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Evaluation of the Utilized Diagnostic Imaging Methods for Breast Cancer in Gaza Governorates

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Evaluation of the Utilized Diagnostic Imaging Methods for Breast Cancer in Gaza Governorates

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Thesis Approval

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Dedication

For my mother and father

For my husband "Tamer"

For my sons" Fadi, Mohammed, and Ferass"

For my brothers, sisters and their families

For my all friends

For my family

I dedicate this work to all of them…

Samira Abo Al Shiekh

Declaration

I certify that this thesis submitted for the degree of Master, is the result of my own research, except where otherwise acknowledged, and this study (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed:

Samira Soliman Abo Al Shiekh

17./5./2018

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Abstract

Breast cancer is considered the most common cancer among females in developed and developing countries. Previously, it was reported that the 5-year survival for breast cancer in the Gaza Strip did not exceed 30-40% and one of the factors is the diagnosis at advanced stages. This study aimed to evaluate the utilized diagnostic imaging modalities for breast cancer in the Gaza Strip in order to examine factors affecting the provision of timely and accurate diagnosis.

Retrospective cross-sectional triangulated study design was used.Quantitative data were collected through two instruments; the first was interviewed questionnaire filled with 122 newly diagnosed breast cancer women registered at one of the two main oncology centers in the Gaza Strip, andthe other was an abstraction sheet to collect data from the patients' medical files. Qualitative data were collected through thirteen in-depth interviews with various medical specialists.

The study revealed that there is underutilization ofmammography screening programs that the majority of women seeking health care only after a mass have been felt. Moreover, the study showed that women face some barriers to seek health care. These barriers were mainly attributed tolack of awareness about the symptoms. The study also showed that patients perceived high overall accessibility scores regarding mammography, Ultrasound, and biopsy which were 82%, 80%, 78% respectively. In addition, the study showed 19.7% of women delayed in seeking health care three months and more.

The study revealed that there is no a national standard protocol to diagnose breast cancer in the Gaza Strip. Mammography and Ultrasoundwere the most commonly usedimaging methods for breast cancer diagnosis. Undoubtedly, the confirmation of diagnosis was done by biopsy. The majority of patients (93.4 %)were referred to imaging diagnosis within 2 weeks of seeking health care. Notably, 12.3% of patients have a diagnosticdelay three months and more. Regarding the effectiveness of imaging methods, mammography and Ultrasoundweresucceeded to diagnose 84.1 %, 93.1% respectivelyof the referred cases and the majority of their reports were written without using a standard classification. In addition, the study revealedthatfactors affecting patient delay were mainly related to unawareness about the symptoms of breast cancer. Regarding to diagnostic delay, the study showed that the diagnostic delay was affected by patient age, nonmalignant findings in either mammography or Ultrasound.

The study recommends adoption of acomprehensive national program to educate and screen women, tofollow up and diagnose breast cancer patients underthe supervision of Ministry of Health and the necessary to put in place the required guidelines for each step in order to guarantee the provision of early and accurate diagnosis of breast cancer.

" تقييم خدمات التصوير التشخيصية المتاحة لدى مرضى سرطان الثدي في محافظات قطاع غزة"

ملخص الدراسة

يعتبر سرطان الثدي هو الأكثر شيوعاً بين مجتمع النساء في البلدان النامية والمتقدمة، وفي تقرير سابق كانمعدل البقاء 5سنوات على قيد الحياة لدى النساء المصابات بسرطان الثدي في قطاع غزةلا يزيد عن 30-40% وقد فسرسبب تدني هذه النسبة بعوامل أحدهم يرجع إلى تشخيص المرض في مراحل متأخرة.

الهدف من الدراسة

هدفت الدراسةإلى تقييم خدمات التصوير المتاحة لمرضى سرطان الثدي في قطاع غزة لدراسة العوامل التي تؤثر على تقديم خدمات تشخيص يةدقيقة وفي الوقت المناس ب من أجل تحسين الخدمات التشخيصية للمرضىومن ثم زيادة معدلات البقاء على قيد الحياة.

منهجية الدراسة

الدراسة عبارة عن دراسة تحليلية شملت على جمع بيانات كمية و نوعية, الكمية بلستخدام وسيلتين لجمع البيانات, الأولى هي إستبانة تم تعبئتها مع 122 مريضةبسرطان الثدي تم تشخيصه ن خلال سنة 2017 ومتابعات في مراكز أورام مستشفى عبد العزيز الرنتيسي وغزة الأوروبي، الوسيلة الأخرى هي جمع البيانات اللازمة للدراسة من ملفات المرضى والتواصل الشخصي مع المريضة. بالنسبة للمعلومات النوعية تم جمعها من خلال 13 مقابلة شخصية مع مختلف الأخصائيين والذين يشاركون في عملية تشخيص سرطان الثدي وهمأخصائيي (الأورام- الجراحة- الأشعة- علم الأنسجة) و أطباء الرعاية الأولية.

تم تحليل بيانات الدراسة بإستخدام برنامج التحليل الإحصائي (SPSS) وقد تم عمل جداول الترددات والرسومات البيانية المختلفة وأيضاً تم عمل الفحوصات الإحصائية المختلفة لإيجاد علاقات بين المتغيراتبهدف تحقيق أهداف الدراسة.أظهرت الدراسة أن النساء في قطاع غزة لا يتوجهن إلى برامج المسح بهدف المسح ولكنهميتوجهن لهذه البرامج من أجل التشخيص حيث أن العدد الأكبر من عينة الدراسة قد توجهن للفحص بعد الإحساس بوجود كتلة. ومن نتائج الدراسة أيضاً أن النساء يواجهن معيقات تحول دون الوصول للخدمة . أكثر هذه المعيقات متعلقة بعد م الفهم الجيد لأعراض وعلامات السرطان , أيضاً التصوير السابق الذي أسفر عن

نتائج سلبية لوجود السرطان شكّل عائقاً للجوء السيدات للخدمات التشخيصية مرة أخرى. وجدت الدراسة أن المريضات كان لديهم معدلات الوصول والحصول علىا لخدمات التشخيصية ماموجرام, ألتراساوند، عينة بمعدلات82%,80%,78% عالتوالي. وجدت الدراسة أيضاً أن19.7% من النساء لديهم تأخير للعرض على الأخصائيين بعد ظهور الأعراض 3 شهور فما فوق.

ومن نتائج الدراسة ليس هناك بروتوكول قياسي وطني لتشخيص مرضى سرطان الثدي في قطاع غزة,ويعتمد التشخيص بشكل أساسي عل ى فحص الثدي بالأشعة (الماموجرام) أوالألتراساوند أو كليهما و يتم تأكيد التشخيص النهائي بسحب العينة ليتم فحصها بمختبرات الأنسجة. % 93.4 من السيدات تم تحويلهم للتصوير خلال أسبوعين من طلب الرعاية الصحية. وجدت الدراسة أيضاً بأنّ12.3% من السيدات المشخصات واجهن تأخير في تشخيصهم 3 شهور وأكثر من طلب الرعاية الصحية. بالنسبة لفاعلية فحوصات تشخيص سرطان الثدي، وجدت الدراسة أن الماموجرام استطاع تشخيص %84من الحالات المحولة إليه بينما استطاعالألتراساو ند تشخيص %93من الحالات المحولة إليه مع ملاحظة أنّ معظم تقارير التصوير كُتبت بدون استخدام تصنيف قياسي موحد.وجدت الدراسةأن العوامل التي تؤدي التتأخر التشخيص بعد طلب الرعاية الصحية هي العمر ونتائج الماموجراموالألتراساوندغير الصحيحةمع وجود دلالات إحصائية على ذلك.

توصي الدراسة بضرورة وجود برنامج لسرطان الثدي لتوعية السيدات, لعمل مسح, تشخيص ومتابعة حالات سرطان الثدي, تحت إشراف وزارة الصحة وضرورة العمل على وضع خطوط عريضة وإستراتيجيات موحدة يلتزم بها الجميع وتكون موحدة على مستوى الوطن وذلك لضمان تقديم خدمات تشخيصية دقيقة و في الوقت المناسب.

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Abbreviations

ACR	American College of Radiology.
ACS	American Cancer Society.
ACSH	American Council on Science and Health.
ANOVA	Analysis of Variance.
ASR	Age-Standardized incidence Rate.
BC	Breast Cancer.
BI-RADS	Breast Imaging Reporting Data System.
CFTA	Cultural and Free Thought Association.
CNB	Core Needle Biopsy.
DCIS	Ductal Carcinoma in Situ.
GGs	Gaza Governorates.
GPs	General Practitioner.
IDC	Invasive Ductal Carcinoma.
ILC	Invasive Lobular Carcinoma.
LCIS	Lobular Carcinoma in Situ.
MOH	Ministry of Health.
MOSA	Ministry of Social Affairs.
MRI	Magnetic Resonance Imaging.
NCCP	National Cancer Control Programme.
PCBS	Palestinian Central Bureau of Statistics.
PHC	Primary Health care.
PNA	Palestinian National Authority.
SD	Standard Deviation.
SPSS	Statistical Package for Social Science.
U/S	Ultrasound.
UNRWA	United Nations Relief and Work Agencies for Palestine Refugees in the Near East.
WHO	World Health Organization.

Chapter1: Introduction

1.1 Background

Breast cancer (BC) is considered a major health problem andthe most common cancer among females in both developed and non-developed countries.If BC is diagnosed early, more specific and less aggressive therapy options are possible, and mortality frombreast cancer falls.

BC incidence was previously measured to be 1.67 million new cases worldwide,and was responsible for approximately 522,000 deaths in 2012 (Ferlay et al., 2015). In spite of considering BC to be a disease of the developed world,Ferlayand Colleagues(2010) showed that roughly 50% of all BC deaths in the world occurred in developing countries during the year 2008. These deaths were attributed to diagnosis in more advanced stages (Unger-Saldana, 2014). It was reported that the age-standardized incidence rate (ASR) of breast cancer in Asia 29.1/100,000, USA 92.9/100,000 and 94.2/ 100000 in Europe. However, the mortality to-incidence ratios are much higher 0.35 for Asia in comparison to 0.16 for USA (Bridges et al., 2011) and 0.24 for Europe(Ferlay et al., 2013).

In Palestine, according to Ministry of Health(MOH), there were 388 new cases in the West Bank during the year 2016 constituting around 15.3% of all cancercases (MOH, 2017). According to cancer registry in Gaza Governorates (GGs), there were 684 cases during the year 2016 constituting around 20.5% of all cancer cases (MOH, 2016)

Early diagnosis of BC is defined by World Health Organization (WHO) as early identification of patients with symptoms ofBC without delay; patients with cancer should

receive diagnostic examinations, pathological confirmation and staging procedures at an appropriate diagnostic facility (WHO, 2017).

Internationally, there are various diagnostic techniques and image-guided interventional procedures used for BC diagnosis. Mammography, Ultrasound (U/S) and Magnetic Resonance Imaging (MRI) are the most widely used modalities in breast imaging.

Mammography is considered to be the gold standard in screening(Fletcher and Elmore, 2003; Tabár et al., 2001),U/Sis effective in detecting lesions and differentiating a benign lesion from malignant one and the combination of both examinations can diagnose breast tumors more accurately (Houssami et al., 2003; Benson et al., 2004; Mujagic et al., 2011).

This study is the first study in GGs aimed to evaluate the role of diagnostic imaging tools for BC in terms of effectiveness, timely diagnosis and barriers that may hinder the success of this process.

1.2 Research Problem

It was reported that 5- year survival rate of BC patients in the GGswas 30- 40% and one of the causes of this low rate is a deficit in the final diagnosis (Bendel et al, 2005). Another study, reported it to be 53.4%(Alagha, 2014).In comparison, 5- year survival rate for BC varies in different countries that it was reported to be 59.6% in Saudi Arabia (Ravichandran et al., 2005), 70% in Iran (Fallahzadeh et al., 2014), 66% to 76% in Spain, 74% in France, 82% in Italy and Netherlands(Sant et al., 2004).

Also, it had been reported that BC among Palestinian women presents in advanced stages of the disease. Around 42.2% of reported cases had regional lymph-node involvement (stage III) and 17.8% had distant metastases (stage IV)(Hussein et al., 2009).

A systematic review of Unger-Saldana (2014) showed that the lower BC survival rates observed for developing countries in comparison to developed countries are due to diagnosis in much more advanced stages. Such delayed diagnosis may berelated to co-factors that patient, community, and health care system share.

1.3 Justification

Cancer early diagnosis is defined by WHO as the early identification of cancer in patients who have symptoms of the disease(WHO, 2017). In the same report, WHO reported that the likelihood of morbidity, disability, and mortality increase as the cancer progress (ibid).

In countries such Palestine when there is a scarcity of resources, the first priority is to have in place accurate diagnosis and to detect tumors at earlier stages without delay in order to initiate early and timely diagnosis that help patients with cancer to start their treatment early and to decrease anxiety among those diagnosed as free of BC.

In the Gaza Strip, there is no formal policy for screening mammography to all asymptomatic women at certain age and no generalized guidelines on the best time to do a screening mammography. However, there are several fragmented non-permanent screening mammography programsexecuted by several providers; MOH, some Nongovernmental Organizations (NGOS), United Nations Relief and Work Agencies for Palestine Refugees in the Near East (UNRWA). Unfortunately, the benefits of these programs and to what extent they effective in BC diagnosis are not studied yet in GGs.

Several studies conducted to evaluate the screening mammography services and the barriers that hinder women to conduct the screening mammography(Shaheen et al., 2011; Abu-Shammala and Abed, 2015; Jadallah, 2016). Other previous related studies focused on

the prevalence of cancer, determinants of5- year survival rate and factors affecting quality of life among those patients. There is a gap in research about the effectiveness of imaging modalities in BC diagnosis, time required to diagnosis, and barriers affecting the success of the process. Hence, it will be rational to conduct a scientific research with an aim to evaluate the diagnostic imaging modalities for BC in the GGs regarding accurate and timely diagnosis. This will help decision makers to identify the gaps in the imaging diagnostic services in order to improve them.

In addition, the results of the current study will be beneficial for the BC patients that it may help to improve the weaknesses points in the diagnosis process, thus increasing patient's survival rate, decrease morbidity and mortality.

Also, for the researchers, the study is the first one and will be the milestone for others to open many fields for research especially in the field of false negative and false positive results of imaging diagnostic services that have an effect on the cancer patients and healthy women as well.Therefore, this study attempts to evaluate imaging diagnostic methods used to diagnose BC and factors affecting the provision of rapid and accurate BC diagnosis.

1.4 Study Objectives

1.4.1 General Objective

This study evaluates the utilized imaging modalities (Mammography, Ultrasound, and Magnetic Resonance Imaging) for BC diagnosis in the Gaza Strip in order to enhance early diagnosis of BC and increase survival rate.

1.4.2 Specific objectives

- To investigate the effectiveness of imaging modalities to diagnose BC using histopathology report as a reference.

- To categorize patients perceived barriers that may hinder early diagnostic process.
- To examine the relationship between patients' accessibility to different diagnostic examinations andthe utilizedsectors.
- To identify factors that may affect the early diagnosis ofbreast cancer.

1.5 Study Questions

- To what extent mammography and U/S are effective todiagnose BC in GGs?
- Is there a difference in mammography and U/S reports in their initial diagnosis of breast cancer?
- Do doctors depend on a standard protocol when they refer suspected BC to imaging modalities?
- What are the scores of patients' accessibility domains regarding different diagnostic exams?
- Is there a difference between patients' accessibility scores with regards to the sector they utilized?
- What are the main barriers that patients face when they decide to seek health care after BC symptoms appeared?
- What are the main sources of delay in BC diagnosis?
- Is there a significant difference between time delay in diagnosis and patients characteristic variables (Age, Place of residence, income level of education, presence of family history)?

1.6 Context of the study

1.6.1 Gaza Governorate demographic characteristics

Palestine is a small country in its area (26.323Km^2). It has an important geographic location **(Annex1)**;it is located in the East of the Mediterranean Sea in the Middle East,boarded by Syria and Jordan from the east, Lebanon from the north, Golf of Al Aqaba from the south and by Egypt and the Mediterranean Sea from the west. Palestinian National Authority (PNA) controls two geographically separated areas, West Bank and Gaza Strip. Population density in Palestineis 811 (Capita/km^2) in the end of the year 2016, for the west bank is 519 and for GGs is 5154.

GGsis a small piece of land located in the southern area of Palestine, according to Palestinian Central Bureau of Statistics (PCBS), there were 1,800,000 Inhabitants in the mid-year 2016(PCBS, 2016a). It is divided into five governorates: North Gaza, Gaza City, Mid Zone, Khanyounis and Rafah**(Annex 2)**.

1.6.2 Palestinian health care system

Health care system plays an important role in improving health. Well-functioning health system enables achievement of good health with efficient use of available resources (Atun, 2012). In the GGs, health care services are provided mainly through four sectors, governmental health services at MOH, NGOs, UNRWA, and the Private Sector.

MOH provides primary, secondary, and tertiary health services and purchase the unavailable tertiary health services from domestic and abroad providers. UNRWA provides primary care services and purchase secondary care services for refugees. NGOs provide primary, secondary and some tertiary services. Private for-profit sector provides the three level of care through a variety of specialized hospitals and investigation centers.

The fragmentation in the health care system and the lack of coordination between various sectors increase the challenges to provide optimal health care services.

1.6.3 Noncommunicable diseases

Noncommunicable diseases (NCDs) including heart disease, stroke, cancer, diabetes and chronic lung diseases are responsible for almost 70% of all deaths worldwide. Almost three quarters of all NCDsdeaths and 82% of the 16 million people who died prematurely occur in low- and middle-income countries(WHO, 2011).

The rise of NCDs has been driven by primarily four major risk factors: tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets (ibid). MOH in the GGshas reported that the number of NCDs patients registered in the primary health care (PHC) centers were 34026 patients, of them 3.3 % are cancer patients (MOH, 2015a)

1.6.3.1 Cancer

According to cancer registry in GGs, 7069 new cancer cases registered during the period 2009- 2014(MOH, 2015b).The most common cancer among female population in the GGs is BC. In the other hand, the most common cancer among males is colon cancer constituting around 11.5% of male cancers (ibid).

1.6.3.2 Breast cancer Services

BC diagnosis starts when the patient seekshealth care and this may be at PHC, governmental hospitals, NGOs, private sector and even UNRWA. The patient then is referred to a specialist or imaging center to start the diagnostic journey.

After confirmation of the diagnosis, mostly the patient will register in one of the two oncology centers (Al-Rantesihospital or Gaza European hospital) for treatment and follow up.

Al- Rantisi hospital

Al- Rantisi Specialized Pediatric hospital is the only governmental specialized Pediatric hospital in GGs. It is considered as a secondary health care delivery organization. The hospital has been established in 2003 on an area of over 2500 m^2, and had become ready to work in 2006.

The hospital provides health care for patients less than 12 years old since that date, and recently it provides health services for the adult oncology and hematology patients after the department had been transferred from Al Shifa hospital to it since 2016 (MOH, 2012 a). Department of oncology and hematology at the hospital is divided into two main parts, the outclinic& daily care unit, and the inpatient department.

The staff of the department consists of 4 oncologists, 5 hematologists, 3 pharmacists, 3 administrative workers, and 19 nurses (Zaggout, September 2017, Personal communication).

Regarding beds, there were 14 beds for women, 10 beds for men in the daily care, while the total number of beds at the inpatient department is 30 beds for women and men (ibid).

The daily care unit provides treatment and a wide range of special support services for BC patients on Sunday, Monday, and Wednesday of every week. Patients attend the daily care unit for a medical or nursing review, blood tests, procedures or treatments, including chemotherapy.

On arrival, patient will be greeted by reception and asked to confirm personal details.Then,patients meet the triage nurse who will record weight and height and withdraw a blood sample. It may take 30 to 40 minutes for blood results to be ready. Then it will be seen by the doctor or nurse in order to decide if the patient will receive treatment or not (ibid).

Gaza European hospital

Gaza European hospital is located at the southern governorate of Khanyounis on a land area 65 Dunums. It was built in 1993 and is considered one of the main hospitals in the southern area providing secondary and tertiary services. Initially, the hospital was established through UNRWA and funded by the European cooperation. In 1997 the hospital began to operate after agreement between European Union, PNA and UNRWA and then the real work started at 2000 when the first case was admitted to the hospital.

The hospital departments were later established until the emergency department was completed in March 2001.Today, the total number of bed reaches 256 beds, and the total number of employees is 765("Gaza European Hospital in Numbers", 2016).

Cancer services are provided for Khanyounis and Rafah inhabitants through the department of oncology and hematology. The department is divided into inpatient unitfor admitted cases and outpatient's clinics fordaily care and follow up for the patients 12 years old and more (MOH, 2012 b).Working days for daily care oncology in the outpatient's clinics were Sunday, Tuesday. In addition Wednesday is considered a day for follow up of cases at the outclinic(Afanah, September 2017, Personal communication).

The staff of the department consists of 4 oncologists and 5 hematologists for the two parts, 26 nurses- of them 4 nurses are working at daily care and 2 at outclinic unit (ibid).

Regarding beds, there were 9 beds and 21 chairs in the daily care, while the total number of beds at the inpatient department is 29 beds for women and men (ibid).

During the year 2016, 153 cases were admitted to the oncology and hematology department. In addition, there were 7400 patients visits and 5000 chemotherapy sessions were provided in the outclinicunit ("Gaza European Hospital in Numbers",2016).

1.7 Operational definitions

1.7.1 Potential delay

Total delay: Suspected BC patient should complete the diagnosis within 90 days (3 months) of symptoms appearance according to WHO cancer early diagnosis guide (WHO, 2017). In this study, total delay is the summation of patient delay and diagnostic delay.

Patient delay: is a delay in seeking medical counseling after self-discovering a potential BC symptom (Caplan, 2014). In the current study, the researcher defined the patient delay as those who have been delayed 3 months andmore to seek medical counseling after BC symptoms appeared.

Diagnostic delay: is the delay within the health care system in getting appointments, scheduling diagnostic tests, receiving a definitive diagnosis and initiating therapy (Unger-Saldana, 2014).

In this study, the researcher considered the diagnostic delay as a delay 3 months andmore from the first counseling visit to confirmation of diagnosis.Also, the researcher divided the diagnostic delay into parts to identify the most important points causing delay.

Referral delay:A referral is defined as a process in which a health care provider at one level of the health system- having insufficient resources (drugs, equipment, skills) to manage a clinical condition- seeks the assistance of a better or differently resourced facility at the same or higher level to assist in (Goel et al., 2013).

It was previously reported by National Cancer Control Programme (NCCP) that the suspected BC patients should be referred to diagnosis within 2 weeks from the first medical counseling(NCCP, 2012). The researcher defined the referral delay as a delay more than 14 days required for the patient to be referred from the first counseling visit.

Mammography delay: is the time delay more than 7 days (including appointment) to conduct mammography and getting results.

U/S delay: is the time delay more than 7 days (including appointment)to conduct U/S and getting results.

Biopsy delay:time delay more than 14 days from imaging resultsto perform the biopsy.

Histopathology delay: time delay more than 14 days frombiopsy (sampling) and getting the first histopathology report confirmed malignancy (Time elapsed in the histopathology department).

1.7.2 Imaging method of choice

The appropriate imaging should be carried out for patients suspected to have BC in the following criteria; U/S is the imaging method of choice for the majority of women aged < 40 years and during pregnancy and lactation, and mammography is used in the investigation of women aged ≥40 years with the addition of U/S when it is indicated (Willett et al., 2010).

In the current study, the researcher examined imaging method of choice in the BC initial diagnosis and to what extent physicians follow international standards.

1.7.3 Barriers

Barrier in health care is defined as a person's estimation of the level of challenge of social, personal, environmental, and economic obstacles to a specified behavior or their desired goal status on that behavior (Glasgow, 2008).

In the current study, barrier is any obstacle face the patient and prevent her receiving timely and accurate diagnosis of BC including, lack of knowledge about BC symptoms,

fear of cost related to exams and transportation, difficulties in referral to imaging, absence of health insurance, geographical, a previous doctor visit or imaging, culture, fear of results, and difficulties in getting appointments, The study examines barriers that may be related to health care system, and to the patients as well.

1.7.4 Accessibility

Access to health care remains a complex concept as it was interpreted by various descriptions through authors. Access was defined as a way of approaching, reaching or entering a place, as the right or opportunity to reach, use or visit (Stevenson, 2010).

In the current study, the researcher studied accessibility considering three main domains: physical accessibility &affordability domain, waiting time & appointments domain, and communication & patient respect domain.

1.7.5 Accurate results

Diagnostic accuracy relates to the ability of a test to discriminate between the target condition and health (Simundic, 2009). In this study, in order to investigate errors in mammography and U/S reports and because of lack of information about the follow up process, a comparison between the report of each imaging exam (mammography or U/S) with the histopathology report as a reference was made, and between the reports of the two different imaging exams were also made. The researcher considered suspected and highly suspicious of malignancy results in mammography and U/S as accurate results. Regarding reported benign lesions, dense breast for other investigations and normal studies were considered as not accurate results.

