | 7.73 | <.0001 |

Adjusted $R^2 = 0.6583$.
Dependent variable = patient and system time intervals (days) is left intended like Adjusted $R^2$.

status of the target patients and time of diagnosis in days was identified. Although the relationships between time spent with a *pir*, *hakim*, and GP were positive, the intensity of this cause and effect relationship varied. The patients who spent 1 day with a *pir* faced the least delay in their breast cancer diagnosis (1.0012 days), followed by GP (1.14 days) and *hakim* (1.21 days). Moreover, the value of adjusted $R^2$ was 0.6583, which means that approximately 66% of the change in the outcome variable was due to the indicators used in the model.

## Discussion

This study shows that long patient intervals, referral intervals, and diagnostic intervals contribute significantly to breast cancer diagnoses in Pakistani women with signs or symptoms suspicious for the disease. The patients who sought care from several health practitioners and traditional health practitioners experienced longer referral intervals compared with those who visited fewer modern science-based medicine health practitioners. The referral intervals ranged from 7 to 194 days, whereas the patient intervals ranged from 31 to 128 days. The patients visited multiple diagnostic centres and spent 15–30 days undergoing diagnostic procedures, such as ultrasound, mammogram, and biopsy. A patient's time spent from self-evaluation of symptoms suspicious of breast cancer until presentation to a diagnostic centre was significantly and positively affected by her age, stage of breast cancer, and time spent obtaining treatment from a *pir*, *hakim*, or GP but was negatively affected by her employment status. Lack of awareness, fear of financial burden, and social barriers to accessing healthcare facilities accounted for most of the delays. Subsequently, severe pain, large tumour size, lack of improvement with treatment, and desire for better treatment brought patients to diagnostic centres.

The findings of this study are based on quantitative data that enhance the conceptual understanding of the variables under study. This report also focused on women with breast cancer, setting it apart from previous studies aimed at addressing community health issues in Pakistan [27,28]. We used inferential statistics to measure the direction and strength of relationships between the outcome variables and number of predictor variables, which allowed us to infer some of the claims and confirm the study hypothesis. However, this study examined only time intervals experienced by those who eventually obtained care in one of two public-sector hospitals. Thus, our findings may not be generalisable to the private sector in Pakistan. We were unable to determine successful referral rates to tertiary care hospitals by various health practitioners. The number of visits, time, and overall spending related to breast cancer diagnosis were not assessed. This study may be supplemented with possible future, larger-scale surveys to strengthen the conclusions obtained regarding the association of various socio-demographic and clinical indicators on the length of time before reaching destined diagnostic facilities.

According to the WHO, Pakistan's health system lacks an operational cancer policy, monitoring system, and disease surveillance. Furthermore, no facilities are available for clinical breast examinations or mammograms at the public primary healthcare level [7]. The direct presentation of patients to tertiary care hospitals without referral by a health practitioner may reflect poorly functioning or absent cancer referral systems [29]. It has been shown that the speed of access to primary care and subsequent specialty care is crucial for earlier breast cancer diagnosis; healthcare providers play an important role in facilitating or impeding timely diagnosis [30].

Our results are consistent with those reported in a Rwandan study that demonstrated a 150-day median patient interval for women with suspected breast cancer [31]. In contrast, a study of patients with breast cancer showed a much lower median patient

interval in 12 Eastern European countries: Bulgaria (34 days), Hungary (24 days), India (43 days), Latvia (43 days), Lithuania (34 days), Poland (25 days), Romania (42 days), Russia (34 days), Slovakia (28), Serbia (31 days), Turkey (34 days), and Croatia (34 days) [32]. The long patient intervals in our study may be explained by low adult literacy rates in Pakistan (55%) compared with India (69%), Turkey (93%), Serbia (98%), Bulgaria (98%), Croatia (99%), Hungary (99%), Romania (99%), Slovakia (99%), Latvia (100%), Lithuania (100%), Poland (100%), and Russia (100%) [33,34].

It has been argued that referral intervals for patients with signs or symptoms suspicious for breast cancer are longer for those who seek care from multiple health practitioners than those who visit a single healthcare facility [35]. This referral interval may be related to misdiagnosis (attributing symptoms to a health problem other than breast cancer) or symptomatic treatment, which increases the time to referral [36]. A systematic review showed that initial misdiagnosis and inadequate examination by health practitioners were the most common reasons associated with delays and failure to refer patients [36].