Chapter2: Conceptual framework and literature review

2.1 Conceptual framework

The researcher drew the conceptual framework based on the literature review and personal experience. This framework shows what the researcher is going to study. The current study examines three main parts that may affect BC diagnosis.

The first part is the patient factors including sociodemographic variables, awareness about the symptoms felt, patients' accessibility, screening versus diagnostic mammography, and potential barriers that may affect seeking health care.

The second part is the system factors including presence of a standard protocol in patient's referral to imaging exams, imaging method of choice in the BC initial diagnosis,effectiveness, utilizedsector, costs and appointments, and follow up issue.

The third one is the potential delay which can be attributed to patient, or system or both. In addition, between the three main parts, barriers to early diagnosis may be appearedas illustrated in **(Figure 2.1)**.

Symptoms

BC Symptoms include a lump in breast or armpit, retracted nipple, nipple discharge, pain, tingling, one breast changes size or shape. Patients should be aware of specific cancer symptoms, understand the urgency of these symptoms, overcome fear or stigma associated with cancer and to be able accessing primary care. Thus, awareness has to be translated into appropriate health-seeking behavior.

Screening mammography

BC can be detected in asymptomatic woman during her routine screening mammography.

Diagnostic mammography

BC can be discovered in woman after signs and symptoms have already appeared.

Follow up cases after a previous breast problem

The researcher also examines follow up of patients with previously reported problems in any breast imaging exam and the main causes of loss to follow up the patients.

Accessibility

Services are directly and permanently accessible with no unwarranted barriers of culture, language, or geography.

The researcher considered three dimensions of accessibility: physical accessibility & affordability which reflect the availability of the service and referral, ability of a patient to pay for imaging diagnostic exams including the presence of health insurance, copayments, out of pockets payments and the transportation issue. The second one is the appointment & waiting time domain in order to perform the exam and to get the results.The third one is communication &patient respect within the service provided.

The researcher studied the overall accessibility for the performed diagnostic exams and if there are differences in patients' accessibility with regards to the sector they utilized.

Potential delay

Delay may occur during BC diagnosis. In the current study, the potential delay may be attributed to patient, or system, or both of them.

Patient delay

Patient delay is the delay in seeking health care three months and moreafter patient noticea potential BC symptom. The researcher studied the main barriers facing the patients and prevents them to seek health care early.

Diagnostic delay

The current study focused on the delay in the final diagnosis three months and more after the patient counseled health care provider. Diagnostic delay was divided into five main stations to explore the most areas causing delay: referral delay, mammography delay, U/S delay, biopsy delay and histopathology delay.

Barrier

Perceived barrier is any obstacle face woman and prevent her to seek health care early. Patients were asked about barriers that may be related to health care system or to the patient in order to know the main barriers that actually affect the patients' early diagnosis.

BC initial diagnosis

The study assesses the presence of guidelines and protocol in referral of patients to BC diagnosis considering the imaging method of choice according to age.

Referral

According to the best practice guidelines, Patients with symptoms or signs of BC should be referred for assessment. The researcher studied to what extent physicians follow international guidelines when they refer suspected BC women to diagnosis.

Effectiveness and Efficiency

Efficiency refers to doing things right whatever is performed; it is achieved in the most suitable way, given the available resources (high efficiency).

Effectiveness, on the other hand refers to doing the right things selecting and focusing on the goal achievement (BC diagnosis).

In the current study, the researcher considers the imaging tool which correctly diagnose the case as effective modality and the imaging tool that is failed to diagnose the case as ineffectivemodality.

Concerning efficiency, the researcher adopted the American College of Radiology (ACR) guidelines regarding what should be done to diagnose suspected BC cases and if there waswastein the resources.

Utilized Sector

When patients seeking health care, they will choose one of the sectors provide BC diagnostic exams (mammography, U/Sand biopsy). These sectors are governmental hospitals, NGOs andthe private sector.

Patient demographic data

In this study, patient demographic data includes age at diagnosis, place of residence, level of education, socioeconomic status, and family history in order to assess the effect of these factors on patient delay and diagnostic delay.

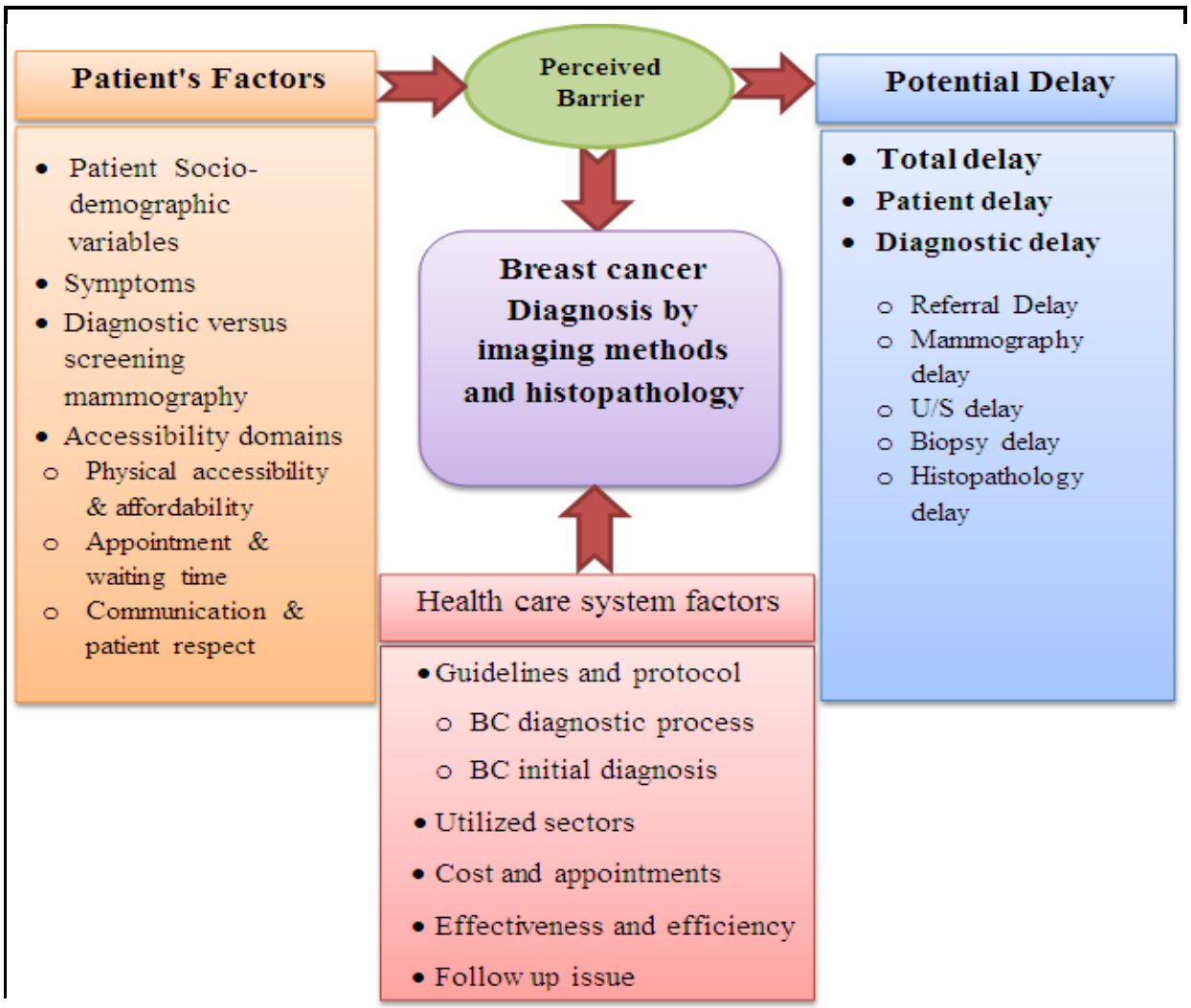


Figure 2.1: Conceptual framework- Self constructed

2.2 Breast cancer (BC)

The breast is composed of three major structures: skin, subcutaneous tissue, and breast tissue (parenchyma and stroma). Parenchyma includes glandular tissues which housesmilk lobules and ducts, and stromal supporting tissues include fatty and fibrous connective tissues of the breast(Morris, 2005).

American Cancer Society (ACS) defined BC as a malignant tumor that occurs as a result of uncontrolled cells growth in breast tissues. It can invade the surrounding breast tissues or spread to distant areas of the body. The evidence showed that BC occurs most frequently in women, but it can occur in men too (ACS, 2017a).

2.3 Breast cancer risk factors

American Council on Science and Health(ACSH)stated that unlike other diseases, BC arises from the presence of multiple risk factors rather than one single cause. These factors can be divided into three main categories: The first category is the established risk factors including gender, age, benign breast disease, family history, early age at menarche, late age at menarche, late age at first full term pregnancy, obesity, physical inactivity and high dose of ionizing radiation exposure.

The second category is the speculated risk factors including never have been pregnant or having one pregnancy, no breast feeding after pregnancy, postmenopausal hormonal therapy, high intake of fat, low intake of fibers, alcohol consumption, tobacco smoking, and abortion.

The third category is the unsupported risk factors category including postmenopausal obesity, exposure to low dose ionizing radiation in midlife and high intake of phytoestrogen (ACSH, 2000)

A master thesis study conducted at Al- Quds University aimed to examine the BC risk factors among females in GGs. The study showed that the major risk factors for BC are high socioeconomic status including high education level, increased household monthly income, and women employment (Hams, 2005).

The second risk factor was the family history. Also, the study showed increase BC among women with contraceptive use. An increased risk was also indicated among women with passive smoking, using hair dye, eating excessive meat and chicken, and drink excessive fruit juice. In addition, women with previous breast mass were at more risk to develop BC. The study also showed that breast feedingwas a protective factor against developing BC

Another master thesis study conducted at Al- Quds University, Gaza examined the association between environmental factors and BC. The study showed that there was a positive association between BC occurrence anda group of factors such as physical trauma in breast, past medication used for infertility as a chemical factor, types of oil used in cooking especially using margarine as a source of saturated fat, living beside the solid waste disposal sites, women who exposed during their work to pesticides, fertilizes and dusts, women dealing with crops by naked hands, and women who livingwith others working in a farm or in agricultural field (Ashour, 2011). The study was Consistent with Hams (2005) study regarding the positive relation between excess chicken and meat intake and risk of developing BC.

2.4 Breast cancer types

The most common types of BC are Invasive Ductal Carcinoma (IDC) and Invasive lobular Carcinoma(ILC) according to the site of its origin (ACS, 2015). Common types of BC include non- invasive BC and invasive BC .Non- invasive BC occur when malignant cells in the ducts do not invade the surrounding fatty and connective tissues.

The most common type is the ductal carcinoma in situ (DCIS), and less frequently Lobular Carcinoma in Situ (LCIS). The other type of BC is the invasive BC in which the malignant cells invade the ducts into surrounding fatty and connective tissues.

IDC begins in the milk ducts of the breast and penetrates the wall of the duct, and invades the fatty tissue of the breast and possibly other regions of the body. IDC is the most common type of invasive BC; accounting 80% of BC diagnoses. While, ILC begins in the milk lobules of the breast, but often spreads to other regions of the body. ILC accounts around 10% to 15% of BC(Sharma et al., 2010).

Less common types of BC are medullary carcinoma, colloid carcinoma, tubular carcinoma, inflammatory BC, Paget's disease and Phylloides tumor (ibid).

2.5 Cancer Stage

The most widely used method for staging cancer is TNM classification that developed by the International Union against Cancer. In which T is referred to clinical features of tumor, N is referred to regional lymph node and M is referred to the absence or presence of metastasis (Kufe et al., 2003). For more details see **(Annex 3)**.

2.6 Breast cancer burden

2.6.1 Breast cancer global burden

BC is the most common cancer among females in both developing and developed countries (Bener et al., 2008;Ibrahim et al., 2014;Baburinet al., 2016;Enayatrad et al., 2016).Itis becoming an increasingly urgent problem in low and middle income countries where incidence rate which was historically low have been increasing by as much as 5 % per year (Bray et al., 2013).In addition, Forouzanfar et al. (2011)revealed that there was a 3.1% annual increase in BC incidence, with an increase estimation of 641,000 cases in 1980 to 1,643,000 cases in 2010.

Moreover, a study estimated the incidence of cancer in European countries resulted in that BC is the most common cancer among European women and the third common cause of cancer deaths among them, with observed disparities among different countries (Ferlay et al., 2013).

BC is the most common cause of cancer deaths worldwide with a responsibility ofmore than 522,000 deaths in 2012 (Ferlay et al., 2015). While it is the most frequent cause of cancer deaths in women in less developed regions (324,000 deathsand constituting14.3% of the total deaths), it is now the second cause of cancer deaths in more developed regions.

In addition, the range in mortality rates between world regions is less than that for incidence because of more survivability from BC in high-incidence developed regions (Torre et al., 2015)

2.6.2 Breast cancer burden in Mediterranean region

BC is the most frequently diagnosed female malignant disease in Arab populations, its incidence is lower in Arab countries than in Europe and USA, but it is rising fast (Chouchane et al., 2013).Also, El Saghir et al.(2007)had reported that almost half of the BC patients among Arab women are below 50 years and median age is 49–52 years while it is63 years in the industrialized nations.

In addition, in the Gulf Cooperation Council states (United Arab Emirates, Bahrain, Saudi Arabia, Oman, Qatar, and Kuwait), it is reported that advanced BC is the most common causeof cancer affecting younger populations compared with other countries (Al-Othman et al., 2015).

2.7 Diagnostic imaging modalities for breast cancer

Several common imaging modalities used to diagnose BC, which have both advantages and limitations.

2.7.1 Mammography

A technique for imaging breast tissues provides high-quality images at low radiation doses in the majority of patients (Nass et al., 2001).Mammography can be used in screening or diagnostic purposes.

2.7.1.1 Screening Mammography

A radiologic procedure applied to a woman who has no sign or symptom of a breast disease and is used for the early detection of BC (Joy et al., 2005). Annual screening

mammography of age-appropriate asymptomatic women is currently the only imaging modality that has been proven to significantly reduce BC mortality (Hellquist et al., 2011).

In the GGs, there is no formal policy for screening mammography and no obvious guidelines neither for the health care providers nor to patients on the best time to do a screening mammography. However, currentlythere is a screening mammography program conducted by MOH for women over the age 40 years old. Also, a screening programfunded by UNRWA in contract with several NGOs and private sectors to conduct screening mammography for all suspected potential BC cases and all women over 35 years old with positive family history of BC (UNRWA, 2016).

A studyconducted at Al- Quds University in order to evaluate the mammography services in GGsshowed that there were some barriers that hinder the Gaza's women to conduct a screening mammography including pain, discomfort, fear from mammography procedure and results, and the time consumed during the procedure (Jadallah, 2016).

2.7.1.2 Diagnostic Mammography

A diagnostic mammography is a radiologic procedure applied to a patient with signs and symptoms of breast disease, or a personal history of biopsy proven benign breast disease (Joy et al., 2005). The goal of mammography is the detection, characterization, and evaluation of findings suggestive of BC and other breast diseases.

2.7.1.3 ACR guidelines for performance of diagnostic Mammography

According to ACR, The indications to conduct mammography involve all the patients with symptoms of breast diseases including but not limited to palpable abnormality, persistent focal area of pain or tenderness, bloody or clear nipple discharge, and skin changes. Also, a finding appeared in screening mammography and need further investigation, a probably

benign radiographic finding that needs a short-interval follow up. In addition to contralateral breast follow up for patients previously diagnosed with BC (ACR, 2014).

2.7.2 Ultrasound(U/S)

U/S in breast imaging is primarily used to distinguish between cystic and solid massesthus this enhance its role in characterization of suspected malignant lesions (Hooley et al., 2013). This is clinically important, as a simple breast cyst is a benign finding that does not require further work-up. Recent advances in U/S technology allow obvious improvement in characterizationof solid masses (ibid).U/S can be used as guidance in breast biopsy (Nass et al., 2001).

2.7.2.1 ACR guidelines for performance of breast U/S

According to ACR, the appropriate indications for breast U/S include evaluation and characterization of palpable masses and other breast related symptoms. In addition, it can be used to evaluate suspected or apparent abnormalities detected on mammography. Also, it is used in the initial imaging evaluation of palpable breast masses in patients under 30 years of age, in women with dense breast and in lactating and pregnant women.

Furthermore, U/S can be used as guidance for biopsy and in the evaluation of patients in planning for radiation therapy, and as a complementary study to mammography in suggestive malignancy (ACR, 2016a).

2.7.3 Biopsy

High-quality breast imaging evaluation is necessary to detect early or subtle breast lesions as well as to accurately target these lesions for image-guided biopsy. Several imaging modalities are commonly available and in clinical use for image-guided breast interventions, including stereotactic guidance, ultrasound and MRI. The choice of guidance technique will depend on lesion visualization and accessibility, availability of the imaging

modality, efficiency, safety, patient comfort, and the practitioner's experience(Bassett, et al., 1997).

Breast biopsies should be performed under imaging guidance in order to guarantee accuracy and to decrease the number of repeated biopsies(Willett et al., 2010). The type of biopsy needles used for specific breast lesions and guidance methods vary around the world.

There is a global trend toward progressively larger needles and more tissue samples per biopsy site have been noted(Ikeda and Miyake, 2016). Biopsy can be guided into several ways either by palpation during clinical examination, orU/Swhich has the advantage of safety and cost effectivenessthan other guidance modalities (Newell and Mahoney, 2014).

Also, the literature showed that imaging guidance is more accurate than palpation in case of palpable breast mass (Hari et al., 2016).In addition, stereotactic guidance enables percutaneous placement of a needle within the breast to sample mammographically detected suspicious breast lesions(Rovera et al., 2008).

2.7.3.1 Follow up after biopsy

Post biopsy follow-up imaging, using the same imaging modality that guided the needle biopsy, should be done at 6, 12, 24, and perhaps 36 months post biopsy for all benign concordant lesions. Specific concordant lesions diagnosed as fibroadenoma or lymph node can have the initial follow-up at 12 months rather than 6 months. If the lesion increases in size at follow up imaging, the lesion should undergo repeated biopsy by needle or surgical excision biopsy (Ikeda and Miyake, 2016).

The literature shows that if there is discordance between imaging and pathology, histological evaluation is still needed. This can be accomplished either by repeat core

needle biopsy(CNB), perhaps with consideration of larger gauge or vacuum-assisted device, or surgical excision(Landercasperand Linebarger,2011; ACR, 2015).

However, Somenonmalignant CNBfindings are considered "borderline" because of theirpotential association with malignancy. Such borderline lesions include atypical ductal hyperplasia, lobular neoplasia (atypical lobular hyperplasia or LCIS), papillary lesions, radial scars (complex sclerosing lesions), fibroepithelial lesions, columnar cell lesions (hyperplasia or flat epithelial atypia), spindle cell lesions, mucocele-like lesions, and pseudoangiomatous stromal hyperplasia. If CNB result with one of these histologic findings requires correlation with imaging and clinical findings to determine concordance, and to either exclude diagnosis of a malignancy by further histological evaluation or to establish a formal plan of follow-up through risk-based, shared decision-making with the patient (Johnson and Collins,2009;Neal et al., 2010;Landercasper and Linebarger,2011).

2.7.4 Magnetic Resonance Imaging

In MRI, a powerful magnet linked to a computer creates hundreds of detailed images of the organ in multiple sections without the use of ionizing radiation. Uses of MRI in breast imaging may include assessment of abnormalities that are unclear on a mammography, determination of the extent of tumor growth after initial diagnosis, and for evaluation of the effectiveness of treatments (Joy et al., 2005).

2.7.4.1 ACR guidelines for performance of breast MRI

MRI can be used to characterize and identify a lesion when mammography and U/S are inconclusive for the presence of BC. MRI can be used as guided biopsy, postoperative to detect BC recurrence. In addition, MRI is indicated in metastatic cancer with unknown origin and expected to be in breast with no mammography findings. Moreover, breast MRI

is indicated in case of suspicious cancer recurrence in women with history of BC when mammography and U/S are normal (ACR, 2013).

2.8 Breast Imaging Reporting Data System(BI-RADS)

BI-RADS lexicon1 of the ACR has enabled more consistent assessment and management of nonpalpable breast imaging abnormalities. It offers a widely accepted risk assessment and quality assurance tool in mammography, U/S or MRI. Part of the initial implementation was to make the reporting of mammographymore standardized and comprehensible to the non-radiologists reading the report (ACR, 2013).

In BI-RADS mammography are categorized from 0–6, with category 0 incomplete exam that requires further investigation and category 6 being biopsy proven malignancy. Categories 1 to 5 are further broken down into negative, benign finding, probably benign finding, suspicious and highly suggestive of malignant lesion respectively.

The advantages of BI-RADS classification system in reporting mammography and U/S had been previously studied well; it can be define an interpretation guide of the mammographic images, less related to the subjectivity of the radiologist. It also allows a homogenization of the radiological findings between the radiologists themselves, and between radiologists and clinicians. Thus, there are fewer misinterpretations of the reports (Lazarus et al., 2006;Kim et al., 2008)

2.9 Breast cancer early diagnosis

BC early diagnosis is the early identification of cancer in patients who have symptoms of the disease. So, the objective of early diagnosis is to identify the disease at the earliest possible stage and to link the patient to the diagnosis and treatment without delay. When done promptly, cancer may be detected at a potentially curable stage, improving survival and quality of life (WHO, 2017).

BC early diagnosis is different from screening in that screening seeks to identify pre-clinical cancer in a healthy target population (ibid). There is an evidence that when the early diagnosis of cancer combined with accessible, affordable and effective treatment. The results are improvement in the stage of cancer at diagnosis and survivability as well (WHO, 2002).

2.10 Components of BC early diagnosis

WHO identified three main steps in BC early diagnosis and each step has its components and potential delay. The first step is patient awareness about BC symptoms and its potential delay is accessdelay. The second step is the clinical evaluation, diagnosis and staging and its potential delay is diagnostic delay. The third step is timely, accessible, affordable treatment and its potential delay is delay in access to treatment (WHO, 2017).

2.11 Guidelines in the initial assessment of BC

The best practice guidelines revealed that the patient with breast disease symptoms should undergo imaging test after taking history and doing clinical breast examination. According to her age, if the woman 40 years oldor more, she should do mammography first, then U/S in the initial assessment of breast disease. In contrast, the patient with less than 40 years old should start with U/S, then a mammography will be done for those who have suspicious of malignancy in the clinical or U/S findings (Willett et al., 2010).

2.12 Referral of patients with suspected BC to imaging

NCCP stated situations in which an urgent referral of patients with suspected BC should be occurred within 2 weeks. These situations include discrete breast or axillary lump (unilateral, distinct, separate mass in patients over 35 years), ulceration Skin distortion, nipple eczema, recent nipple retraction or distortion (less than 3 months), blood-stained

nipple discharge. Patients with an acute abscess should be referred immediately to the next available breast clinic.

Furthermore ,NCCP suppose the early referral of patients within 6 weeks if the patients have one of the following:inflammationthat persists after antibiotics, persistently refilling or recurrent cystunilateral discharge (not blood-stained), intractable pain that does not respond to reassurance or to measures such as wearing a well-fitting bra, or a 3 month course of evening primrose oil or common analgesic drugs, discrete lump in women under 35 years,asymmetrical nodularity that persists at review after menstruation (NCCP, 2012).

2.13 Sensitivity of diagnostic imaging modalities in BC diagnosis

After reviewing the literature, seemingly there is a debate about the sensitivity of imaging modalities used in BC diagnosis. In addition, there are several factors affecting these sensitivities.

The evidence showed superior performance of U/S than that of mammography for the women under the age 40 years old (Osako et al., 2007;Loving et al., 2010;Appleton et al., 2014). Besides that, several studies revealed that the sensitivity of mammography decrease with increase breast density.In their study Berg et al. (2004)showed that the sensitivity of mammography decreased from 100% in fatty breast to 45% in extremely dense breast. Consistent with this finding, in another study conducted with an aim to compare the effectiveness of mammography and MRI in assessment of multifocal and metacentric BC revealed that the sensitivity of mammography decrease with increased density from 80% of entirely fatty breast to 60% of dense one (Sardanelli et al., 2004).

Moreover, the evidence showed that the tumor type also affects the sensitivity of imaging modalities for BC diagnosis. A statistically significant decrease in mammography

sensitivity according to cancer type was reported as the sensitivity decrease 81%, 55% and 34% for IDC, DCISandILC respectively (Berg et al., 2004).

Besides that, the literature revealed a highly diagnostic performance will be obtained by combining U/S together with mammography. In a cross sectional validation study, 45 women with mean age of 45 ± 12.07 were included with complaint of breast mass.Based on histopathology report, 32 out of 45 patients were diagnosed to have BC, the sensitivity of U/S combined with mammography is 100% which is higher than that of mammography alone (90.6%) and this highlighted the benefit to combine these two modalities together (Fatima et al., 2015).

About the importance of MRI in the assessment of residual tumors, a study assessed 39 BC patients who undergo chemotherapy. Dynamic contrast enhancement MRI showed a high correlation with postoperative histopathological findings which means that MRI is a valid technique in the assessment of residual tumors in this patients group (Zhou et al., 2016).

2.14 Breast cancer missed during diagnostic imaging

A study conducted in Egypt with an aim to investigate factors hindering early BC detection and in turn lowering mammographic sensitivity. The study included 152 histopathologicalyproven breast carcinomas that were initially missed by mammography and were detected on double and re-reading by more experienced radiologists. Additional mammographic views were recommended in 35 (23%) cases. Complementary U/S examination was performed for all 152 cases (100%) and showed a higher sensitivity than mammography in carcinoma detection. This study concluded at four factors lead to miss carcinoma by mammography and these factors are patient's factors such as dense breast, tumor factors such as multicintric or multifocal tumors, technical factors such as exposure and provider factors such as bad interpretation (Kamal et al., 2007).

Also, Muttarak et al. (2006) study suggested that several factors causes carcinoma missed by mammography including dense breast parenchyma obscuring a lesion, perception error, interpretation error, unusual lesion characteristics, and poor technique or positioning.

2.15 Diagnostic delay

In a qualitative study aimed to assess the diagnostic delay and its impact on stage of disease among women with BC in Libya, two hundred Libyan women aged 22–75 years with BC diagnosed during the years 2008–2009 were interviewed about their diagnosis of BC, the median diagnosis delay was 7.5 months, as 30% of patients were diagnosed within 3 months after symptoms appeared, 14% were diagnosed within 3–6 months, and 56% within a period longer than 6 months. Diagnosis delay of >3 months was associated with bigger tumor size, positive lymph nodes, high incidence of late clinical stages, and metastatic disease (Ermiahet al., 2012).

Results of diagnostic delay factors of bigger tumor size and positive lymph nodes were also revealed in another study (Redondo et al., 2009).

2.15.1 Barriers affect early diagnosis of BC

After reviewing the literature, it seems that there are multiple factors affecting the early diagnosis of BC and may affect the stage of cancer at the final diagnosis. These factors can be divided into two main components;Patient delay which is the delay in seeking medical consultation after self- discovering a potential BC symptom, and diagnostic delay which is the delay within the health care system in getting appointments, scheduling diagnostic tests, receiving a definitive diagnosis, and initiating therapy.

A study conducted at South African public hospital examined the effect of place of residence on the cancer stage in 1000 public sector patients, and revealed that62% of patients with a distance more than 20 km had a late stage of diagnosis if compared to 50 %

patients with less than 20 km. The study also revealed other factors contributing to delayed diagnosis may include lack of education, concerning where to go to seek help, poor knowledge of symptoms, lack of breast awareness, fear and beliefs hold on the causes of cancer and whether it is curable (Dickens et al., 2014).

Low utilization of healthcare services by women with noncommunicable diseases in general has been documented (Ibanez-Gonzalez and Norris 2013). In addition, a qualitative study conducted with an objective to understand barriers to early diagnosis of symptomatic BC among black African, black Caribbean and white British women in the UK resulted in four types of barriers that may face women and hinder their early diagnosis. These barriers can be summarized as patient factors such as lack of awareness, difficulty appraising symptoms, fearing of cancers, and health care system barriers such as not knowing where to go, difficulties booking appointments, difficulty organizing and attending hospital appointments, and feeling disempowered (Jones et al., 2015).

Also, Poum et al. (2014) studiedfactors associated with greater doctor delay (time from first consultation a health care provider to diagnosis of BC)in a multivariate analysis were previous breast symptoms, self-treatment, distance or travel time to hospital, younger age at first birth, and increased number of consultations with a surgeon before diagnosis.

Chapter3: Methodology

This chapter provides comprehensive information of all aspects of research methodology. It explains the study design, study period and setting, study population, sample size and sampling process, toolsof data collection and analysis, reliability and validity of the instruments. In addition it clarifies the ethical considerations and studylimitations.

3.1 Study design

This study is designed as analytical retrospective cross sectionaldesign to assess the relationship between BC diagnosis by imaging modalities and other study parts; patient's factors, health care system factors and potential delay. The major purpose of cross sectional analytical method allows the investigator to use facts or information already available, and to analyze them to make a critical evaluation of the examined situation (Kothari, 2004;Levin, 2006). Retrospective study may be completed relatively quickly and cost-effectively, compared to other types of studies (Velengtas et al., 2012).

The study is a triangulation study involving both quantitative and qualitative data using three main tools. The triangulation between the two methods creates inclusive information about the study domains that cannot be collected in one method. In addition, the combination between the two approaches maximizing the benefits of both and minimizing the limitations of each (Hussein, 2015).

3.2 Study setting

Quantitative data: The study was conducted in three main hospitals:

- Daily care, outpatient's unit and archive of oncology department at Al-Rantesihospital.
- Daily care, outpatient's unit and archive of oncology department at Gaza European hospital.
- Computed Tomographydepartment at Al Shifa hospital.

Qualitative data: Data were collected at Al Shifahospital, Gaza European hospital, Al-Rantisihospital, and PHC.

3.3 Study population

Quantitative and qualitative data of this study were collected through two populations.

Quantitative part: women diagnosed with BC during the year 2017. The researcher selected this year for investigation becauseBC patientsare frequentlycome to the hospital in the first year of diagnosis. So, it is easier toreach them than patients diagnosed in any other year. In addition, to guarantee the presence of imaging reports before it may be lost and to minimize the recall bias resulted from the retrospective study design.

Qualitative part: Doctors with various medical specialtieswho are involved in diagnosisBC patients.

3.4 Eligibility criteria

3.4.1 Inclusion criteria

Quantitative part: Women diagnosed with BC during the year 2017 and registered at one of the oncology centers (Al-Rantesihospital or Gaza European hospital), and are under treatment and follow-up during the data collection period.

Qualitative part:various medical specialistswho are involved in diagnosing BC patients (Radiologists, oncologists, histopathologists, surgeons and PHC (GPs).

3.4.2 Exclusion criteria

- Women who were newly diagnosed with BC as a secondary tumor for other primary sites.
- Womanwho has a recurrence of BC after history of lumpectomy.
- Unaware patients and those with mental disabilities were also excluded from the study.

3.5 Study period

The study took 13 months to be conducted as it started in March 2017 and completed byMarch 2018. The research proposal has been defended in the front of school of public health assigned committee in May 2017. Initially, the research proposal described the entire process and provided information about study design, data collection and analysis methods and tools. After obtaining the committee's approval, the researcher prepared the required tools of this study. The tools were arbitrated by experts and their opinions were taken into considerations. The arbitration stage lasted for 6 weeks including reviewing of tools by the arbitrators and the academic supervisor’s feedback. In July2017 Arabic translation of the tool was finished with the help of the supervisor and a group of arbitrators.

In August 2017 the tools were ready to start the data collection and the researcher trained one data collector and carried out the required training prior to piloting and field work. Piloting started between 20 and 28 August 2017. Actual data collection of quantitative part and data entry as well started on 10thSeptemberthrough 5th December 2017. The researcher and her assistant began collecting data in the outpatient's and daily care units during work days andhours.

Data entry was performed at the time of data collection. Analysis part of the study was immediately initiated after the completion of data collection. Data management and recoding of variables were done, descriptive analysis, frequency tables were extracted, and then inferential statistics were performed. In-depth interviews were done after analysis of quantitative part in January 2018. The researcher started to prepare the final report which has been finalized byMarch 2018.

3.6 Sample size and sampling process

Quantitative part: The study included all women registered and under treatment and follow up in the two oncology departments (daily care and outclinic unit) during the data collection period.

Previously, it was reported that cancer patients at North Gaza, Gaza city and Middle zone constitute 69.7%. In the other hand, cancerpatients atRafah and Khanyounis cities constitute 28.3% of the total number of cancer cases (MOH, 2015b).

Oncology services at Gaza European hospital coversKhanyounis and Rafah areas while oncology services at Al-Rantesi hospital covers North Gaza, Gaza, and Middle area. Based on that, and with the help of the health staff members in the oncology departments in the two mentioned hospitals, questionnaires were distributed in the two oncology centers in the working days and hours of the two hospitals and the **Table (3.1)**below shows these distributions, inclusion and exclusion criteria were taken into consideration while distribution the questionnaires. Every patientwas asked about the date of diagnosis and if she was previously diagnosed with othertypes of tumors before starting filling the questionnaire.

Table 3.1: Distributionquestionnaires byoncology centers

Name of the hospital	Distributed questionnaires (%)
Al-Rantesi hospital	70.7%
Gaza European hospital	30%
Total	100%

Qualitative part: A purposive sample of thirteen different medical specialistsinvolved in BC diagnosis was selected. The integration between quantitative and qualitative data is important to deeply explore factors affecting early diagnosis issue and barriers that may

hinder this process. The qualitative component was carried out after finishing the quantitative one in order to deeply explore important issues emerged from the quantitative part.

3.7 Study instruments

Quantitative Part: The researcher developed two instruments (interviewed questionnaire and abstraction sheet).

Interviewed questionnaire were fulfilled with BC women under treatment and follow up. The majority of questions were close-ended questions, and few of them were open-ended. See (**Annex 4)** and the translated version (**Annex 5**).

These items were covered by the questionnaire:

- Patients' sociodemographic data
- Symptoms of the disease.
- Number of consultations before diagnosis and referral.
- History of previous examinations.
- Questions about diagnostic process and what had been done
- Delay time to seek health care.
- Delay time to diagnosis.
- Appointments for imaging examinations and questions about referral.
- Patients' Accessibility, affordability for imaging diagnostic modalities
- Perceived barriers (patient's facing barriers when seeking health care)
- Patients' accessibility for the utilized imaging services measured on a 5-pointsLikert-scale ranging from 1 (strongly disagree) to 5 (strongly agree).

The second instrument of the quantitative part is an abstraction sheet **(Annex 6)**which was developed to check patient's records about what had been done during diagnosis. The dates

of performing exams, report dates and conclusion of each exam were gathered. Sample (biopsy) dateand histopathology report date and result, tumor stage at the time of diagnosis were also collected.

Qualitative Part: The researcher used open-endedquestions(semi-structured), see (**Annex 7)** and the translated version (**Annex 8**). Questions were asked by the researcher within in-depth interviews with thirteen different medical specialists working in BC diagnosis field. The interviews focusedon the diagnostic process and if there is available standard protocol in referral and diagnosis of BC, role of imaging tests in the diagnosis, patient delay in seeking health care and barriers that may affect early seeking health care, results of imaging tests and to what extent they are useful and effective in the diagnosis.

3.8 Ethical and administrative considerations

An ethical approval was asked for from School of Public Health at Al-Quds University and Helsinki Committee **(Annex 9)**. Adminapproval was obtained from the human resource development general directorate in the MOHfor the three data collection tools (interviewed questionnaire, Review medical records, and in-depth interviews with medical specialists) see(**Annex 10**). To guarantee patient rights, a covering letter indicating that the participation is voluntary and confidentiality was assured for all of them. All patients were asked for their agreement to participate in the study **(Annex 11).**

3.9 Pilot study

Quantitative part: A pilot study included 12 BC cases (10 % of the total sample size) were done to explore the relevance of the study instruments and allow the research team to train for data collection; this step allowed exploring the appropriateness of the questions, patient's responsiveness and further improvement of the study validity and reliability.

Qualitative part: A pilot interview was done with a radiologist, which allowed for further improvement of the study validity and reliability. Based on the result of this stage; the questions were ordered and the way of asking the questions was improved to be more deeply.

3.10 Data collection

Quantitative part: After completing the pilot study, the researcher and one data collector gathered the data from the two-oncology centers according to working days and hours in the outpatient clinics and daily care of the two hospitals. Also, a number of women were interviewed at AlShifa hospital during their CT staging exam. The researcher herself filled the abstraction sheet by reviewing the medical files for all participants in the archive. In case of incomplete records, the researcher contacted with the patients in order to bring the required reports. This stage was completed after 3 months. Training was done for the data collector about the study aim and objectives and vague questions were clarified. In the field work, the researcher began to collect the data in order to help her assistant fully understand the questions and how to ask them. Confidentiality and privacy were taken into consideration.

Qualitative part: Data were collected through thirteen in-depth interviews with different medical specialists**(Annex 12)** after the completion of the quantitative part.

3.11 Response rate

Quantitative data: During the time of data collection, 130 interviewed questionnaires were distributed in the two main oncology centers, of them 122 were fulfilled. So, the response rate was 93.8%.

Qualitative data: Thirteenin-depth interviews were carried out and the response rate was 100%.

3.12 Scientific rigor

Quantitative part

Validity

- ***Face validity***

Interviewed questionnaire and abstraction sheet were organized in order to allow smooth data collection.

- ***Content validity***

Concerning the content validity, adequate reviewing of related topics in the literature about BC early diagnosis by imaging tools and factors affecting it was done before designing the study instruments and tools. To assess the relevance of the questionnaire and abstraction sheet, experts conducted evaluation process**(Annex 13)**, and comments were taken in consideration. In addition, the researcher reviewed some medical files prior to the study and check about the availability of study items. A validation data by identification number (ID) using excel sheet was used to avoid duplication of cases. In addition, a pilot study was conducted before the actual data collection to examine patient's responsesto the questionnaire and how they understand its questions. Slight modifications were done to make it well understood. This would increase the validity of the questionnaire.

Reliability

The following steps were done to assure instruments reliability:

- Standardization of filling the questionnaires and abstraction sheets.
- Data entry was done in the same day of data collection to permit possible interventions to assure data quality and to re-fill the questionnaire when it is required.

- Patients were contacted by the telephone to bring their reports in case of uncompleted medical files.
- Re-entry of 5% of the data after finishing data entry was done to assure correct entry process and thus to decrease the errors.
- Accessibility data were examined for internal consistency of its domains in order to ensure appropriateness of clustering statements. The researcher used Cronbach's alpha coefficient to check the reliability for each domain as illustrated in **Table (3.2).**

Table 3.2:Cronbach's alpha coefficient for the main Domains

Domain	Alpha Coefficient			No. of questions
	Mammography	U/S	Biopsy	
Physical accessibility & affordability	0.672	0.600	0.69	6
Appointments &waiting time	0.710	0.744	0.741	5
Communication &patients right	0.610	0.645	0.612	9

Qualitative part

To assure the trustworthiness of the qualitative part in this study, three steps were considered.First, a peer check was completed by health experts to review in-depth interview questions to assure that they cover all the essential domains. Second, points were taken about the important issues discussed during the interviews. Third, a debriefing report was written at the end of each interview including the most important points discussed during it.

3.13 Data entry and analysis

Quantitative part: The researcher used Statistical Package for Social Science (SPSS) program version 22 for data entry and analysis. The first stage of data entry was through constructing the entry base and coding of variables, followed by actual data entry. Data entry was performed at the time of data collection. At the analysis stage, data cleaning anddata management for the variables of interest were performed.

The management of data depended upon scientific literature, merging and discretizing continuous variables into categorieswith minimal loss of information.Descriptive analysis including figures, frequency tables, and cross tabulationwere used to describe the main features of the data.

One way Analysis of variance (ANOVA)test was used to examine the relationship between patients' accessibility to diagnostic exams and sectorsthey utilized considering LSD post hoc to examine the differences within groups. Fisher's exact test was used in case of violated assumption in chi square.MacNemar test was used to examine the difference between U/S and mammography resultsin a dependent sample.

All these tests and others were used to analyze the quantitative data; Confidence interval was considered at 95% and p-value < 0.05 was considered statistically significant.

Qualitative part: Open coding thematic analysis technique was used to analyze the transcripts of the in-depth interviews. The researcher would gain the main findings from the interviews. Then, categorization of related ideas, comparison and integration between the quantitative and the qualitative findings was done to create rich items for discussion and interpretation. Also, in-depth interviews were analyzed deeply to identify the most important factors affecting the diagnostic process.

3.14 Limitations of the study

- The study included the patients registered in the oncology centers, while it did not include the unregistered patients.
- Most of the time, medical records were not complete. This obliged the researcher to contact patients by the telephone in order to bring reports and this required too much time and efforts.
- In some cases, the researcher could not gain full required data about the patient because of the incomplete medical records and patient's losing the reports or unwilling to bringthem.
- And finally, frequent electricity cuts and limited access to international publications were also considered limitations for this study.

Chapter4: Results and discussion

Introduction

This chapter illustrates the main findings of the study and discusses them. Descriptive analysis of demographic characteristics of study participants was performed. Then participants were distributedby medical history, referral and diagnostic delaydata.The description interpretations were followed by inferential statistics to achieve the main objectives of the study. Also, qualitative findings were illustrated in a comparison with the quantitative findings.

4.1 Descriptive analysis

4.1.1 Distribution of the study participants by oncology center

Data were collected from the two oncology centers in GGs, 73% of the studyparticipantsreceive their treatment and follow up at the oncology center inAl- Rantisi hospital and27% of the participantsreceive their treatment and follow up at the oncology center in Gaza European hospital as illustrated in **Figure (4.1)** below.

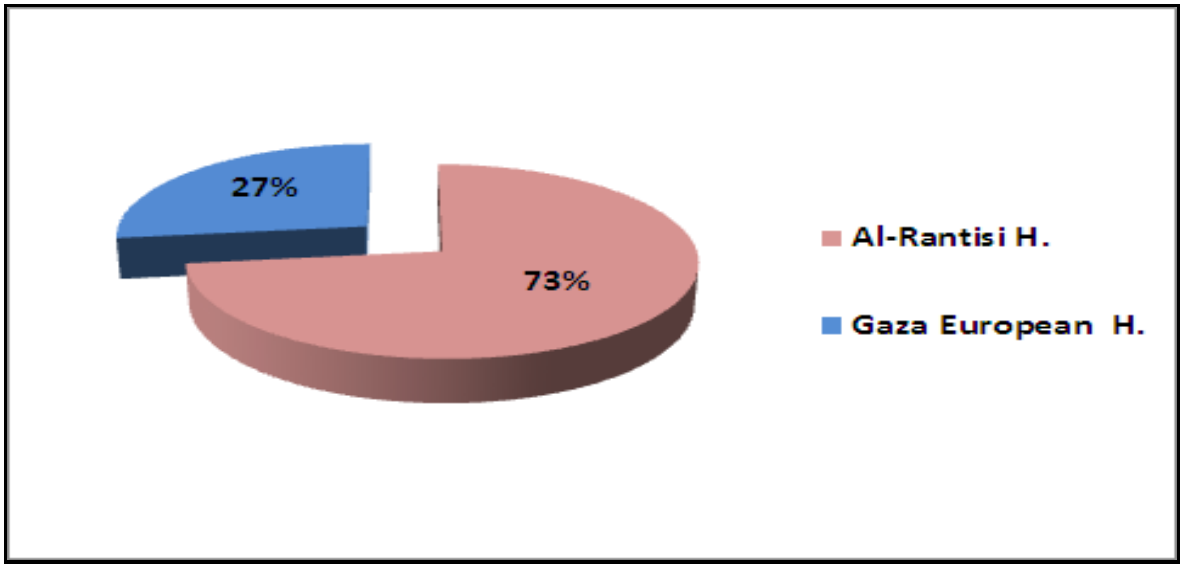


Figure 4.1: Distribution of participants according to oncology centers

4.1.2 Demographic characteristics of study participants

Regarding place of residence, patients were distributed along the GGs as the following:45.9% of the study participants are resident in the Gaza city. This result reflects the high population density of this city (PCBS, 2016a).Others are resident along other governorates: Middle zone area, North Gaza, Khanyounis, and Rafah constituting 19.7%, 13.9, 12.3% and 8.2% respectively as shown in thefigure below**(Figure 4.2).**

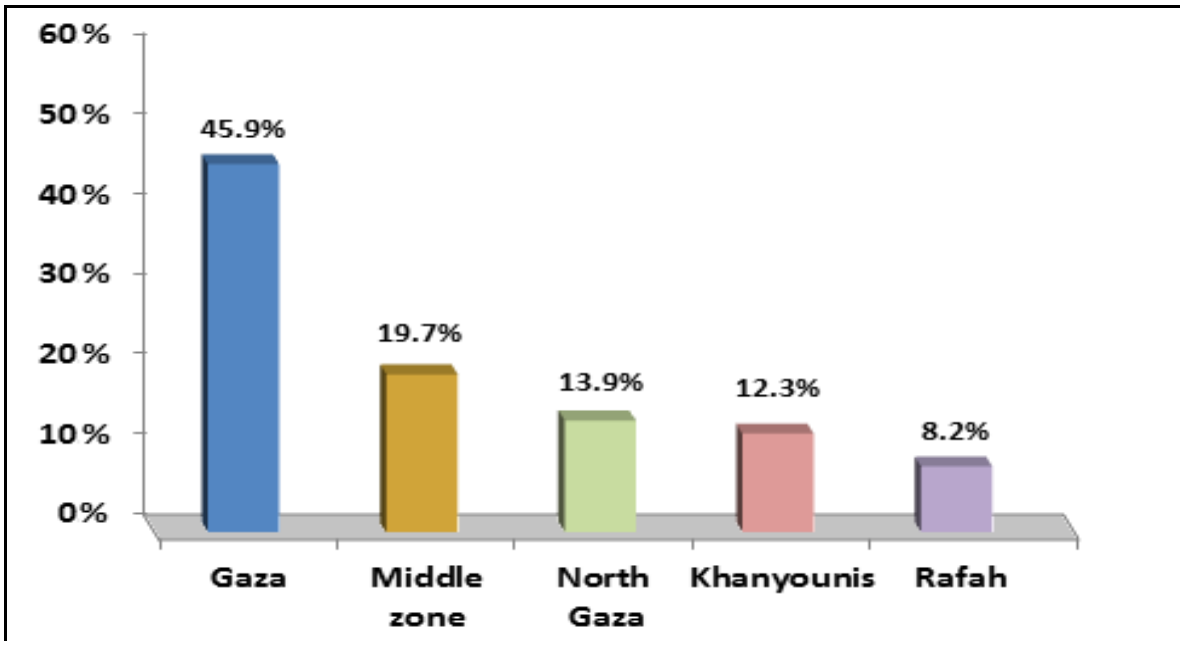


Figure 4.2: Distribution of BC patients according to place of residence.

Results arein a line with a master thesis study conducted at Al- Quds University with an aim to examine determinants of 5- year survival for BC among Gaza's women.The result showed that the highest percentage of the study participants (53.4%)were resident in the Gaza city (Alagha, 2014).

Concerning age, the mean age of BC patients is 51.2 years old with a standard deviation (SD) 12. This finding compatible with Hassanein et al. (2017)finding that showed the mean age of BC among Saudi Arabian women was 51.9 years.

Previously, Alagha(2014)showed that the mean age of women at the time of BC diagnosis in the GGs during the year 2007 was 53.4 years which is slightly higher than the current number.The researcher interprets the difference between the two studies in thatarecent progresswas achieved in mammography and U/S systems specialized for breast imaging in GGs.In addition, digital mammography systems with higher sensitivity to diagnose BC were adopted in MOH and some NGOs in the recent three years. Moreover, adoption of screening programs by the MOH and some international organizations help increase patient access to the diagnostic services and this may help in the early diagnosis of BC. Within in-depth interviews experts ensured our interpretation as one said*:" The awareness programs executed by MOH and some organizations regarding BC and its symptoms and the presence of free of charge screening programs made a difference".*

The majority of BC patients lie within the age groups (40-49) years, and (50-59) years constituting29.5% and 27.1% respectively, followed by the age group less than 40 years constituting 15.6%, the old age groups (60-69) years and (70 and more)years constituting around 18% and 9.8% respectively as illustrated in**Figure (4.3)**.