In Morocco, the median time to breast cancer diagnosis was previously reported by Maghous et al. as one month, during which 13.9% of patients reported medical reasons for delay, including negative physical breast examination, non-specific medical treatment without control, a negative fine-needle aspiration biopsy, misinterpreted mammography, and surgical excision without pathological examination [37]. Similarly, the mean diagnostic interval was reported as approximately 27.8 days in Taiwan [35]. In 2014, Ruddy et al. documented a 16.5-day median time from presenting for medical care to breast cancer diagnosis in the United States [38]. Long diagnostic intervals and the use of multiple diagnostic centres within the public health sector in Pakistan may be related to delays in issuance of medical reports, long travel distances to facilities, and physician unwillingness to refer patients to public healthcare centres. Physicians view public-sector facilities poorly because of non-functioning equipment, unavailability of diagnostic facilities, uncooperative staff, unawareness of test service availability, referral by laboratory staff, and affordability of procedures at private diagnostic centres [8].

It has been shown that 40.7% of patients in Pakistan with breast cancer who visited traditional healers experienced longer times to diagnosis when using alternative medicines [39]. Moreover, in one study, Pakistani women who consulted a *pir* had palpable breast lumps for as long as two years before presenting to a regional cancer hospital for treatment; in those cases, the patients' husbands and family members seemed unsupportive and did not assist the patients with their illnesses [40]. One qualitative study proposed that care-seeking from an alternative medicine health practitioner is associated with beliefs regarding alternative therapy, awareness and perceived seriousness of signs and symptoms, psychological stress, social inhibition and financial constraints, and seeking such care results in diagnostic delays [41].

Conflicting findings exist concerning breast cancer with respect to age and stages of the disease. Contrary to our results, Caplan et al. reported that breast cancer patients with stage 1 in the United States had longer system intervals than those with advanced stages [42]. Therefore, developing countries such as Pakistan experience the reverse situation in which it is generally observed that patients are diagnosed when their disease has progressed [43]. This might be due to the patient's health-seeking behaviour wherein patients do not visit a healthcare facility or screening centre for regular medical check-ups until they develop serious signs and symptoms that start to hinder their daily life activities [44]. Similarly, in our study, age contributed to the delay in the diagnosis of breast cancer. With advancement in age, a person develops multiple healthcare issues of differing natures. These healthcare problems pertaining to the ageing process present a barrier to the early diagnosis of the disease [45], as healthcare providers may focus on more obvious healthcare issues and illnesses rather than investigating other serious problems, resulting in a delay in diagnosis of cancer by age [46].

Consistent with our results, various studies showed that delays in accessing health services were significantly associated with increasing age [47,48]. The effect of age on delay might also be affected by socio-economic status and educational level [48]. However, contrary results were reported by Caplan et al., indicating that younger women were subject to increased system intervals relative to older women and that this might be due to lower suspicion of breast cancer in younger age groups by the women and healthcare providers, resulting in a delay in diagnosis [42,49].

Regarding the working status of women, those who are self-employed must invest more time to earn their incomes and may not have time to visit a healthcare facility until the disease has progressed [50]. In contrast, women who work a fixed schedule may have more time available to consult a healthcare facility, which means their cancer is diagnosed earlier [51]. Moreover, housewives may be able to more easily schedule appointments since they do not work outside the home, leading to the shortest diagnosis interval across employment status groups [50].

Finally, our results support previous findings from a Rwandan study that a GP is not sufficiently qualified to diagnose complicated diseases such as cancer [52] and does not refer a patient in a timely manner to other senior level professionals for several reasons, which delays cancer diagnosis [53]. Similarly, traditional healers, such as a *pir* or *hakim,* are often uninformed concerning the disease and its nature [31]. Therefore, healers may waste time trying different therapies while the patient's condition deteriorates, which also delays diagnosis.

Improving patient awareness regarding seeking healthcare when suspicious of breast tumours and establishing an effective cancer referral system for Pakistani patients and their support networks are necessary to improve early diagnosis, timely treatment, and patient quality of life. Increased capacity in public-sector tertiary care hospitals will also decrease long diagnostic intervals and improve patient outcomes, including cancer-related mortality. The authors of this report also propose that future studies explore participants' preferences and care choices, including motivation, and that qualitative analysis methods (for example, thematic analysis) in particular might provide meaningful information regarding patients' experiences.

## Conflicts of interest

No conflicts of interest are associated with this work.

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