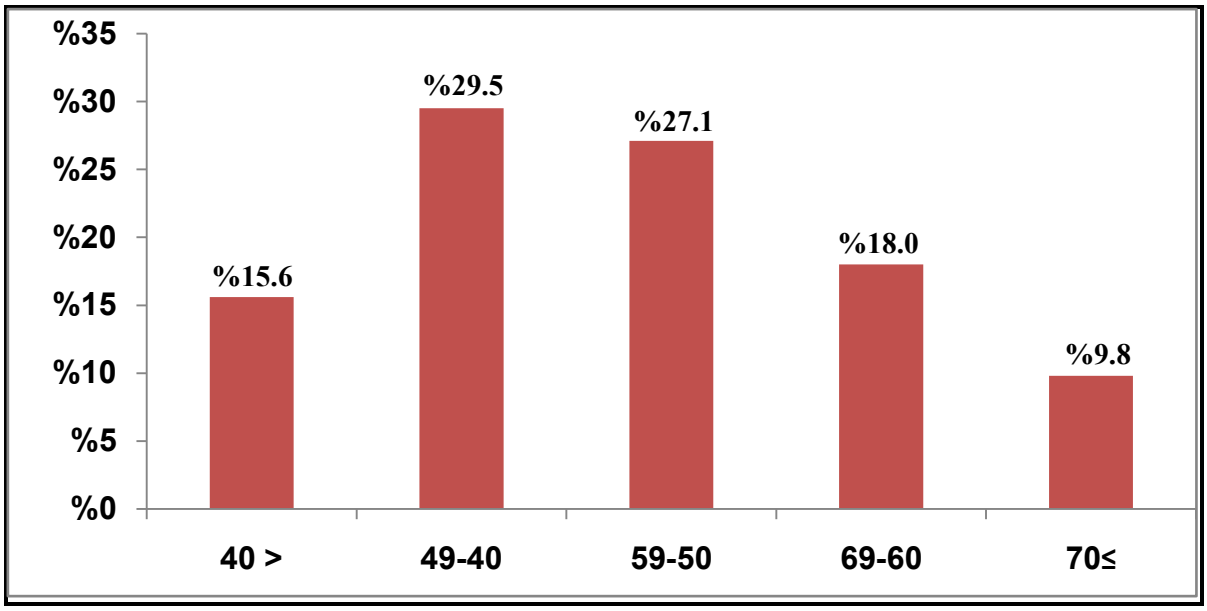


Figure 4.3: Distribution of cases by age groups

Findings are consistent with doctorate thesis conducted at Arab Emirates country which found that the most affected age group with BC was (41-50) years old (Elobaid, 2014). Besides thatAlghamdi et al. (2013)showed that the highest percentages (38.6% and 31.2%) of BC cases among Saudi Arabian women lie within the age groups (30–44) and (45–59) years respectively. In comparison, the result is inconsistent with the most affected age groups among American women(50-59), and (60-69) years old (ACS, 2015). This reflects the occurrence of BC among women in developing countries at earlier ages if compared to developed ones. Locally, Alagha(2014) study showed a consistent finding regarding the most affected age groups (40-49) and (50-59) constituting 22% and 32 % of study participants respectively.

Other sociodemographic variables are illustrated in the **Table (4.1)**: Marital status, number of children, level of education, occupational status, income andthe presence of health insurance.

Table 4.1: Summary of demographic characteristic of study participants

Variable	Categories	Frequency (%)
Marital status (n=122)	Single	12 (9.8)
	Married	84 (68.9)
	divorced	3 (2.5)
	Widowed	23 (18.8)
No. of children (n=122)	No children	24 (19.7)
	1- 4	35 (28.7)
	5-7	34 (27.8)
	8 and more	29 (23.8)
level of education (n=122)	<secondary school	44(36.1)
	≥secondary school	78(63.9)
Occupational status (n=122)	No	98 (80.3)
	Yes	24 (19.7)
Income (n= 115)	<1000 NIS	59 (51.3)
	1000-2290 NIS	32 (27.8)
	≥ 2290 NIS	24 (20.9)
Presence of health insurance (n=122)	Yes	118 (96.7)
	No	4 (3.3)

Regarding the marital status, the researcher noticed that the majority of the study participants are married, widowed, or divorced (90.2%), while few of them (9.8%) have not married before. This may be attributed to increasing the probability of BC occurrence with increasing age (ACS, 2015;McGuire et al.,2015) at the time women mostly will be married. This finding was in a linewith Alagha(2014)finding that showed a higher incidence of breastcancer among married (73.5%). On the other hand, this finding is

incompatible with other studies (Shamsi et al., 2013;Martínez et al., 2017)that showed a higher incidence of BC among participants that had not been married before in comparison with married women.

Regarding the number of children, about 19.7% women had no children, 28.7% of them have 1-4 children. Furthermore, 27.8% of the study participants had 5-7 children and finally, 23.8% of them had 8 children and more.

Concerning level of education, the author noticed that two thirds of study participants (63.9 %) have finished at least secondary education. Contrary, 36.1 % of participants have less than secondary education.

Regarding the occupational status, the majority of the respondents are unemployed (80.3%) and few (19.7%) have a work of different types including skilled, semiskilled, and unskilled workers.

Regarding income, the study shows that more than half of the study participants (51.3%)have monthly income less than 1000 NIS. Unfortunately, 79.1 % of the study participants are living below the poverty line (2290 NIS)as it was previously determined (PCBS, 2016b).This mainly reflects the deteriorated economical Palestinians situation especially in the GGs as an impact of the israeli-imposed blockade and the several attacks on GGs in the recent years.

About health insurance, the majority of the participants are health insured (96.7%) with various types of health insurance; compulsory, israeli workers, voluntary, Ministry of Social Affairs (MOSA) and old ages insurances.This reflects the universal coverage of health insurance in the GGs as it was stated before (WHO, 2016).

4.1.3 Medical history of study participants

Table 4.2:Distribution of cases by medical history

Variable	Frequency (%)	
Presence of family history of BC		
Yes	41(33.6)	
No	81(66.4)	
Laterality		
Left side	67 (54.9)	
Right side	53 (43.5)	
Bilateral	2 (1.6)	
Presence of signs and symptoms		
Symptom	**Yes**	**No**
Breast mass	99 (81.1)	23 (18.9)
Pain	20 (16.4)	102 (83.6)
Tingling	16 (13.1)	106 (86.9)
Retracted nipple	16 (13.1)	106 (86.9)
Unequal size of both breasts	9 (7.4)	113 (92.6)
Tenderness	8 (6.6)	114 (93.4)
Nipple discharge	7 (5.7)	115 (94.3)
Mass under axilla	7 (5.7)	115 (94.3)

Table (4.2)indicates that 33.6% of the study population hada family history of BC.Presence of afamily history amongparticipantsis related to sister, mother or Aunt. This percentage invites us to think deeply about the importance to target these women in the screening program. The literature showed that family history plays an important role in BC and is responsible for more than 20% of all BC among females (Collins et al., 2005; ACS, 2015).

The current study shows that BC is more common in the left breast (54.9%) compared to the right breast (43.5%). Despite the compatibility of this finding with some studies in the literature (Fatima et al., 2015; Singh et al., 2016), it is not compatible with other (Afzal et al., 2009). The researcher interprets the inconsistency in these results by the differences in selection of samples with regards to other factors such as metastasis, and hormonal receptor status.

"*Receptors are proteins in cells that can attach to certain substances in the blood. Normal breast cells and some BC cells have receptors that attach to the estrogen and progesteronehormonesand depend on these hormones to grow*"(ACS, 2017b).

Moreover, the study shows that most of the study participants sought health care because of theappearance of one or more symptoms. Breast mass was noticed in 81.1% of study participants, painful breast among16.4%. Similarly, lump and pain are the major symptoms defined by women in Turkey (Ozmen et al., 2014).

Other symptoms identified by the study participants include retracted nipples among 13.1 %, and tingling among 13.1% of the respondents. Other symptoms includingunequal size of breasts, breast tenderness, nipple discharge and mass under axilla, all these symptoms constituting were noticed among few of the participants.

4.1.4 Patients' perceived barriers to seek health care

The study shows that only 21.3% of the study participants had not any barrier to seek health carewhenBC signs and symptoms appeared. A clear difference, 78.7% of study participants had one or more barriers to seek health care.Those barriers were divided into barriers related to patients including personnel, interpersonal and economic barriers and barriers related to the health system

4.1.4.1 Perceived barriers related to patients

Table 4.3: Perceived barriers related to patients

Variable	Frequency (%)	
Personnel and interpersonal factors	**Yes**	**No**
considering symptom was not serious	49 (40.2)	73 (59.8)
feared of results	41 (33.6)	81 (66.4)
No chief complaint	40 (32.8)	82 (67.2)
Lack of pain	35 (28.7)	87 (71.3)
Stigma	5 (4.1)	117 (95.9)
I was not beable to organize my time	5 (4.1)	117 (95.9)
Fear of pain related to the exams	5 (4.1)	117 (95.9)
Shy to demonstrate symptoms to healthcare providers	5 (4.1)	117 (95.9)
Lactation	4 (3.3)	118 (96.7)
I went to traditional healers	4 (3.3)	118 (96.7)
My husband prevented me	2 (1.6)	120 (98.4)
Economic factors	**Yes**	**No**
Cost of the exams	6 (4.9)	116 (95.1)
Transportation costs	6 (4.9)	116 (95.1)

Table (4.3) shows barriers related to patients and interpersonal factors, 40.2% of participants considered that the symptoms were not serious, 33.6% feared from the results, 32.8 % said that there was no chief complaint,28.7% experienced painless symptoms. These barriers may delay seeking health care and thus delay the diagnosis and this will be examined later (4.2.2.2, page:77).

The unawareness regarding these symptoms also appeared in the open-endedquestion about barriers as one of thewomen said "*I felt the mass before 9 months and I did not care about. When the doctor told me that I should do mammography, I am really surprised that*

*it could be acancer….. Thanks God".*After all, some specialists duringin-depth interviews attributed delay in seeking health care to social barriers rather than to unawareness as one of them said" *Women became aware of BC symptoms as most of them have access to internet, social media. Patients usually delay seeking health care as they fear of social relationship especially husbands*". Another expert said" *Stigma and denial of having BC play a role in patient delay".*

Other barriers related to patient and interpersonal factors such as Stigma, inability to organize time, fear of pain related to the exams, shy to demonstrate symptoms to health care professionals, lactation, seeking traditional healers, prevention by husbands are all studied and were recognized among few of the study participants.

Regarding the economic barriers, few patients experienced fear of the exam and transportation costs. This finding is attributed to universal coverage of health care, providing mammography service through free of charge screening programs.

4.1.4.2 Perceived barriers related to the health care system

Table 4.4: Perceived barriers related to the health care system

Variable	**Frequency (%)**	
Health care system barriers	**Yes**	**No**
A previous examination with free results	12 (9.8)	110 (90.2)
Didn’t know where to go	6 (4.9)	116 (95.1)
A previous counseling visit and the doctor did not take care of the case	5 (4.1)	117 (95.9)
Complexity of referral system	4 (3.3)	118 (96.7)
Place of diagnostic facility is too far	2 (1.6)	120 (98.4)
Service is not available	1 (0.8)	121 (99.2)
Lack of female health care providers	1 (0.8)	121 (99.2)

Regarding barriers related to thesystem, some of the study participants (9.8 %) recognized that a previous breast imaging anda negativeresult is a barrier to seek health care another time from their perspectives. Other barriers related to thesystem such as patient did not know where to go, a previous counseling visit and the doctor did not take care about the case, complexity of referral system, place of thediagnostic facility is too far, lack of female health care providers, unavailability of diagnostic services are all recognized in few of study participantsas shown in the **Table (4.4)**.

Conversely, in open-ended questions some patients recognized system barriers during their diagnosis, one of the females said "*I went to the doctor from the first appearance of the lump, the doctor did not refer me to imaging and did not take care about me and said that I'm O.K…*".

4.1.5 Potential delay

Table 4.5: Distribution of cases by potential delay categories

Types of delay	Categories	Frequency (%)
Total delay n =122	≥ 3 months	51 (41.8)
Patient delay n = 122	≥ 3 months	24 (19.7)
diagnostic delay n= 122	≥ 3 months	15 (12.3)
Referral delay n = 122	>14days	8 (6.6)
Mammography delay n=91	>7days	10 (8.2)
U/S delay n =111	>7days	3 (2.7)
Biopsy delay n = 112	>14days	29 (25.9)
Histopathology delay n = 121	>14days	56 (46.3)

Table (4.3) shows the distribution of study participants by potential delay categories,

41.8% of patients have a total delay of 3 months and more which is considered a delay according to WHO report(WHO, 2017).

19.7 % of patients were considered delayers in the time to seek health care (mean for all patients = 54.5 days).It is worth to mention here that there were 3 patients that did not seek health care for more than 3 years. Such cases were mentioned by different medical specialists within in-depth interviews for instancean oncologist said*:" Unfortunately, we still see such cases. But, we cannot be certain about the exact time of developing cancer".*

On the other hand, 12.3% of patients experienced diagnostic delay of 3 months and more (mean for all patients= 35.8 days).

In comparison, several studies reported patients' delay and diagnostic delay among breast cancer patients (Landolsi et al., 2010; Norsa'adah et al., 2011;Ghazali et al., 2013; Sharma et al., 2013; Ozmen et al., 2014; Poum et al., 2014).

Regarding referral delay, 6.6 % reported a delay in referral more than 2 weeks and this is considered a delay according to international guidelines (NCCP, 2012).

In brief, referral time is good in general but there is a need to take care about certain rare diseases that may be treated for a long time as other diseases rather than cancer such as Paget's diseases or inflammatory carcinoma.

When a PHC doctor working at mammography screening program was asked about the referral, she excluded the occurrence of such situation and said "*Doctors at PHC refer patients even though they did not have the actual sign and symptoms of BC, I do not expect referral delay to be occurred".*

Regarding to imaging delay,8.2 % of patients had reported a delay in performing mammography. Also, 2.7% of patients had reported a delay in conducting U/S. This delay

is occurredas a result of appointment to do the exam, or ignorance because of nonmalignant findings of the first imaging method.

Furthermore, 25.9 % of patients reported a delay of more than 14 days in performing biopsy and 46.3% of them reported a delay of more than 14 days in getting the histopathology result. These delays differ with different sectors that will be discussed later.

4.1.6 Patients'follow up after a previous breast problem

Figure (4.4) indicates that the majority of the study participants (73.8%) have never been examined before, 18.8%had a previous breast exam in the purpose of diagnosis and few of them(8.2%) had a previous exam in the purpose of screening.

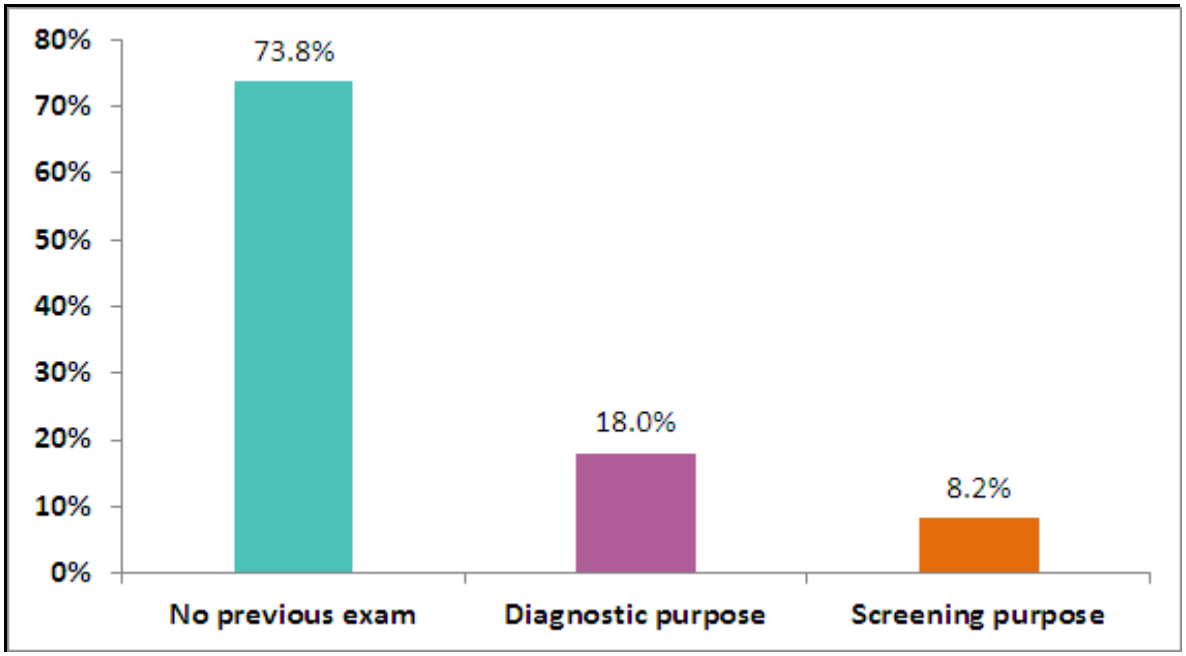


Figure 4.4: Distribution of cases regarding the presence of a previous breast exam

The result indicates underutilization of screening programs in the Gaza Strip that most of the cases undergo a mammography or any other breast exam when the signs of BC have already appeared. This result is in a line with the literature that showed underutilization of screening programs among women in GGs and Arab countries as well (Abu-Shammala and Abed, 2015;Donnelly et al.,2015).

The study shows that 9% of the participants lost follow up after benign findings in previous breast imaging done less than a year in the causes related to patients such as ignorance or causes related to the healthcare system. The proposed protocol for follow up of a probably benign lesionis a repetition of unilateral diagnostic mammography at 6 months and a bilateral diagnostic mammography at 12 and 24 months, and optionally at 36 months (Dorsi et al.,2003). Whereas, when mammography shows a definite benign mass (forexample lymph node, hamartoma,lipoma, calcified fibroadenoma, oil cyst) a clinical follow up is the appropriate management (ACR, 2016b). In brief, a previous negative result in either mammography or US does not mean mistake rather we should to enhance the follow up issue of these reported nonmalignant findings.

In anopen-endedquestion, women explained this point as a barrier to early diagnosis as one womansaid:*" When I did the previous exam before 9 months, the doctor said that I m O.K and did not say that I should come back for another test".* The researcher comments at this point in that the success of follow up of benign lesions firstly need a specialist in order to follow up the case clinically, and secondly the patients should be invited by thespecialist after clarifying the negative consequences if the patient delayed**.**

Different specialists within in-depth interviews mentioned that thefailure in the follow up process is considered a diagnostic delay, as one of theexpertsin the oncology field said *"Absolutely, it is considered a delay in diagnosis, this woman should be at least programmedin a close follow up after benign findings in imaging or to be biopsied".*

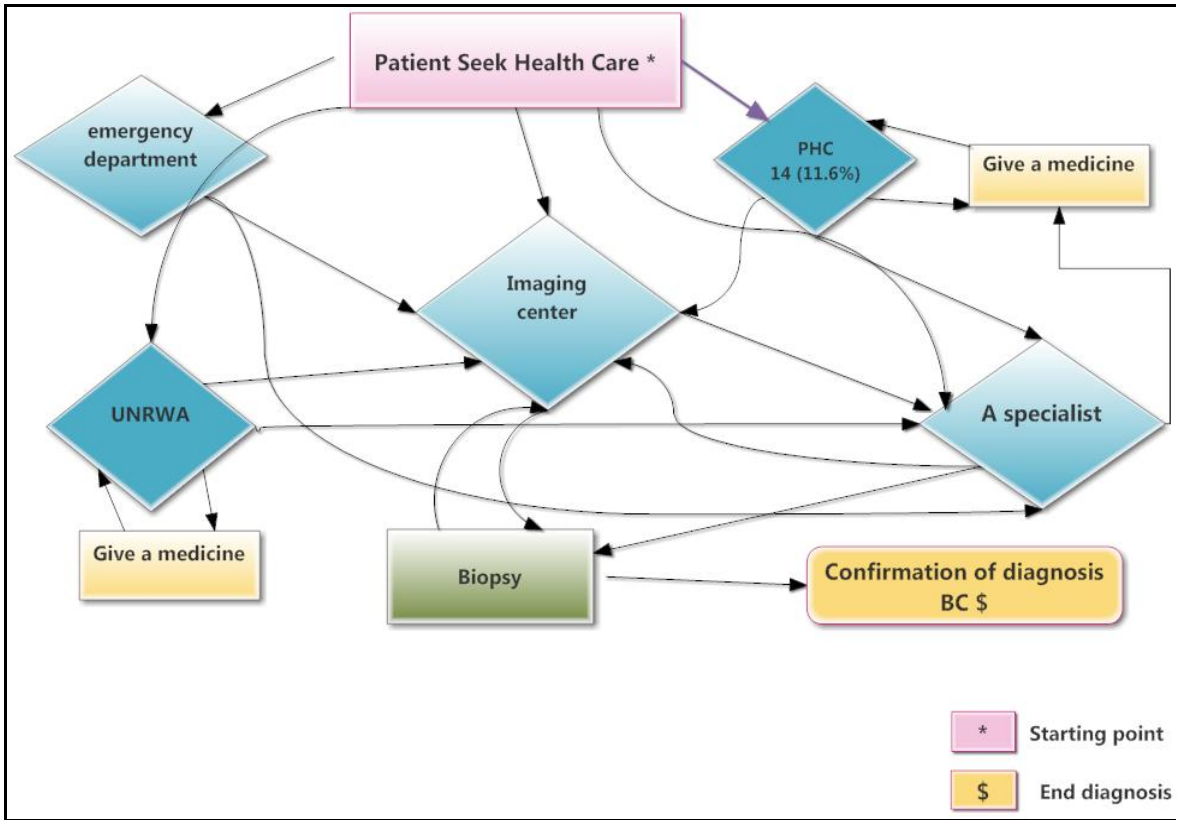
4.1.7 Referral of suspected BC cases to diagnosis

There is no clear process for the suspected BC cases to be referred for the diagnosis, and the process seems to be a complex and ambiguous one **(scheme 4.1).**

About 49.2% of the study participants were referred firstly to surgeons for assessment, then to theimaging centers. In addition, UNRWA referred about 17 % of the total study

participants for imaging exams. PHC also referred 7.4% directly to imaging without surgery assessment.

Other referrals to imaging centers,11.9% of the participantswere referred by emergency, cardiology,and thoracic surgery departments,or by a charitable society, or doctors with various medical specialists including endocrinologistandhistopathologist and others.



Scheme 4.1: Referral of suspected breast cancer patients to imaging exams

Table 4.6: Referral of suspectedBCpatients to diagnosis

Variable	Categories	Frequency (%)
Number of counseling times before referral to imaging service	1 time	49 (40.2)
	2-3 times	52 (42.6)
	≥ 4 times	19 (15.6)
	Did not counsel	2 (1.6)
Utilized diagnostic modalities	Mammography+ US+Biopsy	79 (64.8)
	U/S+ Biopsy	30 (24.6)
	mammography + Biopsy	12 (9.8)
	Only biopsy	1 (0.8)
Ranking for utilized imaging modalities	combined mammography & U/S-biopsy	32 (26.3)
	Mammography- U/S – Biopsy	31 (25.4)
	U/S – biopsy	29 (23.8)
	U/S – mammography– biopsy	14 (11.5)
	Mammography– biopsy	10 (8.2)
	Biopsy- U/S	2 (1.6)
	U/S-Biopsy- mammography	2 (1.6)
	Biopsy	1 (0.8)
	U/S- Biopsy- combined mammography&U/S	1 (0.8)

Table (4.6)reveals 40.2% of the study participants were referred to imaging exams from the first counseling visit. 42.6% of the study participants counseled two or three times before referral to imaging diagnosis. In addition, 15.6 % of patients counseled 4 times andmore before starting imaging. Cancer signs and symptoms can be vague, non-specific or difficult to detect. In addition, general practitioners (GPs) in PHC and different specialists other than surgeons and oncologists see a limited number of cancer cases.

Health-care providers may lack physical exam skills or have insufficient time to assess suspicious cancer symptoms, such as inability to properly perform a clinical breast exam for a breast lump. These factors can lead to misdiagnosis and delayed detection. Within in-depth interview a GP doctor identified the problem in assessing BC in the PHC said that*" GPs have insufficient education and training courses about BC assessment".*

The study shows that suspected BC patients in GGs were referred to imaging examinations in different processes. For instance, around 26 % of the study participants conducted combined mammography and U/S (at the same time), then biopsy. Also, 25% of them conducted mammography, then U/S, and finally biopsy. Other diagnostic process, 23 % of participants conducted U/S, then biopsy. Moreover, 11.5 % underwent U/S, then mammography and finally biopsy. In addition, 8.2% of the participants conducted mammography then U/S.These inconsistent referrals to imaging exams did not follow international guidelines (Willett et al., 2010) as previously illustrated in chapter 2, (p: 28-29).

The resultof the current study reflects the inactive standard protocol in assessment of suspected BC patients in GGs. This result wassupportedby open-ended question within in-depth interviews and there is agreement among various specialists that there are no national guideline to diagnose BC, a consultant radiologist specialized in breastimagingfield said "*There are no written guidelines about BC diagnosis, the only documented guidelines stated in 2010 particularly for mammography screening program at PHC and it is not generalized for all health institutions".* Another expert said: *"There is no generalized protocol for all the institutions; but we depend on European guidelines and some depends on American guidelines in the diagnosis process and follow up also".*

It is worth to mention here that there is no single case referred to conduct a breast MRI and that means MRI has no role in BC diagnosis in the Gaza Strip. The interviewed

radiologists agree with the result and one of them said "*The role of MRI is only used when mammography and U/S are inconclusive, but we do not use it in the BC diagnosis because of disadvantages of MRI as it is expensive, does not be used in case of large breast and in calcified breasts but it has a role to differentiate between scar and recurrence of malignancy in case of lumpectomy".*

4.1.8 Distribution of cases by utilized sector

Table4.7: Distribution of cases by examination performed and utilized sectors

Variable	Categories	Frequency (%)
Mammography	No	30 (24.6)
	Yes	92 (75.4)
	If yes (n=92)	
	Governmental hospital	31 (33.7)
	NGOs	55(59.8)
	Private	6 (6.5)
U/S	No	12 (9.8)
	Yes	110 (90.2)
	If yes (n=110)	
	Governmental hospital	40 (36.4)
	NGOs	47 (42.7)
	Private	23(20.9)
Biopsy	No	0 (0.0)
	Yes	122(100)
	If yes (n=122)	
	Governmental hospital	36 (29.5)
	NGOs	40 (32.8)
	Private	46 (37.7)

Variable	Categories	Frequency (%)
Patients change the facility during the diagnostic process	No	76 (62.3)
	Yes	46 (37.7)
	If yes (n= 46)	
	Mammography	4 (8.7)
	U/S	3 (6.5)
	Biopsy	39 (84.8)
Reasons for changingfacility n=46	Appointment	19 (41.4)
	Availability	8 (17.4)
	Doctor advise	7 (15.3)
	Trust	6 (13.0)
	Affordability	3 (6.5)
	Health insurance	2 (4.3)
	Doctor refused to repeat biopsy	1 (2.1)

Regarding mammography, 33.7%of the referred tomammography conducted it at governmental hospitals and more than 59.8% conducted at NGOs, and only 6.5% at the private sector.It is noted that a high percentage of participants utilized NGOs and governmental hospitals for mammography service. This is related to low cost, or in sometimes costless mammography service at the two mentioned sectors unlike the private one.

Regarding U/S, 36.4 % of participants utilized governmental hospitals, 42.7 % utilized NGOs and 20.9% utilized the private sector.

Regarding biopsy, about 29.5% of the study participants conducted biopsy at governmental centers, and 32.8%of patients conducted it at NGOs and 37.7% of them conducted it at the private sectors as shown in the**Table(4.7)**.

In the Gaza Strip, suspected BC patients are referred to mammography and U/S free of charge by UNRWA without covering the financial feesof biopsy. In addition, screening programs at NGOs cover only mammography and U/S and do not cover the financial cost of biopsy. This obliges the patient to change the facility for biopsy. In contrast, Cultural and Free Thought Association (CFTA) refer the patients to do the three exams at NGOs centers free of charge. Most of the time, patients conducted mammography and U/S at one facilityand changed the facility forthe biopsy because oflong appointment or unavailability of the service.

4.1.9 Patients' accessibility to diagnostic services for breast cancer

In order to analyze the patients' accessibility to diagnostic services for BC, the researcher arranged the statements into three main parts, accessibility &affordability domain, appointment&waiting time domain, and communication & patient's respect domain. Patientswere asked about the level of their accessibility regarding examinations that performed during the diagnostic process, **Figure (4.5)** shows the three accessibility domains and the percentage of their scores.

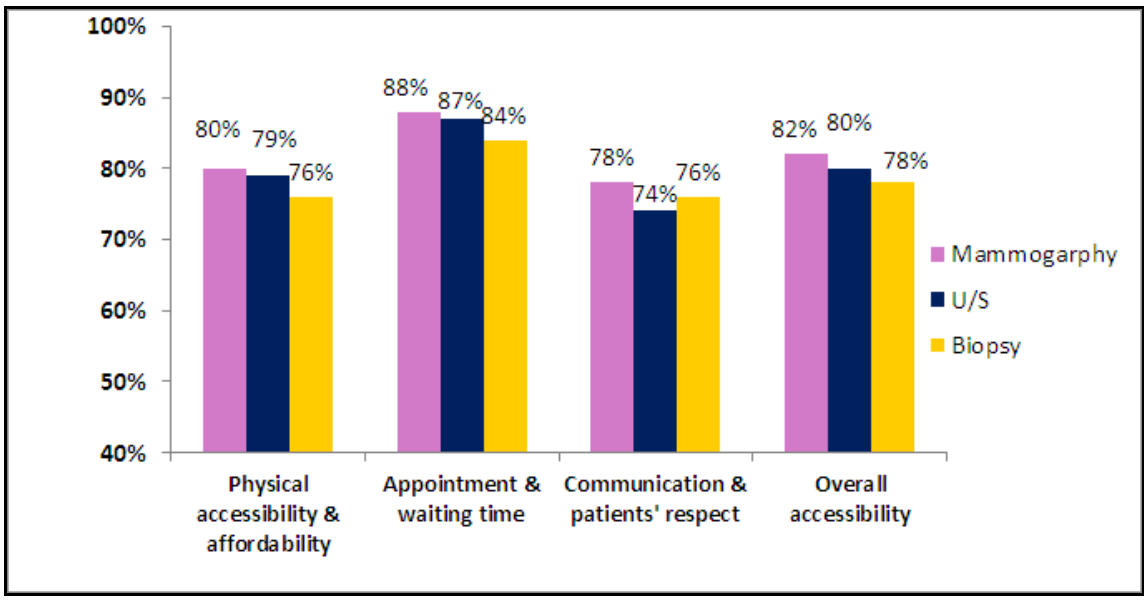


Figure 4.5: Accessibility domains of patients according to diagnostic exams

The overall weighted mean for accessibility domains for mammography, U/S and biopsy are 82%, 80% and 78% respectively which reflect a high level of accessibility among study participants.For the three diagnostic exams, the researcher noted that the highest weighted mean scoreis for appointment& waiting time domain, followed byphysicalaccessibility & affordability, and the lowest mean score is for the communication& patients' respect domain that will be discussed for each method separately.

4.1.9.1 Patients' accessibility to mammography service

Table 4.8: Level of accessibility among study participants regarding mammography service, (n= 91)

Variable		Strongly disagree n (%)	Disagree n (%)	Not certain n (%)	Agree n (%)	Strongly Agree n (%)	mean	mean %
Affordability and accessibility	It was easy to reach to mammography center	1(1.1)	4(4.4)	5 (5.5)	58 (63.7)	23(25.3)	4.08	81.5
	The distance between your place of residence and mammography center was suitable	9 (9.9)	13 (14.3)	4 (4.4)	49 (53.8)	16 (17.6)	3.55	71
	Transportation is availableto mammography	0 (0.0)	5(5.5)	2 (2.2)	54 (59.3)	30(33)	4.20	84
	In general, the performance of health care providers in mammographyis good	2 (2.2)	4(4.4)	5 (5.5)	26 (28.6)	54 (59.3)	4.38	87.7
	The cost of mammography was reasonable	7 (7.7)	6(6.6)	1 (1.1)	36 (39.8)	41 (45.1)	4.08	81.5
	The transportation cost to reach mammography center was suitable	12(13.2)	13 (14.2)	5 (5.5)	33 (36.3)	28 (30.8)	3.57	71.4
Appointment and waiting time domain	The referral systemto mammography was within appropriate time	3 (3.3)	2(2.2)	5 (5.5)	33 (36.3)	48 (52.7)	4.33	86.6
	The appointment to conductmammography was suitable for you	3(3.3)	3(3.3)	2 (2.2)	35 (38.5)	48 (52.7)	4.34	86.8

Variable		Strongly disagree n (%)	Disagree n (%)	Not certain n (%)	Agree n (%)	Strongly Agree n (%)	mean	mean %
	Health care providers in mammography center committed with the appointments	1(1.1)	1(1.1)	0 (0.0)	25 (27.5)	64 (70.3)	4.65	93
	Waiting time to get mammography service was appropriate	3 (3.3)	9 (9.9)	1 (1.1)	42 (46.1)	36 (39.6)	4.09	81.8
	The result of mammography was received at anappropriate time	1(1.1)	1(1.1)	0 (0.0)	39 (42.9)	50 (54.9)	4.49	89.9
Communication and patient respect	Health care provider at mammography centerintroduced him/ herself	10(11)	36 (39.5)	14(15.4)	14 (15.4)	17 (18.7)	2.91	58.2
	Medical imaging procedure was explained by the health care provider in mammography	8 (8.8)	13 (14.3)	3 (3.3)	42 (46.2)	25 (27.5)	3.69	73.8
	Health care provider answered your questions carefully in mammography	3(3.3)	22 (24.4)	11 (12.2)	40 (44.4)	14 (15.6)	3.44	68.9
	Clean gownand coverlet were available in mammography	1 (1.1)	2 (2.2)	2 (2.2)	40 (44)	46 (50.5)	4.41	88.1
	Privacy was valued during mammography	0 (0.0)	1 (1.1)	0 (0.0)	23 (25.3)	67 (73.6)	4.71	94.3
	There was a female health careprovider in mammography	1(1.1)	0 (0.0)	0 (0.0)	24 (26.4)	66 (72.5)	4.69	93.8
	You were given enough time to explain your condition in mammography	2 (2.2)	3 (3.3)	4 (4.4)	41 (45.1)	41 (45.1)	4.27	85.5
	No discrimination between patients in mammography	5 (5.5)	3 (3.3)	2 (2.2)	45 (49.4)	36 (39.6)	4.14	82.9
	Feasible contact with mammography facility	19 (20.9)	26 (28.6)	6 (6.6)	18 (19.8)	22 (24.2)	2.99	59.7
Total		**Affordability and accessibility**					**4.0**	**80**
		Waiting time and appointment					**4.4**	**88**
		Communication and patients respect					**3.9**	**78**
Overall accessibility for mammography							**4.1**	**82**

n: number of participants

Table (4.8) shows that the mean scores for accessibility domains –physical accessibility& affordability and appointment & waiting time for mammography services are 4.0 and 4.4 (weighted mean 80% and 88%) respectively. These high scores of the two domains for mammographyservice reflect the presence of available and affordable service with good appointmentin general.

Regarding communication& patient respect domain, the mean score is 3.9 (weighted mean= 78%). The researcher noted that the mean score for communication and patient respect is reduced by the patients'responses towards the statement" health care provider at mammographycenter introduced him/ herself".The weighted mean score is 58.2 % as more than 50 % of the study participants responded with disagree or strongly disagree.

Health care team knows so much personal information about the patients, yet patients know nothing about them. Self-introduction of health care providers to patients is an issue of providing kind care. More consideration should be given to this point to increase the communication between health care providers and patients,and to make the patients more trust about the service provided.

Regarding the statement "health care provider answered your questions carefully in mammography", it is noted that the weighted mean score is 68.9%, as 27.7% of the participants responded with disagree or strongly disagree.Patients usually wanted the mammography imaging specialist at the center to give the result immediately after conducting the examination, while writing mammography reports is the responsibility of the radiologist and not the technologist. In addition, radiologists do not be able to confirm the diagnosis by the results of mammography alone, and wait to completethe required investigations in order to confirm the diagnosis. Efforts should be done to write instructions about mammography and U/S technique and procedures. Also, the patients

should be informed that all the investigations complete each other and the patient should be wait to complete all of them to confirm the diagnosis.

4.1.9.2 Patients' accessibility to U/Sservice

Table 4.9: Level of accessibility among study participants regarding U/S service, (n= 110)

Variable		Strongly disagree n (%)	disagree n (%)	Not certain n (%)	Agree n (%)	Strongly agree n (%)	mean	mean %
Affordability and accessibility	It was easy to reach to U/S center	1 (0.9)	4 (3.7)	4 (3.7)	75(68.8)	25(22.9)	4.09	81.8
	The distance between your place of residence and U/S center was suitable	11(10.1)	14 (12.8)	10 (9.2)	57(52.3)	17(15.6)	3.50	70.1
	Transportation was availableto the U/S	1 (0.9)	4 (3.7)	3 (2.8)	69(63.2)	32(29.4)	4.17	83.3
	In general, the performance of health care providersin U/S was good	1 (0.9)	7(6.4)	7 (6.4)	35(32.1)	59(54.2)	4.32	86.4
	The cost of U/S was reasonable	10(9.2)	10(9.2)	4 (3.6)	3(33.0)	49(45.0)	3.95	79.1
	The transportation cost to reach U/S center was suitable	11(10.1)	14 (12.9)	6 (5.5)	47(43.1)	31(28.4)	3.67	73.4
Waiting time and appointment	The referral systemto U/S was within appropriate time	11(10.1)	14 (12.9)	6(5.5)	47(43.1)	31(28.4)	4.30	86.1
	The appointment to conduct U/S was suitable for you	4(3.7)	4 (3.7)	3 (2.8)	40(36.6)	58(53.2)	4.32	86.4
	Health care providers in U/S center committed with the appointments	1 (0.9)	2 (1.8)	0(0.0)	36(33.1)	70(64.2)	4.58	91.6
	Waiting time to get U/S service was appropriate	5 (4.6)	8 (7.4)	2 (1.8)	54(49.5)	40(36.7)	4.06	81.3
	The resultof U/S was received at anappropriate time	1 (0.9)	2 (1.8)	0 (0.0)	47(43.2)	59(54.1)	4.48	89.5

Variable		Strongly disagree n (%)	disagree n (%)	Not certain n (%)	Agree n (%)	Strongly agree n (%)	mean	mean %
Communication and patients respect	Health care provider at U/S center introduced him/ herself	17(15.6)	39(35.8)	12(11)	25(22.9)	16(14.7)	2.85	57.1
	Medical imaging procedure was explained by the health care provider in U/S	9 (8.3)	15 (13.8)	7(6.4)	52(47.6)	26(23.9)	3.65	73.0
	Health care provider answered your questions carefully in U/S	1(0.9)	27 (24.8)	12 (11)	50(45.9)	19(17.4)	3.54	70.8
	Clean gownand coverlet were available in U/S	0 (0.0)	0(0.0)	4 (3.7)	53(48.6)	52(47.7)	4.44	88.8
	Privacy was valued during U/S	0 (0.0)	1 (0.9)	0 (0.0)	38(34.9)	70(64.2)	4.62	92.5
	There wasa female health careprovider in U/S	36 (33)	15 (13.7)	4 (3.7)	27(24.8)	27(24.8)	2.94	58.9
	You were given enough time to explain your condition in U/S	0 (0.0)	6 (5.5)	4 (3.7)	57(52.3)	42(38.5)	4.24	84.8
	No discrimination between patients in U/S	5 (4.6)	4 (3.7)	2 (1.8)	56(51.4)	42(38.5)	4.16	83.1
	Feasible contact with U/S facility	21(19.3)	35 (32.1)	5 (4.6)	24 (22)	24 (22)	2.95	59.1
Total		**Affordability and accessibility**					**3.9**	**79**
		Waiting time and appointment					**4.3**	**87**
		Communication and patients respect					**3.7**	**74**
Overall accessibility for U/S							**4**	**80**

n: number of participants

Table (4.9) shows that the mean scores for accessibility to U/S service; physical accessibility &affordability, appointment &waiting time are 3.9, and 4.3 (weighted mean=79% and 87%)respectively. These high scores reflect the high physical accessibility and affordability within appropriate appointments.The mean score for communication& patient's respect domain is 3.7 (weighted mean=74%).The researcher noted that the domain scorewas reduced by the responses towards the statement" health care provider at U/S

center introduced him/ herself" with a weighted mean score 57.1% as 51.4%of the participants responded with disagree or strongly disagree.

The other statement reduced the domain score is "there was a female health care provider in U/S" with a weighted mean score 58.9% as 46.7% of the participants responded with disagree or strongly disagree. The researcher comment about this point in that breast imaging includes sensitive procedures that may be socially unaccepted. Therefore, we have to focusat this point and to develop femalehealth care providers in all types of breast imaging including radiologists, technologists and nurses to make breast imaging field more acceptable to women and thus more accessible.

Finally, the score also was reduced by the responses towards the statement" feasible contact with U/S facility" with a weighted mean score 59.1% as 51.4% of the study participants responded with disagree or strongly disagree.The contact between patients and medical facilities is important for the patients and health care providers as well as it help in appointment process and inquire about the case especially when the case scheduled within a follow up program.

4.1.9.3 Patients' accessibility to biopsy service

Table 4.10: Level of accessibility among study participants regarding biopsy service, (n= 121)

Variable		Strongly disagree n (%)	disagree n (%)	Not certain n (%)	Agree n (%)	Strongly agree n (%)	mean	mean %
Physical accessibilityand affordability	It was easy to reach to the biopsy center	1 (0.8)	6 (5)	6 (5)	78(64.4)	30 (24.8)	4.07	81.4
	The distance between your place of residence and biopsy center was suitable	12 (9.9)	21 (17.4)	8 (6.6)	62(51.2)	18 (14.9)	3.44	68.8
	Transportation was availableto biopsy	1 (0.8)	7 (5.8)	2 (1.7)	73(60.3)	38 (31.4)	4.16	83.2
	In general, the performance of health care providers in biopsywas good	2 (1.7)	6 (5)	6 (5)	37(30.5)	70 (57.8)	4.38	87.6
	cost of biopsy was reasonable	30(24.8)	15 (12.4)	2 (1.7)	39(32.2)	35 (28.9)	3.28	65.6
	The transportation cost to reach biopsy centerwas suitable	15 (12.4)	18 (14.9)	6 (5)	47(38.8)	35 (28.9)	3.57	71.4
Waiting time and appointment	The referral systemto biopsy was within appropriate time	3 (2.4)	4 (3.3)	6 (5)	45(37.2)	63 (52.1)	4.33	86.6
	The appointment to conduct biopsy was suitable for you	4 (3.3)	5 (4.1)	2 (1.7)	43(35.5)	67 (55.4)	4.36	87.2
	Health care providers in biopsy center committed with the appointments	1 (0.8)	1 (0.8)	0 (0.0)	39(32.2)	80 (66.2)	4.62	92.4
	Waiting time to get biopsy service was appropriate	5 (4.1)	11 (9.1)	3 (2.5)	48(39.7)	54 (44.6)	4.12	82.4
	The result of histopathology was received at anappropriate time	13 (10.7)	15 (12.4)	2 (1.7)	43(35.5)	48 (39.7)	3.81	76.2

Variable		Strongly disagree n (%)	disagree n (%)	Not certain n (%)	Agree n (%)	Strongly agree n (%)	mean	mean %
Communication and patients respect	Health care provider at biopsy center introducedhim/ herself	15 (12.5)	39 (32.2)	12 (9.9)	27(22.3)	28 (23.1)	3.12	62.4
	Medical imaging procedure was explained by the health care provider in biopsy	6 (5)	14 (11.5)	4 (3.3)	55(45.5)	42 (34.7)	3.93	78.6
	Health care provider answered your questions carefully in biopsy	2 (1.7)	22 (18.3)	9 (7.5)	56(46.7)	31 (25.8)	3.77	75.4
	Clean gownand coverlet were available in biopsy	0 (0.0)	0 (0.0)	3 (2.5)	54 (45)	63 (52.5)	4.50	90
	Privacy was valued during biopsy	1 (0.8)	1 (0.8)	0 (0.0)	41(34.5)	76 (63.9)	4.60	92
	There was a female health careproviders in biopsy	50 (42)	21 (17.6)	5 (4.2)	29(24.4)	14 (11.8)	2.46	49.2
	You were given enough time to explain your condition in biopsy	1 (0.8)	4 (3.3)	6 (5)	57(47.6)	52 (43.3)	4.29	85.8
	No discrimination between patients in biopsy	5 (4.1)	3 (2.5)	3 (2.5)	60(49.6)	50 (41.3)	4.21	84.2
	Feasible contact with biopsy facility	17 (14)	36 (29.8)	8 (6.6)	26(21.5)	34 (28.1)	4.07	81.4
Total		**Affordability and accessibility**					**3.8**	**76**
		Waiting time and appointment					**4.2**	**84**
		Communication and patients respect					**3.8**	**76**
Overall accessibility for biopsy							**3.9**	**78**

n: number of participants

Table(4.10) shows that the mean score for physical accessibility &affordability 3.8 (weighted mean score=76%). The researcher noted that the domain score is reduced by the respondedtowards the statement" the distance between your place of residenceand biopsy center was suitable" with a weighted mean score 68.8% as 27.3% of the study participants responded with disagree or strongly disagree. The author comments about this result in that

not all the imaging centers have the possibility to do biopsy,andthisobliges the patient to change the facility in order to complete the diagnostic process. As far as the researcher concerned, completion of the diagnostic process in one facility and within few visits is an important issue for the patient in order to reduce financial and psychological burden as well.

Also, the domain score is affected by therespondedtowards the statement" cost of biopsy is reasonable" with a weighted mean score 65.6% as 37.2% of the study participants responded with disagree or strongly disagree. The researcher interpretsthis finding in that screening programs at NGOs and UNRWA do not cover biopsy fees. Therefore, patients performed biopsy out of pocket (Range, 200- 800 NIS) and this is considered too much from their perspectives.

The mean score for appointment & waiting time for biopsy service is 4.2 (weighted mean score is 84%). The researcher noted that patientshave very good responses for all statements except for the statement"the result of histopathology was received at an appropriate time" with a weighted mean score of 76.2%as 23.1% of the study participants answered with disagree or strongly disagree. After biopsy, the sample should be exist in the histopathology department for several days in order to interpret it by histopathologist.

It is worthy to mention here that patients perform biopsy at the governmental hospitals have two types of delay, an appointment to perform the biopsy and another delay to get the histopathology result. In contrast, Samples at NGOs or private sector are examined at a shorter delay time if compared to governmental hospitals. Within in-depth interview, histopathologists attributed the delay in governmental hospitals to many factors as one of them said*" The maximum time for histopathology report to be ready is 11 days, there are cases finished before that time, this depends on the tumor nature as sometimes*

requiresmuch effort and time to decide about it, a device stop working, unavailable materials, weekends, and holidays, all these factors may cause delay in report delivery".

Regarding communication and patient respect domain, the mean score for this domain is 3.8 (weighted mean score =76%). The score of this domain was affected by the responsestowards the statement"health care provider at biopsy center introduced him or herself" with a weighted mean score 62.4% as 44.7% of the study participants respondedwith disagree or strongly disagree. Also, the domain is affected by the responses towards the statement"there was a female health careprovider in biopsy center" with a weighted mean score 49.2% as 59.6% of the participants'respondedwith disagree or strongly disagree.

4.1.10 Patient's medical records

Table 4.11: Documentation in the patients' medical records

Variable	Categories	Frequency (%)
Mammography records n=92	Report was not found	39 (42.4)
	Report wasfound	53 (57.6)
U/S records n=110	Report wasnot found	41 (37.3)
	Report wasfound	69 (62.7)
Biopsy records n=122	Report wasnot found	2 (1.8)
	Report wasfound	120 (98.2)
Cancer stage as documented	I	1 (0.8)
	II	13 (10.7)
	III	28 (23)
	IV	13 (10.7)
	Not reported	65 (53.3)
	file was not found	2 (1.5)

The researcher found that there is incompleteness in the patient's medical recordsas 42.4% of mammography reports and 37.3% of U/S reports are not found in the patients' file. Regarding histopathology reports, the researcher found that most reports are found in the patients' file (**Table 4.11)**.

Oncologistswereasked about this issue and assured that the presence of mammography and U/S reports in the medical file is crucial, one of them said "*we depend on mammography and U/S in the management process and it should be exist in the patient file. But, maybe there is a problem regarding follow up of records and what is important to be kept"*.

Regarding stage of cancer, only 11.5% of participants were reported as either stage I or stage II. This is due to delay in the diagnosis for the factors related to patients or system. About 33.7% were reported as stage III or IV. Unfortunately, more than half of the study participants (53.3%) were not reported to any stage at the time of data collection. Within in-depthinterviews oncologists confirmed its importance and one of them said"*it is mandatory to document the patient stage as the management plan depends on what stage the patient is"*.

4.2 Inferential analysis

4.2.1 International guidelines for referral to imaging diagnostic methods(effeciency)

The researcher interested to know if physicians in GGs follow the international guidelines whenthey choose the firstmethod to diagnose BC according to age(Willett et al., 2010).

Table 4.12: Method of choice in imaging related to age categories

Age categories	Method of first choice	Frequency (%)
<40 years n= 24	Mammographyfirst	2 (8.3)
	U/S first	18 (75)
	biopsy first	1 (4.2)
	Combined mammography with U/S	3 (12.5)
≥40 years n= 98	Mammographyfirst	39 (39.8)
	U/S first	28 (28.6)
	biopsy first	2 (2)
	Combined mammography with U/S	29 (29.6)

Table (4.12)clarifies the distribution of cases the first method selectedin BC initial diagnosis. For patients in the age group less than 40 years,75%of study participants performed U/Sfirst, 8.3% performed mammography first and 4.2% performed biopsy first.

On the other hand, 39.8% of participants in the age 40 years or more performed mammography first, 28.6 %performedU/Sfirst and 2% performed biopsy first. Considering guidelines in the initial diagnosis of BC, there were12.5% of patients in the age group less than 40 years started their diagnosis by either mammography or biopsy which did not follow standards and is considered inefficient process.

Also, 30.6% of participants in the age group 40 years and more started their diagnosis with either U/S or biopsy which did not follow standards and also is considered inefficient process. The differences in the choice of imaging method reflect that the present guidelines for BC assessmentare not generalized for all institutions. This finding is consistent with in-depth interviews findings as one of the expert said" *There is no guideline about what should be done. The choice basedon physician experience and what hesees"*.

4.2.2 Relationship between patient delay to seek health care and other factors

4.2.2.1 Relationship between patients delayand demographic variables

Table 4.13: Relationship between patients delay and some demographic variables

Variable	Categories	Patient's delay		χ^2	p-value
		Non delayers <3 months	Delayers ≥3months		
Age	< 40	20 (20.4)	4 (16.7)	0.17	0.46
	≥ 40	78 (79.6)	20 (83.3)		
Place of residence	North Gaza	13 (13.3)	4 (16.7)	2.35	0.67
	Gaza	43 (43.8)	13 (54.1)		
	Middle zone	20 (20.4)	4 (16.7)		
	Khanyounis	14 (14.3)	1 (4.2)		
	Rafah	8 (8.2)	2 (8.3)		
Income	< 1000 NIS	46 (50.5)	13 (54.2)	0.32	0.85
	1000- 2290 NIS	25 (27.5)	7 (29.2)		
	≥ 2290 NIS	20 (22.0)	4 (16.7)		
level of education	< secondary school	34 (34.7)	10 (41.7)	0.407	0.52
	≥ secondary school	64 (65.3)	14 (58.3)		
Family history of BC	no	66 (67.3)	15 (62.5)	.203	0.65
	yes	32 (32.7)	9 (37.5)		

Table (4.13) shows that there is no statistically significantrelationshipbetween patient delay and examined demographic variables (Age, place of residence, income, level of

education, and family history of BC). By comparison, the literature showed a significant effect of sociodemographic factors on patient delay in seeking health care after theappearance of BC symptoms (Khan et al., 2015;Ozmen et al., 2014;Ermiahet al., 2012).Another study, Altwalbeh et al.(2015)showed that the only sociodemographic factor affecting patient's delay was age. The inconsistency of results could be interpreted by the differences in the patient's context about the social norms, communities,and encouragement by the family members. Also, in the GGs, health insurance coverage and the presence of free of charge mammography provided by more than one provider could enhance the accessibility of the service for all.

4.2.2.2 Relationship between patient delay and perceived barriers

Table 4.14: Relationship between patient delay and perceived barriers

Variable		Patients' delay		χ^2	p-value	O.R	CI
		Non delayers <3 months	Delayers ≥3 months				
Considering symptom was not serious	Yes	28 (29.2)	21 (80.8)	22.67	0.00*	10.2	(3.5-29.7)
	No	68 (70.8)	5 (19.2)				
No chief complaint	Yes	25 (26.0)	15 (57.7)	9.3	0.003*	3.11	(1.6-9.5)
	No	71 (74.0)	11 (42.3)				
Lack of pain	Yes	21 (21.9)	14 (53.8)	10.2	.001*	4.2	(1.7-10.3)
	No	75 (78.1)	12 (46.2)				
Feared of results	Yes	32 (33.3)	9 (34.6)	.015	0.902	1.1	(0.43-2.64)
	No	64 (66.7)	17 (65.4)				

*statistically significant, ³Fisher's exact test

Table (4.14) shows that there are some barriers related to patientsthat affect the time to seek health care afterappearance of BCsymptom. The researcher found these barriers are the most recognized barriers among patients. The relationship between such barriers and patient delay was examined by performing Chi square test**.**Regarding the barrier" considering symptom was not serious", chi square testrevealed that patient who had experienced this barrier was more likely to be delayed than those had not (χ^2 =22.6, p-value= 0.00).Also, the study revealed that patient who hadexperienced such barrier was exposed to delay in seeking health care 10 times more than that who had not (O.R= 10.2). The result is supported by the result of Ozmen et al.(2014) study.

Regarding the barrier" no chief complaint", the study showed that patient experienced such barrier was more likely to be delayed than thathad not (χ^2=9.3, p-value= 0.003). Also, the study revealed that patientwho had experienced this barrier was exposed three times to delay more than that who had not (O.R= 3.11).

Regarding to the barrier "experiencing painless symptom", the study showed that patient experienced such barrier was more likely to be delayed than that had not (χ^2=10.2, p-value= 0.001). Also, the study revealed that patient who had experienced this barrier was exposed four times to delay more than those had not (O.R= 4.2).

All these results reflect lack of awareness among women in GGs regarding signs and symptoms of BC and there is a necessity to educate them in order to seek health care earlier.

Regarding barrier "feared of results", the study showed that there is no association between patient experienced fear of results and the time to seek health care (χ^2= 0.015, p-value =0.9).

Inconsistent findings appeared within in-depth interviews regarding patients' delay in seeking health care that it is attributed to other barriers rather than awareness and education

as one oncologist said *"Social barriers and fear from husband abandon is very important in our society. Although educated women are aware of BC and its symptoms, they mostly come in anadvanced stages of the disease".*

4.2.3 Relationship between diagnostic delay and other factors

4.2.3.1 Relationship between diagnosticdelay and demographic variables

Table 4.15: Relationship between diagnosticdelay and demographic variables

Variable	Categories	Diagnostic delay		χ^2	p-value
		Non-delayers <3 months	Delayers ≥3 months		
Age	< 40	18 (16.8)	6 (40.0)	4.47	0.045*
	≥ 40	89 (83.2)	9 (60.0)		
Place of Residence	North Gaza	15 (14.0)	2 (13.2)	0.96	0.915
	Gaza	49 (45.8)	7 (46.7)		
	Middle zone	20 (18.7)	4 (26.7)		
	Khanyounis	14 (13.1)	1 (6.7)		
	Rafah	9 (8.4)	1 (6.7)		
Income	<1000 NIS	49 (47.6)	10 (83.4)	5.512	.063ᵌ
	1000-2290 NIS	31 (30.1)	1 (8.3)		
	≥ 2290 NIS	23 (22.3)	1 (8.3)		
level of education	< secondary school	42 (39.3)	2 (13.3)	3.83	0.08ᵌ
	≥ secondary school	65 (60.7)	13 (86.7)		
Family history of BC	No	72 (67.3)	9 (60.0)	0.313	0.39
	yes	35 (32.7)	6 (40.0)		

*statistically significant, ᵌFisher's exact test

To examine the relationship between diagnostic delay and patient's age, chi square test was performed. The testrevealedthat patients aging less than 40 years old experienced diagnostic delay more than those aging 40 years and more (χ^2= 4.47, p-value=0.045).The researcher interprets this result in that it is known among health care providers that BC in young ages is uncommon so older patients are prioritized by physicians and receive a faster diagnostic process.Also, younger patients may utilize the service immediately after feeling symptoms of the disease in comparison with old ages. In addition, mammography sensitivity increase with increasing age as the breast density decreases. These results are agree to some extent to the literature (Ozmen et al., 2014;Ermiahet al., 2012).For the other examined demographic variables, chi square testrevealed that there are no statistically significant differences in diagnosticdelay and the examined sociodemographic variables (place of residence, income, education level, and the presence of family history of BC) as indicated in the **Table (4.15**).

4.2.3.2 Relationship between diagnosticdelay and imaging findings

Table 4.16:Relationship between diagnosticdelay and imaging findings

Variable	Categories	Diagnostic delay		χ2	p-value	O.R	CI
		Non delayers <3 months	Delayers ≥3 months				
Mammography findings	malignant findings	68 (86.1)	3 (33.3)	14.4	0.001*ɜ	8.4	(2.3- 30.1)
	Nonmalignant findings	11 (13.9)	6 (66.7)				
U/S Findings	malignant findings	85 (90.4)	9 (64.3)	7.4	0.018*	3.73	(1.4- 9.5)
	Nonmalignant findings	9 (9.6)	5 (35.7)				

*statistically significant, ɜFisher's exact test

The researcher wanted to know if nonmalignant finding in either mammography or U/Sincrease the chances ofdiagnosticdelay. For this purpose, the researcher performed chi square test.The reading of Fisher's exact test revealedthat there is a statistical significant difference (χ^2= 14.4, p-value=0.001) between patients whowas reported as nonmalignant findings in mammography to have a diagnostic delay more thanpatient who was reported as malignant findings. In addition, the study revealed that patient who was reported wrongly as nonmalignant findings in mammography was exposed to diagnostic delay 8 times more than who was reported as malignant findings.

Moreover, the result of U/S affected thediagnosticdelay in that patientswho have been reported as nonmalignant findings in U/Shad a diagnostic delay more than those who have been reportedasmalignantfindings. Also, the result revealed that patient who was wrongly reported as nonmalignant findings in U/S was exposed to diagnostic delay more than patient with malignant finding (χ^2= 7.4, p-value=0.018). In addition, the study revealed that patient who was reported wrongly as nonmalignant findings in U/S is exposed to diagnostic delay 3.7 times than those who was reported as malignant findingsas shown in the **Table (4.16)**

The researcher interprets these results in that nonmalignant findings in either mammography or U/S may lead to three main scenarios: nonmalignant findings may be neglected, or treated as a breast disease rather than cancer, or finally patients may be scheduled in a close follow up program. All these management and follow up processes may delay the time of actual diagnosis.Therefore, nonmalignant findings in either mammography or U/S increase the delay time to diagnosis and the results are agree withthe literature(Norsa'adah et al., 2011;Ozmen et al., 2014)

4.2.4 Patients'accessibility todiagnostic services for breast cancer

4.2.4.1 Accessibility of patients to mammography service with regards to the utilized sector

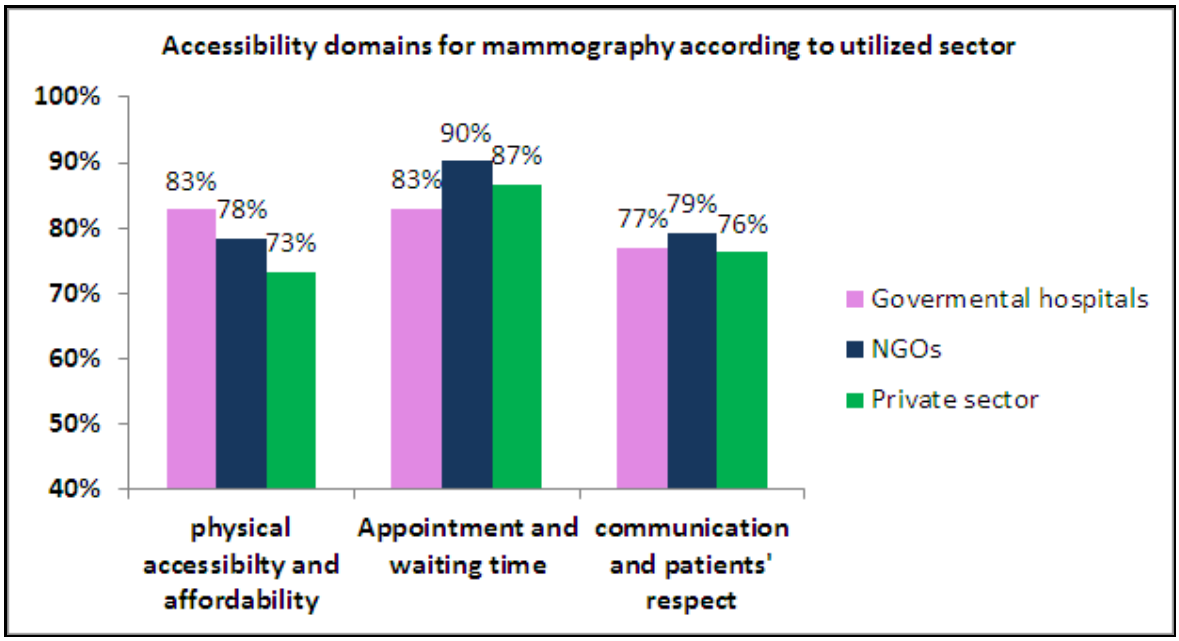


Figure 4.6: Accessibility domains for mammography according to utilized sector

Figure(4.6)clarifies a comparison between different sectors (governmental sector, NGOs,andthe private sector) regarding topatients' accessibility tomammography services and shows that the highest weighted mean score for physical accessibility & affordability domain (83%)is for governmental hospitals. This reflects the availability and affordability of mammography services in governmental hospitals. The highest weighted mean score regarding appointment&waiting time (90%)isfor NGOs. This high weighted mean score reflects that NGOs provides mammography service withinappropriateappointment and waiting time. Regarding communication&patient's respect domain, the highest weighted mean score is 79% for NGOs sector.

The researcher wanted to know if the weighted mean score for accessibility domains is statistically different between the three utilized sectors. For this purpose, the researcher performed one way ANOVA test as illustrated in **Table (4.17).**

4.2.4.2 Differences between patients' accessibility to mammography service regarding the sector they utilized

Table 4.17:Differences between patients' accessibility to mammography service and the sector they utilized

Domain	Category	N	Mean±SD	F	p-value
Physical accessibility &affordability	Governmental hospital	30	4.1 ± 0.6	1.80	0.172
	NGOs	55	3.9 ± 0.7		
	Private	6	3.7 ± 0.9		
Appointment &waiting time	Governmental hospital	30	4.1 ± 0.6	4.048	.021*
	NGOs	55	4.5 ± 0.5		
	Private	6	4.3 ± 0.5		
Communication &patient respect	Governmental hospital	30	3.9 ± 0.5	.595	.550
	NGOs	55	4 ± 0.5		
	Private	6	3.8 ± 0.4		

*statistically significant

Table (4.17)shows the ANOVA test which revealed no statistically significant difference between physical accessibility &affordability to mammography service and the three utilized sectors (p-value=0.172).Also, there are no statistically significant differences in patient's communication &respect with regards to the sector they utilized (p-value= 0.55). On the other hand, the test shows a statistically significant difference betweenappointment&waiting time domain for mammography exams between the three

sectors (F= 4.048, p-value = 0.021). To examine these differences, LSD post hoc test was performed and revealed thatthe governmental sector had the lowest mean score in the waiting time and appointment domain (mean= 4.1), followed by the private sector (mean= 4.3) and the highestfor NGOs (mean= 4.5). The researcher interpretsthe results in that the crowded waiting list for mammography exam in the governmental hospitals makes the examination to be done at a longer appointment than that of NGOs and theprivate sector. On the other hand waiting time at the private sector score is slightly low as patients in the private sector have a higher expectation towards the service provided. Also, the score may be affected by the low sample size.Within in-depthinterviewsone of the radiologists said *"patients utilizeda private sector has a higher expectation. Also, she went to the private sector considering the time factor. So, any delay will be considered"*

4.2.4.3 Patients'accessibility to U/Sservicewith regards to the utilized sector

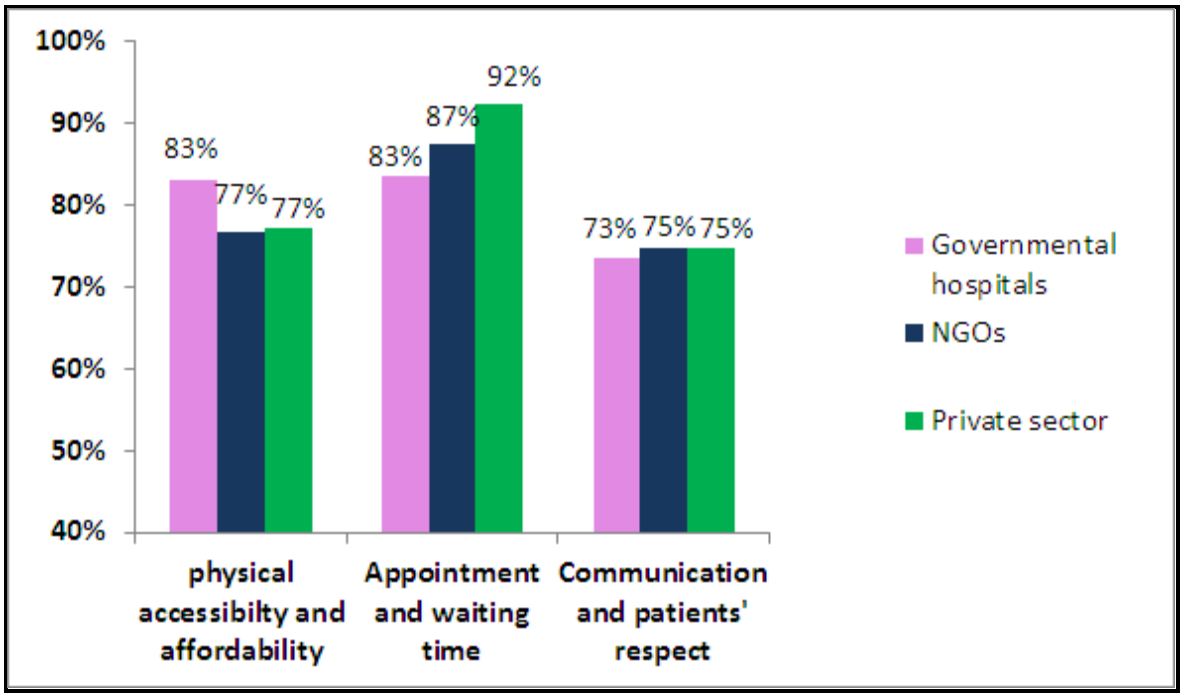


Figure 4.7: Accessibility domains for U/S according to utilizedsector

The highest weighted mean score in the physical accessibility &affordability domain of U/S service is 83% for thegovernmental sector. This reflects the available, reachable and

affordable service at the governmental hospitals. The weighted mean scores for this domain is 77% for NGOs and the private sector as well.

Regarding appointment and waiting time domain, the highest mean score is 92% for the private sector, followed by 87% and 83% for NGOs and the governmental hospitals respectively. Regarding communication and patient's respect domain, the researcher noted that the communication and patient's respect domain is almost equal at governmental, NGOs, and the private sector (73%, 75%, 75% respectively)asshown in**Figure (4.7)**

The researcher concerned to know if there is a statistically significant difference between patients'accessibility forU/S serviceandthe utilized sectors. To achieve this purpose, the researcher performed one way ANOVA test.

4.2.4.4 Differences between patients' accessibility to U/S service and the sector they utilized

Table 4.18: Differences between patients' accessibility to U/S service and the sector they utilized

Domain	Category	N	Mean±SD	F	p-value
Physical accessibility & affordability	Governmental hospital	39	4.2 ± 0.5	3.6	.032*
	NGOs	47	3.8 ± 0.6		
	Private	23	3.9 ± 0.6		
Appointment &waiting time	Governmental hospital	39	4.2 ± 0.7	4.16	0.018*
	NGOs	47	4.4 ± 0.6		
	Private	23	4.6 ± 0.4		
Communication &patient respect	Governmental hospital	39	3.7 ± 0.6	0.14	0.874
	NGOs	47	3.7 ± 0.5		
	Private	23	3.7 ± 0.6		

*statistically significant

Table (4.18) shows the results of One way ANOVA test regarding U/S. Patients are different in their physical accessibility and affordability in relation to the sector they utilized and the difference reaches the statistically significant (F= 3.6, p-value= 0.032). LSD post hoc test shows that the highest mean score for physical accessibility &affordability domain is for patients performed their U/S at governmental hospitals (mean= 4.2), followed by theprivate sector (mean= 3.9), and NGOs (mean= 3.8). The researcher interprets this result in that the patient performed U/S in governmental hospitals canafford the service more than those performed it at NGOs or the private sector. In addition, screening programs at NGOs focus in mammography and perform U/S only for selective cases. Also, it was noted that patients utilized NGOs and the private sectorsuffer long distance and transportation issue impact if they are compared to those in the governmental hospitals.

Considering appointment &waiting time domain for U/S service, one way ANOVA test revealed a statistically significant difference between thesector utilized and this domain (F= 4.16, p-value= 0.018). LSD post hoc test shows that the lowest mean score of this domain is for patients performed their U/S exam at governmental hospitals (mean= 4.2), followed by those performed it at NGOs (mean= 4.4) and finally the highest mean score for those performed the exam at the private sector (mean= 4.6). The researcher noted that the patients have a shorter appointment and waiting time if U/S is performed at NGOs and the private sector if compared to those performed it at governmental hospitals.

About the communication and patient's respect domain, one way ANOVA test shows no statistically significant differences between communication&patient respect domain for U/S exam with regards to the center they utilized (p-value= 0.87).

4.2.4.5 Patients'accessibility to biopsy service with regards to the utilized sector

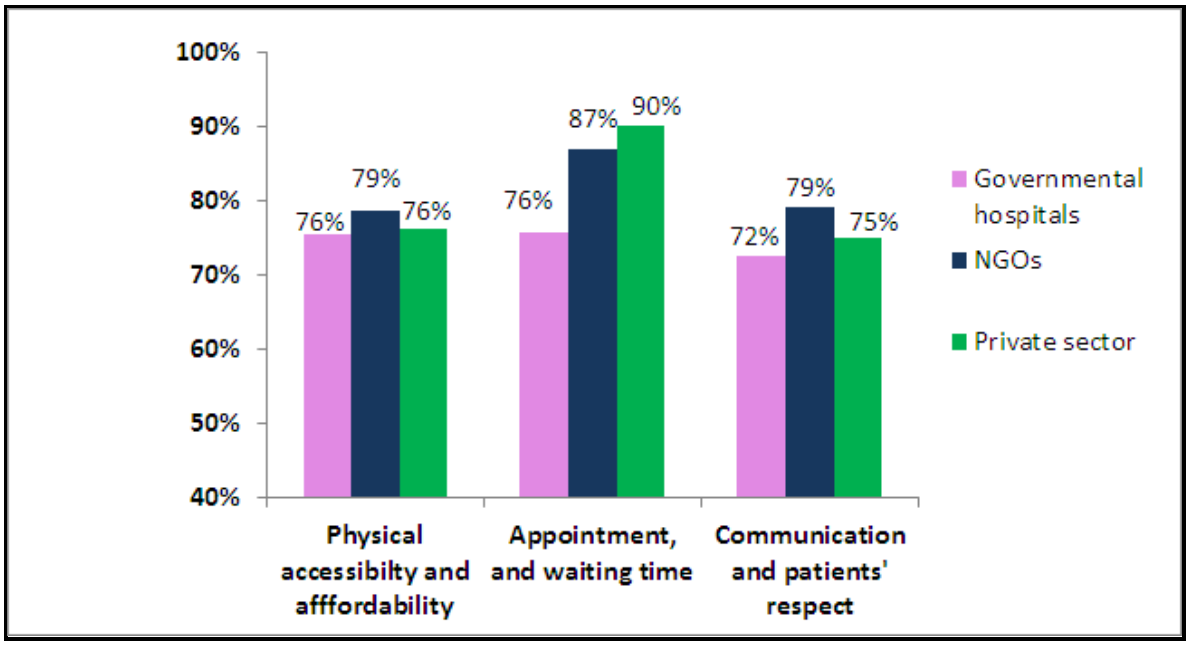


Figure 4.8: Accessibility domains for biopsy according to utilized sector

Figure (4.8) shows that the highest weighted mean score for physical accessibility &affordability domain (79%)is for patients conducted biopsy atNGOs, followed by weighted mean scores (76%) for patients utilized the private sector and governmental hospitals as well.

Governmental hospitals provide mammography, U/S and biopsy services for health insured patients withcopayments. Also, UNRWA refers mammography to its screening program. Some NGOs provides mammography service free of charge in non-permanent screening campaigns. In addition, CFTA refer suspected BC cases to NGOs free of charge for all the diagnostic procedures. Significantly, NGOs and UNRWA provide mammography andsometimesU/S services free of charge, but they don't cover the fees of biopsy. As a result, the patient either performs the biopsy out of pocket or performs it at a governmental hospital**.**

Regarding appointment &waiting time, the highest weighted mean score is 90% for patients utilized the private sector, 87% for patients utilized NGOs and finally 76% for patients utilized the governmental hospitals**.**Considering the third domain communication&patient respect domain, the figure shows that the highest weighted mean score is 79% for NGOs, 75% for the private sector, and finally 72% for governmental hospitals.

4.2.4.6 Differences between patients' accessibility to biopsy service and the sector they utilized

Table 4.19: Differences between patients'accessibility to biopsy service and the sector they utilized

Domain	Category	N	Mean±SD	F	p-value
Physical accessibility & affordability	Governmental hospital	35	3.8 ± 0.7	0.91	0.40
	NGOs	40	3.9±0.5		
	Private	46	3.8± 0.7		
Appointment &waiting time	Governmental hospital	35	3.8 ± 0.9	13.03	0.00*
	NGOs	40	4.4 ± 0.6		
	Private	46	4.5 ± 0.5		
Communication &patient respect	Governmental hospital	35	3.6 ± 0.6	3.578	0.03*
	NGOs	40	4.0 ± 0.5		
	Private	46	3.8 ± 0.5		

*statistically significant

To examine if there arestatistically significant differences between accessibilityscores and the utilized sector, the researcher performed ANOVA test**(Table 4.19).** The test revealed that there is no statistically significant difference between patients physical accessibility&affordability scoresregarding biopsy service and the sector they utilized (p-value= 0.40).

Regarding appointment &waiting time domain, ANOVA test shows a significant difference inappointment and waiting timedomain score among patients with regards to the utilized sector (F= 13.03, p-value= 0.00). Post hoc test shows that patients utilized governmental hospitals have the lowest score in this domain (mean= 3.8), followed by NGOs (mean= 4.4) and the highest mean score for the private sector (mean= 4.5). The researcher interprets this result in that patient performed thebiopsy at a governmental hospital has two types of delay, anappointment for conducting the biopsy exam and the other appointment for receiving the final histopathology report and this may take more than a month. Patients confirmed this result in the open-ended question about barriers during diagnostic process and revealed that the long waiting list for biopsy in governmental hospitals forced them to do it at NGOs or the private sector. One of the patientssaid"*The hospital gave mean appointmentafter 16 days for biopsy, I could not wait along this time, I wanted to be assured*".Medical specialists in biopsy field confirmed that overload work and the few work days specialized for biopsyleadtothisdelayasone of the experts at a governmental hospital said: *"The problem of biopsy appointment that we have a long waiting list as we have only one U/S instrument for biopsy guidance and one day is specialized also"*.

Regarding communication &patients respect domain, the test revealedthatthereare statistically significant differences between patients in their level of communicationandpatient respect(F= 3.57, p-value= 0.03) with the highest mean score for NGOs (mean= 4.0), followed by the private sector(mean= 3.8), and finally for the governmental hospitals (mean= 3.6). LSD post hoc test shows that there is a statistically significant difference between governmental and NGOs, and between governmental and the private sector. The researcher noted that patients performed the biopsy at governmental hospitals had not been given enough time to explain their condition and there are no

feasible telephone contact with the biopsy centers in contrast to the private and NGOs sectors.

4.2.5 Effectiveness of imaging diagnostic procedures

Table 4.20: Results of diagnostic imaging examinations

Variable	Categories	Frequency (%)
Mammography report conclusion n= 82	Malignant findings	69 (84.1)
	Nonmalignant findings	13 (15.9)
U/S report conclusion n= 101	Malignantfindings	94 (93.1)
	Nonmalignant findings	7 (6.9)
Using BI-RADS classification at mammography (n=87)	Yes	26 (29.9)
	No	61 (70.1)
Using BI-RADS classification at U/S (n= 107)	Yes	25 (23.4)
	No	82 (76.6)

After completion of the patients' records by communication with the patients themselves, classification of these reports was made. All patients performed imaging exams and biopsies within three months period were included in the analysis. Unlessall other patients that performed biopsies in a period of time exceed more than three months after imaging exams were not included in this analysis.

Table (4.20)shows that mammography succeeded to diagnose 84.1 % of the total patients referred to mammography units and failed to diagnose about 15.9% of the referred cases as it reported the cases as either benign findings or normal. Considering U/S, it was effective to diagnose about 93.1% of all cancer cases and failed to diagnose 6.9% of the referred cases as they were reported to have either benign findings or normal.

Misdiagnosis of imaging may be related to different sensitivities (Berg et al., 2004; Fatima et al., 2015).Also, the literature showed that interpretation errors, technical and tumor factors may lead to misdiagnosis of BC(Kamal et al., 2007).

The current study shows that only 29.9% of mammography reports and 23.4 %of U/S reports classified the lesions by using a standard classification (BI-RADS). Despite the advantages of BI-RADS classification system in reporting mammography and U/S(previously clarifiedin chapter 2, p: 27), it is not heavily used among radiologists in theGGs. Different specialists agreed that it is very useful to adoptone classification as one of them said"*These categories help the surgeon to determine the next step"*, and the other said "*it unifies readings and interpretation between radiologists"*, anotherspecialist said "*We are not a big country to have different views of adopted standards and guidelines. We should encourage using one standard to be a national standard, BI-RADS classification is a good classification especially it is actually used inJordan, Egypt,and Arab Gulf"*.Also, another expert said*" Recently, we started a training coursein interpretation of mammography and U/S funded by WHO. This program is targeting radiologists and will adopt the use of BI-RADS classification to unify the interpretation language at all health institutions in GGs along with the west bank".*

4.2.6 Differences between mammography and U/Sfindings

The researcher interested to know if there is a difference between mammography and U/S results in the participant's group who underwent mammography and U/S in the same three months.For this purpose, the researcher performed chi square test (n=77participants)as indicated in**Table (4.21)**.

Table 4.21: Differancesbetween findings of mammography and U/S

Variable	Malignant findings n (%)	Non-malignant findings n (%)	χ^2	P-value
	mammography			

Variable		Malignant findings n (%)	Non-malignant findings n (%)	$\chi 2$	P-value
		mammography			
U/S	Malignant findings n (%)	60 (98.4)	7 (43.8)	35.8	0.06€
	Non-malignant findings n (%)	1 (1.6)	9 (56.3)		
	Total n (%)	61(100)	16(100)		

*statistically significant,€MacNemar test

MacNemartest revealed that there is a difference in the results of these two examinations, but the difference does not reach statistically significant (χ^2= 35.8, p-value= 0.06).Mammography and U/S are different in diagnosis of BC as7 (43.8 %)of correctlyreported as malignant findings byU/S werewronglyreported as nonmalignant findings by mammography.Also, 1 (1.6%) ofwrongly reported as nonmalignant finding in U/S was correctly reported as malignant finding in mammography.The superiority of U/S above mammography in diagnosis of BC in the GGs is related to several factors including unavailability of stereotactic biopsy guided mammography which is the method of choice when a lesion is suspected by mammography. Also, interpretation errors of mammography,lack of second readings procedures, technical factors, and machines limited sensitivities especially when analogue mammography is used instead of digitalized systems.These factors force health care providers to depend upon U/S as a diagnostic tool rather than mammography. As far as the researcher know, effectiveness of mammography and U/S are different in BCdiagnosis and the combination of the two methods increase theeffectiveness of diagnosis and the result in a line with the literature (Lalchan et al., 2015; Tiwari et al., 2017).

Chapter5: Conclusion and Recommendations

5.1 Conclusion

Early diagnosis of breast cancer is defined as early identification of patients with symptoms without delay. This study was carried out to evaluate the utilized diagnostic imaging modalities for breast cancer in Gaza Governorates.

The study mainly examined three interrelated parts that affect the provision of timely and accurate diagnosis of BC.The first part includes factors related to patients, the second one includes factors related to the system,and the third one is the potential delay. The study showed that the mean age of Gaza's women diagnosed with BC duringthe year 2017 was 51.9 years with the most affected age groups (40-49), and (50-59). The majority of them (73.8%) have never been examined before.

The study revealed that mammography and U/S are the most imaging methods commonly used to diagnose BC in GGs with no role to MRI.Without a doubt, all the suspected BC patients during the diagnostic process underwentbiopsy procedureto confirm their diagnosis. There are several choices for suspected cancer patients in GGs to be examined; one of them is through governmental hospitals with copayments. In addition, nonpermanent screening campaignsthrough UNRWA and some NGOs provide mammography services and U/Sfree of charge without covering the financial fees of biopsy.In contrast, CFTA referssuspected cancer patients to do the three exams at NGOs centers free of charge.

Unfortunately, more than one-third of the participants conducted the imaging exams at one facility and changed the facility for thebiopsy because of long appointment and unavailability of the service.

The study revealed that all women utilized the diagnostic services afterappearance of BC symptoms. This reflects underutilization of screening programs in the GGs that women use the service only after the BC symptoms appeared.High percentage of women sought health care because of feeling a mass. Moreover, 78.7% of study participants had one or more barriers to seek health care after the symptom appeared.These barriers were divided into two main parts; the first part includes barriers related to the unawareness regarding the BC symptoms as considering the symptom was not serious, painless, and no main complaint. The study revealed that patients perceived such barriers have been delayed more than patients who did not and the differences are statistically significant. This result indicates a necessity for a health education program to educate women regarding signs and symptoms of BC and the importance of early presentation.

The second part includesbarriers related to the health care system, the study revealed that a previous imaging and the result was free is a barrier to seek health care another time. We have to adopt a standard follow- up protocol with obvious guidelines to follow symptomatic women that previously reported to have benign or even normal findings.

The study also showed that patients perceived highoverall accessibility scores regarding mammography, U/S, and biopsy, which are 82%, 80% 78%, respectively. In addition, the study examined patients' accessibility to diagnostic services with regards to the sector they utilized, the study showed statistically significant differences between physical accessibility & affordability domain regarding U/S service as patients performed U/S in the governmental hospitals afford the service more than those performed it at NGOs or the private sector. Moreover, patients perceived a lower score for the appointment& waiting time domain in governmental hospitals for the three diagnostic methods (mammography, U/S, and biopsy) and the difference is statistically significant if it is compared to those utilizedNGOs and the private sector. Too much effort should be done to shorten the long

waiting list for the diagnostic exam and especially biopsy at governmental hospitals and to increase the number of days specialized for this purpose in order to decrease the financial and psychological burden among BC patients. With regards to communication & patients respect domain, the study revealed a statistically significant difference between patients performed the biopsy at governmental hospitals have a lower score if compared to those performed it at NGOs or the private sector.

About system factors, the study revealed that no national standard protocol is available to diagnose BC patients neither in the first methodselected according to age, nor in the ranking of the diagnostic exams.

The majority of patients were referred to imaging centers within two weeks of seeking health care. This result reflects that patients' referral to imaging centers is good in general but there is still a need to put additional care about rare types of tumors such as Paget's disease and inflammatory carcinoma as it may be initially treated as other diseases rather than cancer.

Mammography was effective to diagnose 84.1 % of examined participants and U/S was effective to diagnose 93.1% of the referred cases. Besides that, mammography and U/S showed a difference in their diagnosis of BC but the difference did not reach the statistically significant (χ^2=35.8, p-value= 0.06), and the combination between the two methods increase the effectiveness towards the diagnosis.The study concludesthat U/S should be done in complementary to mammography despite its negative results especially in symptomatic patients.

Significantly, the study showed that 9% of the participants were lost to follow up after benign findings in a previous breast imaging less than a year because of factors related to

patients such as ignorance or to the health care system such as the doctor did not advise the patient to come back.

The study showed that only 29.9% of mammography reports and 23.4 %of U/S reports classified the lesions by using a standard classification. Thus, there is a need to adopt a standard protocol to follow up reported benign findings and the necessary to standardize the reporting methods in order to help specialists in their decisions regarding follow up and biopsy issues.

The third part affecting BC diagnosis is the potential delay; the study showed that19.7 % of the study participants delayed to seek health care 3 months and more from the symptoms appearance. In addition, there were no statistically significant differences between patient's delay to seek health care and examined sociodemographic variables (place of residence, income, level of education, and the presence of family history of BC).

Also, the study showed that12.3% of the participants experienced a diagnostic delay. Inferential analysis showed that age is the only examined sociodemographic variable affecting the diagnosticdelay in that women below 40 years old have a longer diagnosticdelay than those 40 years old and more,and the difference was statistically significant(p-value=0.045). Surely, care should be given to symptomatic patients regardless the age. Also, the study showed that the reported nonmalignant finding in either mammography or U/S was a factor to delay BC diagnosis. Absolutely, this result is attributed to weakness in the follow-upissue.

In conclusion, Patients factors that hinder BC early diagnosis are underutilization of screening programs, lack of awareness about BC signs and symptoms and lack of patients' attention about follow up of previously reported nonmalignant findings. Diagnosticdelayis related to patient age at diagnosis as younger patient have more diagnostic delay than old,

and reported nonmalignant findings in any of the imaging procedures.In addition, appointment delay especially for biopsy is an issue to be considered.

There is still a need to increase patients' awareness regarding breast cancer signs and symptoms and the benefits of early presentation and detection. Also, there is a need to unify guidelines for screening, diagnostic, and follow up procedures in order to assure the provision of timely and accurate diagnosis of breast cancer.

5.2 Recommendations

5.2.1 The study recommendations

1. Adopt national program with clear and unify guidelines regarding the imaging method of choice in the BC initial diagnosisand what should be done for a suspected breast cancer.
2. There is a need to adopt clear guidelines to follow up symptomatic women with previously reported benign or normal findings.
3. Unifying the way of interpreting mammography and U/S examinations using a standard classification.
4. Health education programabout BC symptoms and signs shouldbe introduced with specific strategies in order to shorten thepatients' delay and to increase women utilization for mammography screening programs.
5. Perform U/S in complementary with mammography in order to increase the effectiveness oftheimaging services in BC diagnosis.
6. Stereotactic biopsy procedure should be activated at MOH in order to conduct the biopsy for suspected lesions especially microcalcifications by mammography.
7. Symptomatic patients should be given the complete investigationsfor the presence of BC diagnosis regardless their ages.

8. Decrease long waiting lists for diagnostic procedures especially biopsy in the governmental hospitals.
9. Female health care providers including radiologists, technologists and nurses in breast imaging field should be trained and skilled in order to make the diagnostic process more accepted.
10. There is a necessity to complete the medical records of oncology patients and to document cancer stage for every patient.
11. Too much effort should be done to enhance the communication between health providers and patients in order to increase the trust about the services provided and to enhance the follow up issue.

5.2.2 Recommendations for further research

1. Conduct a prospective study to examine the accuracy of mammography and U/S in breast cancer diagnosis in GGs.
2. Conductresearch about factors leading to diagnostic errors (Interpretation errors, and technical factors).
3. Conduct research to deeply explore social barriers that may affect seeking health care and hinder the early diagnosis of breast cancer.
4. Conduct a comparative study to explore the effectiveness of mammography and U/S in governmental hospitals, NGOs, and the private sector.
5. Conduct research exploring the relationship between diagnostic delay and stage of cancer.

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Annexes

Annex 1: Palestine map

Source: Palestinian Central Bureau of Statistic

Annex 2: Gaza Strip Map

Source: http://www.maps-of-the-world.net/maps-of-asia/maps-of-gaza-strip

Annex 3: TNM classification of breast cancer

ANATOMIC STAGE/PROGNOSTIC GROUPS			
Stage 0	Tis	N0	M0
Stage IA	T1*	N0	M0
Stage IB	T0	N1mi	M0
	T1*	N1mi	M0
Stage IIA	T0	N1**	M0
	T1*	N1**	M0
	T2	N0	M0
Stage IIB	T2	N1	M0
	T3	N0	M0
Stage IIIA	T0	N2	M0
	T1*	N2	M0
	T2	N2	M0
	T3	N1	M0
	T3	N2	M0
Stage IIIB	T4	N0	M0
	T4	N1	M0
	T4	N2	M0
Stage IIIC	Any T	N3	M0
Stage IV	Any T	Any N	M1

Source:https://cancerstaging.org/referencestools/quickreferences/Documents/BreastSmall.pdf

Annex 4: Interviewed questionnaire: English version

A. Serial number: ☐☐☐

B. Oncology center:A☐ntesiH.Gaza Europe☐.

Patient name:

ID number:

Contact number:

Date of the interview:// (day/month/year)

A. First: Interviewed Questionnaire		
1. Personal Data		
1.1	Age	☐years
1.2	Permanent place of residence	☐ North Gaza ☐Gaza ☐Middle Zone ☐Khanyounis ☐Rafah
1.3	Marital Status	☐Single ☐Married ☐Divorced ☐Widow
1.4	Level of education	☐Illiterate ☐Primary school (1-6 classes) ☐Preparatory school (7-9 classes) ☐Secondary education (10-12 classes) ☐University education
1.5	Number of children	☐
1.6	Are you working?	☐ Yes ☐ No If yes, specify your job: _____
1.7	Monthly average household income	☐
1.8	Do you have a health insurance?	☐ Yes ☐ No **If yes, what is its type?** ☐compulsory ☐israeli workers ☐Voluntary ☐MOSA ☐Other, Specify_____
2. Medical history		

2.1	Do you have a family history of breast cancer?	□No □Yes If yes, what is the relation? **More than one option is possible** □Mother □Sister □Daughter □Aunt □Grandmother □Second degree relative		
2.2	In which side the problem was?	□RT breast □ LT breast □ Both		
2.3	What were the Signs and Symptoms at the time of diagnosis?	Symptom	Yes	No
		□Breast mass □Mass under axilla □Pain □Tingling □Nipple discharge □Retracted nipple □Two breast are not equal in size or shape □Readiness □asymptomatic		
		Others, Specify: _____		
2.4	What was the time interval between the appearance of signs and symptoms and seeking health care services?	□_____		
2.5	Answer with yes or no about barriers that may face you during the diagnostic process:		Yes	No
		□ symptom was notserious □Shy demonstrating symptoms tohealth care professionals □ Lack of pain □ No chief complaint □ Stigma □ Feared of results □ diagnostic facility was too far □ Complexity of referral system □ Don't know where to go □ Service was not available □ Fear of husband abandonment □ I went to traditional healers □ Cost of the exams □Transportation costs □ Didn't trust of health care system □Lack of female health care providers □ My husband prevented me □ Fear of exposure to radiation □ Fear of pain related to the exams		

		□I don't able to organize my time □ A previous doctor visit who did not take care of me □ A previous examination and the results were free For other reasons Specify, _____		
2.6	How long did it take for completion the diagnosis? (from seeking health care to be diagnose of BC)	□		
2.7	Who encourage you to seek services?	□My husband □ Family □A screening program at a health facility □ no one (Self)		
2.8	Referral doctor specialty for the first diagnostic modality	□PHC GP □Surgeon □ Oncologist □Gynecologist □ Radiologist □UNRWA □Screening program at NGOs Others, Specify _____		
2.9	How many times did you counsel health care providers before starting diagnostic process?	□times		
2.10	Which exam(s) did you do during the diagnostic process? **(more than one answer is possible)**	□mammography □ U/S □MRI □Biopsy		
2.11	Please, order the exams that have been performed to you during the diagnostic process,, (1, 2, 3, 4)	□Mammography □ U/S □ combined mammography and U/S □MRI □Biopsy		
2.12	Have you ever been examined before?	□No(If answer is no, move to question number (3.1) □Yes □No If yeas (for what reason?) □Screening □Diagnostic		
2.13	What was the exam (Exams) done?	□Mammography □U/S □Biopsy		

2.14	When did you have a previous examination?	□
2.15	What was the result?	□Normal □Benign findings □Calcifications
2.16	Where did you perform the previous examination (s)?	□Governmental hospital □ NGOs □ Private sector
3. Accessibility and Affordability data		
3.1	How many times did you visit the hospital or clinic to complete the diagnostic process?	□times
3.2	Did you receive a financial support from anyone to complete the diagnostic process?	□ No □Yes Specify whom?
3.3	Did you change the facility during the diagnostic process?	□ No □Yes If yes, for what diagnostic exam? □Mammography □U/S □MRI □Biopsy
3.4	What was the reason for changing the diagnostic facility?	----------
4. General Questions about the diagnostic modalities		
4.1	During the diagnostic process, Where did you do the exams?	

Mammography	**U/S**	**MRI**	**Biopsy**
□Yes □No	□Yes □No	□Yes □No	□Yes □No
□Governmental h. □NGOs □NGOs with free breast exam □Private sector	□Governmental h. □NGOs □NGOs with free breast exam □Private sector	□Governmental h. □NGOs □NGOs with free breast exam □Private sector	□Governmental h. □NGOs □NGOs with free breast exam □Private sector

4.2	Why did you choose this sector to perform the exam?

Mammography	**U/S**	**MRI**	**Biopsy**
1-more affordable 2- No long appointment 3- Trust 4- More quality 5- doctor advise 6- health insurance	1-more affordable 2- No long appointment 3- Trust 4- More quality 5- doctor advise 6- health insurance	1-more affordable 2- No long appointment 3- Trust 4- More quality 5- doctor advise 6- health insurance	1-more affordable 2- No long appointment 3- Trust 4- More quality 5- doctor advise 6- health insurance

7- One of my family members advice 8. Availability of the service 9. It is close to my Place of residence 10.Society referral 11. UNRWA referral	7- One of my family members advice 8. Availability of the service 9. It is close to my Place of residence 10.Society referral 11. UNRWA referral	7- One of my family members advice 8. Availability of the service 9. It is close to my Place of residence 10.Society referral 11. UNRWA referral	7- One of my family members advice 8. Availability of the service 9. It is close to my Place of residence 10.Society referral 11.UNRWA referral

4.3	How many days did you wait to perform the exams? (Appointment)

Mammography	U/S	MRI	Biopsy

4.4	How much did you pay for the diagnostic exams?

Mammography	U/S	MRI	Biopsy
() NIS	() NIS	() NIS	() NIS

4.5	How much did you pay to transportation for diagnostic facilities? (Including all visits for all exams)	() NIS

4.6	In general what is your satisfaction about the quality level of the service provided?	**Mammography** *1. less than accepted* *2.accepted* *3. good* *4.Excellent*	**U/S** *1. less than accepted* *2.accepted* *3. good* *4.Excellent*	**MRI** *1. less than accepted* *2.accepted* *3. good* *4.Excellent*	**Biopsy** *1. less than accepted* *2.accepted* *3. good* *4.Excellent*
4.7	Will your recommend this service to one of your friends or family if it is needed?	□Yes □No	□Yes □No	□Yes □No	□Yes □No

4.8 What are perceived barrierthat could hinder your diagnostic process?

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4.9 Did you have any suggestion that could enhance the quality of the services provided?

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Domain	No.	Statement	Mammography	U/S	MRI	Biopsy
			1.Strongly disagree 2.Disagree 3.Uncertain 4.agree 5.strongly agree	*1.Strongly disagree 2.Disagree 3.Uncertain 4.agree 5.strongly agree*	*1.Strongly disagree 2.Disagree 3.Uncertain 4.agree 5.stronglyagree*	*1.Strongly disagree 2.Disagree 3.Uncertain 4.agree 5.strongly agree*
Physical Accessibility andaffordability	1.	It was easy to reach to the center				
	2.	The distance between your place of residence and the facility was suitable				
	3.	Transportation was availableto the diagnostic facility				
	4.	In general, the performance of health care providers was good				
	5.	The cost of the exam was reasonable for you				
	6.	The transportation cost to reach the hospital was suitable				
Appointment and waitingtime	7.	The referral systemto diagnostic facility was within appropriate time				
	8.	Theappointment to conduct the exam was suitable for you				
	9.	Health care providers committed with the appointments				
	10	Waiting time to get the service was appropriate				
	11.	The results of medical imaging exam were received at anappropriate time				

Communication and Patients' rights	12.	Health care provider introduced him/ her-self before conducting the exam				
	13.	Medical imaging procedure was explained by the health care provider				
	14.	Health care provider answered your questions carefully				
	15.	Clean gownand coverlet were available				
	16.	Privacy was valued during imaging procedure				
	17.	There were female health care providers				
	18.	You were given enough time to explain your condition				
	19.	No discrimination between patients				
	20.	Feasible contact with the diagnostic facility				

Thanks for your cooperation

Annex 5: Interviewed questionnaire- Arabic version

أ- رقم الملف الطبي_____ب-الرقم المتسلسل: _____

ج. مركز الأورام :م. الرنتيسيم.غزة الأوروبي☐ ☐

الاسم:

رقم الهوية:

رقم التليفون _____جوال:_____

تاريخ المقابلة : / /يوم /شهر /سنة

أولا: إستبانة مع المريض		
1	**. المعلومات الشخصية**	
1.1	العمر	☐
1.2	مكان السكن الدائم	☐ شمال غزة ☐ غزة ☐ الوسطى ☐ خانيونس ☐ رفح
1.3	الحالة الاجتماعية	☐انسة ☐ متزوجة ☐مطلقة ☐ أرملة
1.4	عدد سنوات التعليم	☐أمي ☐ابتدائي (1-6 صفوف) ☐ إعدادي(7- 9 صفوف) ☐ ثانوي(10-12) ☐ تعليم جامعي
1.5	عدد الأطفال	☐
1.6	هل تعملين؟	☐نعم ☐لا إذا كانت الإجابة نعم حددي عملك؟ _____
1.7	ما هو متوسط الدخل الشهري للأسرة	☐
1.8	هل لديكي تامين صحي؟	☐نعم ☐لا إذا نعم حدد نوعه ؟ ☐إجباري☐عامل إسرائيل ☐اختياري☐تأمين شؤون اجتماعية أخرى حددي :_____

2. التاريخ الطبي				
2.1	هل لديكي تاريخ عائلي لسرطان الثدي؟	□لا □ نعم إذا نعم ما هي درجة القرابة **(أكثر من إجابة واحدة ممكنة)** □أم □أخت □بنت □خالة أو عمة □جدة □قرابة من الدرجة الثانية		
2.2	في أي جهة المشكلة؟	□الثدي الأيمن □الثدي الأيسر □كليهما		
2.3	ماالأعراض التيظهرت لديكي عند بداية المرض؟	الأعراض	نعم	لا
		□كتلة في الثدي □كتلة تحت الإبط □ألم □وخز □إفراز من الحلمة □حلمة غائرة □شعرت بأن الثديين غير متساوييننفي الحجم أو الشكل □احمرار □ بدون أعراض		
		□أعراض أخرى حددي_____		
2.4	ما هي المدة الزمنية بين ظهور الأعراض وطلب المساعدة الطبية؟	□ _____		
2.5	أجيبي بنعم أو لا حول المعيقات التي قد تكون واجهتك عند بداية ظهور الأعراض وقرار اللجوء الى الرعاية الصحية؟		نعم	لا
		□اعتبرت أن الأعراض غير خطيرة □الحرج من الكشف على أخصائيين □لا يوجد ألم □لا يوجد عرض رئيسي □الشعور بالعيب □الخوف من النتائج □مكان التشخيص بعيد □التعقيدات في عملية التحويل □لم أعرف أين أتوجه □الخدمة غير متوفرة □الخوف من أن يتركني زوجي □توجهت إلى الطب البديل □تكلفة الفحوصات عالية □ تكلفة المواصلات عالية		

		□لا أثق بالنظام الصحي □عدم وجود مقدمات خدمة (نساء) □منعني زوجي □ الخوف من التعرض للأشعة □ الخوف من الألم المصاحب للفحص □ لم أستطع تنظيم وقتي للذهاب للفحص □لقد زرت الطبيب مسبقا ولم يبدي أي اهتمام بحالتي □قمت بإجراء فحوصات مسبقة وكانت النتائج طبيعية معيقات أخرى حددي _____		
2.6	كم من المدة استغرقت عملية التشخيص؟(منذ بداية طلبك للرعاية الصحية وحتى تمام التشخيص).	□		
2.7	من الذي شجعكي لتلقي الخدمة الصحية؟	□الزوج □العائلة □وجود برنامج الكشف المبكر □لا احد		
2.8	ما تخصص الطبيب أو من هي الجهة التي قامت بتحويلك لعمل الفحوصات الخاصة بتصوير الثدي؟	□طبيب الرعاية الأولية □أخصائي الجراحة □أخصائي الأورام □أخصائي نساء وولادة □أخصائي أشعة □الأونروا □أحد برامج المسح الخاصة بالثدي □أخرى: حددي _____		
2.9	كم من المرات قمتي باستشارة عاملين في المجال الصحي وأخصائيين لتبدأعملية التشخيص؟	□مرة		
2.10	ما الفحوصات الإشعاعية (التصوير)التي تم عملها لكي؟ **(أكثر من اجابة ممكنة)**	□ماموجرام □ألتراساوند □ رنين مغناطيسي □ سحب عينة		
2.11	لو سمحتي رتبي الفحوصات الإشعاعية (التصوير) التي تم عملها لكي أثناء عملية التشخيص : (1,2,3,4)	□ماموجرام □ألتراساوند □ماموجرام + ألتراساوند مكمل □ رنين مغناطيسي □ سحب عينة		
2.12	هل قمتي بإجراء فحوصات سابقة؟	□ لا(إذا كانت الإجابة لا انتقل للسؤال رقم 3.1) □ نعم إذا كانت الإجابة نعم (ما هو سبب التصوير؟) □كشف مبكر □ تشخيص		

2.13	ما هو الفحص (الفحوصات السابقة)ال تـي قمتي بإجراءه(ها)	□ماموجرام □التراساوند □عينة
2.14	متى تم عمل الفحص السابق لكي ؟	□
2.15	ما هي نتيجة الفحصالسابق ؟	□ طبيعي □ ورم حميد □تكلسات
2.16	أين تم فحصك فيالسابق؟	□ قطاع حكومي □القطاع غير حكومي □ القطاع الخاص

3. معلومات الوصول والمقدرة على دفع مصاريف عملية التشخيص

3.1	كم مرة زرتي مراكز التشخيص لاستكمال عملية التشخيص؟	□مرة
3.2	هل تلقيتي مساعدات مالية من أي جهةخلال عملية التشخيص؟	□نعم □لا إذا كانت الإجابة نعم حدد ي الجهة : _____
3.3	هل غيرتي مكان الفحصأثناء عملية التشخيص؟	□ نعم □ لا إذا كانت الإجابة نعم لأي فحص تم التغيير □ماموجرام □ألتراساوند □ رنين مغناطيسي □ سحب عينة
3.4	ما السبب الذي جعلك تغيرين المكان؟	----------

4. معلومات عامة حولوسائل التشخيص

4.1	في خلال عملية التشخيص ,أين عملتي الفحوصات التشخيصية؟

ماموجرام نعم-لا	ألتراساوند (تلفزيون) نعم-لا	رنين مغناطيسي نعم-لا	عينة نعم-لا
□ القطاع الحكومي □ قطاع غير حكومي □ قطاع غير حكومي معوجود برنامج كشف مجاني □ قطاع خاص	□ القطاع الحكومي □ قطاع غير حكومي □ قطاع غير حكومي معوجود برنامج كشف مجاني □ قطاع خاص	□ القطاع الحكومي □ قطاع غير حكومي □ قطاع غير حكومي معوجود برنامج كشف مجاني □ قطاع خاص	□ القطاع الحكومي □ قطاع غير حكومي □ قطاع غير حكومي معوجود برنامج كشف مجاني □ قطاع خاص

4.2	لماذا تم اختيار هذا المكان دون غيره لإجراء الفحص ؟

ماموجرام	ألتراساوند (تلفزيون)	رنين مغناطيسي	عينة
1. نظرا لاستطاعتي شراء الخدمة من المكان 2.مواعيد الحجوزات كانت مناسبة	1.نظرا لاستطاعتي شراء الخدمة من المكان 2.مواعيد الحجوزات كانت مناسبة	1.استطاعتي شراء الخدمة من المكان 2.مواعيد الحجوزات كانت مناسبة	1.استطاعتي شراء الخدمة من المكان 2.مواعيد الحجوزات كانت مناسبة

3.أثق بهذا المكان 4.جودة الخدمة المقدمة في المكان 5.قام طبيبي بتحويلي لهذا المكان 6.لوجودالتأمين صحي 7.أحد أفراد عائلتي نصحنيبه 8. لتوفر الخدمة في المكان 9. لقربه من مكان سكني 10.تحولتمن الجمعية الخيرية 11.محولة من الأونروا	3.أثق بهذا المكان 4.جودة الخدمة المقدمة في المكان 5.قام طبيبي بتحويلي لهذا المكان 6.لوجودالتأمين صحي 7.أحد أفراد عائلتي نصحنيبه 8. لتوفر الخدمة في المكان 9. لقربه من مكان سكني 10. تحولتمن الجمعية الخيرية 11.محولة من الأونروا	3.أثق بهذا المكان 4.جودة الخدمة المقدمة في المكان 5.قام طبيبي بتحويلي لهذا المكان 6.لوجودالتأمين صحي 7.أحد أفراد عائلتي نصحنيبه 8. لتوفر الخدمة في المكان 9. لقربه من مكان سكني 10.تحولتمن الجمعية الخيرية 11.محولة من الأونروا	3.أثق بهذا المكان 4.جودة الخدمة المقدمة في المكان 5.قام طبيبي بتحويلي لهذا المكان 6.لوجودالتأمين صحي 7.أحد أفراد عائلتي نصحنيبه 8. لتوفر الخدمة في المكان 9. لقربه من مكان سكني 10. تحولتمن الجمعية الخيرية 11.محولة من الأونروا
4.3	كم المدة الزمنية (باليوم)إنتظرتي لعمل الفحص؟(موعد)		
ماموجرام	ألتراساوند (تلفزيون)	رنين مغناطيسي	عينة
4.4	ما هي تكلفة الفحوصات ؟		
ماموجرام	ألتراساوند (تلفزيون)	رنين مغناطيسي	عينة
() شيكل	() شيكل	() شيكل	() شيكل
4.5	ما هي تكلفة المواصلات للوصول لأماكن التشخيص (يتضمن ذلك كل الزيارات لكل الفحوصات)		() شيكل

4.6	ما مدى رضاكي عن الخدمة المقدمةلكي في المركز؟	**الماموجرام** *1.أقل من المقبول* *2.مقبول* *3.جيد* *4.ممتاز*	**ألتراساوند** *1.أقل من المقبول* *2.مقبول* *3.جيد* *4.ممتاز*	**رنين مغناطيسي** *1.أقل من المقبول* *2.مقبول* *3.جيد* *4.ممتاز*	**العينة** *1.أقل من المقبول* *2.مقبول* *3.جيد* *4.ممتاز*
4.7	هل ستنصحي أحد من أقاربك أو أصدقائك التوجه لعمل فحوصات في المستقبل- إذا دعا الأمر- في هذا المركز؟	**الماموجرام** □ نعم □ لا	**ألتراساوند** □ نعم □ لا	**الرنين المغناطيسي** □ نعم □ لا	**العيزة** □ نعم □ لا

5. مدى الوصول للخدمات المتاحة						
المحور	الرقم	السؤال	ماموجرام 1.غير موافق بشدة 2.غير موافق 3. محايد 4. موافق 5. موافق بشدة	ألتراساوند 1.غير موافق بشدة 2.غير موافق 3. محايد 4. موافق 5. موافق بشدة	رنين مغناطيسي 1.غير موافق بشدة 2.غير موافق 3. محايد 4. موافق 5. موافق بشدة	عينة 1.غير موافق بشدة 2.غير موافق 3. محايد 4. موافق 5. موافق بشدة
القدرة على الوصول الفزيائيو النفع	1	كان من السهل الوصول للمركز				
	2	المسافة بين بيتك والمركز مناسبة				
	3	المواصلات متاحة من بيتك للمركز				
	4	بشكل عام, كان أداء مقدمي الخدمة جيدا				
	5	كان سعر شراء الخدمة مناسب بالنسبة لكي				
	6	أسعار المواصلات للوصول للمركز مناسبة				
مواعيد التصوير ووقت الإنتظار	7	عملية التحويل لإجراء التصوير كانت واضحة				
	8	مواعيد الفحص كانت مناسبة				
	9	التزم الفريق الطبي بموعد الصورة ولم يتمالتأجيل				
	10	وقت الانتظار لعمل الفحص كان مناسبا لكي				
	11	حصلتي على نتيجة الفحص بالوقت المناسب				
التواصل واحترام المرضى	12	قام مقدم الخدمة بالتعريف عن نفسه قبل إجراء الفحص				
	13	قام مقدم الخدمة بشرح الفحص لكي قبل إجراءه				
	14	قام مقدم الخدمة بالإجابة على استفساراتك				
	15	يوجد شراشف وملابس نظيفة في المكان				

	16	تم إحترام خصوصيتك أثناء إجراء الفحص					
	17	هناك مقدمات خدمة (أنثى) للفحوصات المحرجة					
	18	أعطيتي الوقت الكافي للتعبير عن مشكلتك					
	19	لا يوجد تمييزبين المرضى					
	20	هناك وسائل للاتصال بالمركز					

شكرا لتعاونك معنا

4.8 ما هي المعيقات أو الصعوبات التي واجهتك أثناء عملية التشخيص؟

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4.9 هل لديكي أي اقتراحات لأي مركز قمتي بزيارته من شانه أن يزيد من جودة الخدمة المقدمة ؟

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Annex 6: Abstraction sheet

Item		Mammography	U/S	MRI
1.1	Request date(day/month/year)			
1.2	Examination date(day/month/year)			
1.3	Report date(day/month/year)			
1.4	Report conclusion 1.Normal 2.Benign findings 3.Dense breast for other investigation 4.Suspected Malignancy			
1.5	BI-RADS classification			
1.6	Next step			
1.7	Is the examination requested for the patient in need?	□ Yes □No	□ Yes □No	□ Yes □No
1.8	If the exam is not needed, explain why?			
1.9	Biopsy Date	//(day/month/year)		
1.10	Histopathology Report Date	//(day/month/year)		
1.11	Biopsy procedure	□ FNA □ True cut □ Both (FNA+ True cut) □Excision B.		
1.12	How many biopsies were needed to confirm diagnosis?			
1.13	Cancer Type	_____		
1.14	Cancer stage	□ I □ II □ III □ IV		

Annex 7: Semi structured in-depth interviews questions- English version

Introduction and explaining research purpose and the scenario of the interview

For all specialists at hospitals and GPs at PHC

- Is there a standard protocol to refer suspected BC cancer patients to diagnosis, if it is available what does it contain?
- The quantitative data resulted in a difference between physician referral of patients to the first method according to their age. Is there a standard protocol that physicians depend on when referring suspected BC cancer?
- From your point of view, what are the reasons that lead to delay in seeking health care after the appearance of BC signs and symptoms?
- There are some cases that counseled health care providers more than threeor four times at PHC and specialists without referral to imaging, what is your opinion especially in the presence of screening programs free of charge and availability in the governmental hospitals?
- The quantitative data of the current study resulted in a diagnosticdelay among BC patients less than 40 years old than those 40 years old and more: What is your opinion?

For Radiologists, surgeonsand oncologists

- At the current study, the results showed that radiologist use BI- RADS classification in 29.9% of mammography reports and 23.4% of U/S reports which indicates that this classification is not common among radiologists. What is your opinion? Do you encourage them to use this classification?
- Some cases have benign findings in mammography, U/Sand even biopsy.After a period of time, these patients diagnosed withBC. In your opinion, what are the reasons for this phenomenon?
- Some patients claimed that theyhavemasses since more than 3 years and they did not seek health careuntil they wereaccidently diagnosed to have BC during routine investigation for any other disease. Is there a probability for this mass to be cancer without performing any complication: What is your comment?

For radiologists only

- It is noted that there is no role for MRI in diagnosis BC and the diagnosis depends on mammography and U/S, what is your comment about that?

- Quantitative part of this study revealed that physical accessibility & affordability domain, and waiting time & appointment is very good in general, but there is a problem in the communication & patients respect domain. How do you explain the low score in this domain?
- The study revealed that waiting time in theprivate sector is more than NGOs: How do you explain this result?

For oncologists only

- It is noted that 42.4% of mammography reports and 37.3% of U/S reports are not found in the patient file: How do you find this?
- Quantitative data revealed that more than half of the study sample is not classified according to the cancer stage despite completeness of all investigations and starting the management process: How do you comment about this?

For histopathologists only

- Quantitative data resulted in that the mean of delay for the delivery of histopathology reports exceed 11 days: from you perspectives what are the reasons of such delays?

Annex 8: Semi structured in-depth interviews questions- Arabic version

Introduction and explaining research purpose and the scenario of the interview

لجميع الأخصائيين في المستشفيات وأطباء الرعاية الأولية

- هل يوجد لدينا في وزارة الصحة ولدى مقدمي الخدمات الصحية بروتوكول واضح في عملية تحويل المرضى الذين لديهم أعراض سرطان الثدي للتشخيص؟ إذا وجد هذا البروتوكول ما هو فحواه؟
- أظهرت نتائج الدراسة الكمية أن هناك إختلاف في إختيار نوع التصوير الأول لدى المرضى مع الأخذ بالإعتبار العمر. ما هو المقياس الذي يستند عليه الأطباء عند إختيار الفحص وهل يوجد بروتوكول معين لذلك؟
- من وجهة نظركم ما هي الأسباب التي تؤدي إلى تأخر السيدات في بعض الأحيان عن طلب الرعايةالصحية بعد ظهور أعراض سرطان الثدي؟
- هناك بعض من الحالات تتوجه للإستشارة الطبيةأكثر من ثلاثأو أربع مرات في بعض مراكز الرعاية الاولية وأخصائيين دون تحويلها للتصوير , ما رأيكم في ذلك خصو صاً في ظل وجود بعض برامج المسح و توفر الخدمة في المستشفيات الحكومية؟
- لقد أظهرت نتائج الدراسة الكمية أن النساء المصابات بسرطان الثدي وعمرهم أقل من 40 سنةلديهم وقت تشخيص أطول من السيدات في عمر الأربعين سنة فأكثر: مارأيكم؟

لأخصائيي الأشعة والجراحة والأورام

- أظهرت النتائج الكمية للدراسة أن 29.9% من تقارير الماموجرام و 23.4% من تقارير الألتراساوندإستخدم فيها الأخصائيين تصنيف (BI-RADS)؟ وهذا يعني أن هذا التصنيف غير متداول كثيرا بين أخصائيي الأشعة: ما رأيكم بهذه النسب وهل تنصحون أخصائيي الأشعة إعتماد هذا التصنيف في تقاريرهم الخاصة بالثدي؟
- هناك بعض الحالات كان الماموجراموالألتراساوند وحتى العينة فيها كتل حميدة وبعد فترة تم إكتشافالسرطان, برأيك ما هو السبب في تلك الظاهرة؟
- هناك إدعاء من قبل بعض السيدات بوجود الكتلة السرطانية المكتشفة منذأكثر من 3 سنوات دون طلب المساعدة الطبية وأن هؤلاء السيدات تم تشخيصهم بسرطان الثدي عندما طلب الطبيب عمل الماموجرام عند الدخول للمشفى وعمل فحوصات روتينية: هل يمكن أن تكون هناك كتلة سرطانية لأكثر من 3 سنوات دون عمل أي مضاعفات أو مشكلات أخرى:ما تعليقكم على هذا الأمر؟

لأخصائيي الأشعة فقط:

- لقد أظهرت نتائج الدراسة أن ليس هناك دورللرنين المغناطيسي في تشخيص مرض سرطان الثدي وأن الإعتماد يكون فقط على الألتراساوندوالماموجرام, كيف تعلقون على هذا الأمر؟
- لقد أظهرت نتائج الدراسة الكميةأن أبعادالحصول على الخدمةالتشخيصية من ناحية الوصول الفيزيائي والمواعيد بشكل عام جيد جداً ولكن أظهرت الدراسة أن موضوع التواصل وإحترام المرضى يشكل أقلهم نسبة وهي لا تتعدى جيد في كل المراكز: بم تفسرون تدني نسبة التواصل مع المراكز الصحية ومقدمي الخدمات؟
- أظهرت النتائج الكمية أن الإنتظار للحصول على تقارير الماموجرامبالنسبة للمراكز الخاصة أكثر من المراكزغير الحكومية : بما تعلقون على هذا الأمر؟

لأخصائيي الأورام فقط:

- لقد لوحظ من خلال الدراسة أن ما نسبته 42.4% من تقارير الماموجرام و 37.3%من تقارير الألتراساوند غير موجودة في ملفات المرضى الذين شملتهم الدراسة: ما هو رأيكم في هذا ؟
- أظهرت النتائج الكمية أن أكثر من نصف عينة الدراسة غير مصنفة لمراحل الأورام رغم إتمام جميع الفحوصات التشخيصية والبدء بالعلاج: كيف تعلقون على هذا الأمر؟

لأخصائيي الأنسجة فقط

لقد أظهرت النتائج الكمية أن المشخصاتفي مرض سرطان الثدي يعانون من مواعيد طويلة لجاهزية التقرير النهائي حيث أن متوسطالمواعيد في الحكومة تزيد عن 11يوما: برأيكم ما هي الأسباب التي تجعل هذه المواعيد طويلة؟

Annex 9: Helsinki approval

المجلس الفلسطيني للبحث الصحي

Palestinian Health Research Council

تعزيز النظام الصحي الفلسطيني من خلال مأسسة استخدام المعلومات البحثية في صنع القرار

Developing the Palestinian health system through institutionalizing the use of information in decision making

Helsinki Committee

For Ethical Approval

Date: 2017/08/07 **Number:** PHRC/HC/239/17

Name: SAMIRA S. ABOALSHIEKH الاسم:

We would like to inform you that the committee had discussed the proposal of your study about:

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم حول:

Evaluation of the Utilized Diagnostic Imaging Methods for Breast Cancer in Gaza Governorates

The committee has decided to approve the above mentioned research. Approval number PHRC/HC/239/17 in its meeting on 2017/08/07

و قد قررت الموافقة على البحث المذكور عاليه بالرقم والتاريخ المذكوران عاليه

Signature

Member **Member**

7.8.17

Chairman

7/8/2017

Genral Conditions:-

1. Valid for 2 years from the date of approval.
2. It is necessary to notify the committee of any change in the approved study protocol.
3. The committee appreciates receiving a copy of your final research when completed.

Specific Conditions:-

E-Mail:pal.phrc@gmail.com

Gaza - Palestine غزة - فلسطين

شارع النصر - مفترق العيون

Annex 10: MOH (admin) approval

State of Palestine
Ministry of health

دولة فلسطين
وزارة الصحة

التاريخ:29/08/2017
رقم المراسلة 158258

السيد : رامي عيد سليمان العبادله المحترم

مدير عام بالوزارة /الإدارة العامة لتنمية القوى البشرية - /وزارة الصحة

السلام عليكم ،،،

الموضوع/ تسهيل مهمة الباحثة// سميرة أبوالشيخ

التفاصيل //
بخصوص الموضوع أعلاه، يرجي تسهيل مهمة الباحثة/ **سميرة سليمان أبوالشيخ**
الملتحقة ببرنامج ماجستير الصحة العامة – مسار علم الأوبئة- -كلية الصحة العامة - جامعة القدس أبوديس في إجراء بحث بعنوان :-

"Evaluation of the Utilized Diagnostic Imaging Methods for Breast Cancer in Gaza Governorates "

حيث الباحثة بحاجة لتعبئة استبانهوالاطلاع على الملف الطبي لعدد من المريضات اللاتي يعانين من سرطان الثدي واللاتي تم تشخيصهن كمريضات بالمرض المذكور في الربع الاخير من العام 2016 والعام 2017 وكذلك إجراء مقابلات مع عدد من مقدمي الخدمات الصحية لهن.
نأمل تزجيهاتكم لذوي الاختصاص بضرورة الحصول على الموافقة المستنيرة من المريضات اللاتي هن على استعداد للمشاركة في البحث ومن ثم تمكين الباحثة من التواصل معهن، بما لا يتعارض مع مصلحة العمل وضمن أخلاقيات البحث العلمي، و دون تحمل الوزارة أي أعباء أو مسئولية.
وتفضلوا بقبول التحية والتقدير،،،
ملاحظة / تسهيل المهمة الخاص بالدراسة أعلاه صالح لمدة 9 اشهر من تاريخة.

محمد ابراهيم محمد السرساوي
مدير دائرة/الإدارة العامة لتنمية القوى البشرية -

Gaza Tel. (+970) 8-2846949 Fax. (+970) 8-2826295
غزة تلفون. 8-2846949 (+970) فاكس. 8-2826295 (+970)

Annex 11: Participation approval letter

جامعة القدس
Al-Quds University

أختي الكريمة ؛؛؛

أنا الباحثة:سميرة سليمان أبو الشيخ- أقوم بإجراء دراسة بعنوان:

" تقييم خدماتالتصوير التشخيصية المتاحة لدى مرضى سرطان الثدي في محافظات قطاع غزة**"**

وذلك استكمالاً لمتطلبات الحصول على درجة الماجستير في الصحة العامة / مسار علم الأوبئةوعليه فقد تم إعداد هذه الإستبانة بهدف جمع البيانات وأرجو منك الإجابة على بنودها بدقة وموضوعية وصدق حيث أن الوقت اللازم لتعبئتها لا يتعدى النصف ساعة مع العلم أنه تم اختيارك بشكل عشوائي للمشاركة بالدراسة وأنّ المعلومات الواردة فيها سوف تستخدم فقط لأغراض البحث العلمي وذلك بهدف تحسين وتطوير الخدمات التشخيصية وأخذ القرارات المبنية على الحقائق.

إننا نرحب بمشاركتك في هذا الإستبانة لذا نرجو من حضرتك الإجابة على جميع الأسئلة قدرالإمكان. مع العلم أنه بإمكانك المشاركة أو الرفض أو الإنسحاب بأي وقت ولن يؤثر ذلك على الخدمات المقدمة لكي.

شاكرين على حسن تعاونك

الباحثة: سميرة سليمان أبو الشيخ

جامعة القدس

0597155586

Annex 12: List of experts (interviewees)

Name	Affiliation
Radiologists	
Dr. Kamal Jabre	Al Shifa hospital- MOH
Dr. Mohammad Mattar	Al Shifa hospital- MOH
Dr. Marwan Matar	Gaza European hospital- MOH
Dr. Mohamed Alkanoa	Al Shifa hospital- MOH
Dr. WajdyJarbou	Al Shifa hospital- MOH
Surgeons	
Dr. Mohammed Al- Ron	Al Shifa hospital- MOH
Dr. RamyImara	Al Shifa hospital- MOH
Oncologists	
Dr. KhaledThabet	Al-Rantesihospital- MOH
Dr. Ahmed Shorafa	Gaza European hospital- MOH
Histopathologists	
Dr. Hosam Hamada	Al Shifa hospital- MOH
Dr. Fayeq Abu Rouk	Gaza European hospital- MOH
GPs	
Dr. AydaHelles	PHC
Dr. AlaaMatar	PHC

Annex 13: List of experts (arbitrators)

No.	Name	Affiliation
1.	Dr. Bassam Abo Hamad	Al- Quds University
2.	Dr. Yahia Abed	Al- Quds University
3.	Dr. Khitam Abo Hamad	Al- Quds University
4.	Dr. Ahmed Najim	Al Azhar University
5.	Dr. SamyAlagha	Al Azhar University
6.	Dr. Kamal Jabre	MOH
7.	Dr. AymanAbuMustafa	Palestine College of Nursing
8.	Mr. AwnyUbeid	MOH
9.	Dr. AydaHelles	MOH
10.	Dr. IhabNaser	Al Azhar University
11.	Mr. WaelYousef	MOH

Abstract in Arabic