



Mapping study for cancer care in the Gaza Strip

Current services, challenges, gaps, needs, recommendations for improvement

Gaza - Palestine 2021

Foreword

Cancer is a global killer. According to the World Health Organization, it is one of the leading causes of death across the globe. Cancer affects all ages and no one is immune to the disease. Cancer exerts a tremendous physical, psychological, social, emotional, spiritual, and financial strain on individuals, families, communities, and health systems.

In the Gaza Strip, cancer is the second leading cause of death after cardiovascular diseases (MoH, 2020). Rates of cancer are rising in the Gaza Strip. However, the majority of cancer patients never receive the comprehensive, integrated care they need. A large number of cancer patients do not have access to timely, quality diagnosis and comprehensive treatment. The five-year survival rate of patients with breast cancer is much lower than in Israel due to delayed detection and poor treatment options.

My hope and expectation is that this report will help Islamic Relief Palestine identify the gaps in service provision and support the Ministry of Health in setting priorities around cancer control and comprehensive health coverage. This report builds on the evidence from pioneers in health service provision in Gaza and patients' sufferings through their painful journey of cancer management.

Denial or delayed access to care for cancer patients from Gaza to more advanced centers is a significant barrier that leads to the spread and metastasizes of cancer with complicated, expensive management or the death of patients.

Islamic Relief Palestine is proud and has the pleasure to present this report to use its findings and recommendations for other funding agencies and the Ministry of Health to reform the health system. By adopting and providing comprehensive, integrated, and uninterrupted health services for cancer patients, we hope to mitigate mortality and prolong patients' survival rate.

In Gaza, the rapid spread of Covid- 19 since late August 2020 has posed a heavy burden on a healthcare system which already over-stretched due to 15 years of Israeli restrictions, the internal Palestinian divide, and recurrent hostilities and violence.

Together, we can achieve more to help cancer patients.

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ACRONYMS

AAH	Ahli Arab Hospital
ALL	Acute Lymphoblastic Leukemia
CRC	Colorectal Cancer
CT	Computerized Tomography
GS	Gaza Strip
ICDA	International Confederation of Dietetic Associations
IEC	Information Education Communication
IRPAL	Islamic Relief- Palestine
IRW	Islamic Relief Worldwide
IT	Information Technology
KIIs	Key Informant Interviews
MAP-UK	Medical Aid for Palestinians- United Kingdom
MoH	Ministry of Health
MRI	Magnetic Resonance Imaging
NCDs	Non-communicable diseases
NGOs	Non-governmental organizations
OCHA	Office for the Coordination of Humanitarian Affairs
OECD	Organization for economic co-operation and Development
oPt	occupied Palestinian territories
PA	Palestinian Authority
PCBS	Palestinian Center Bureau of Statistics
PCHR	Palestinian Center of Human Rights
PCRF	Palestinian Children Relief Fund
PHC	Primary Health Care
PHIC	Palestinian Health Information Center
PSS	Psychosocial Support
SPSS	Statistical Package of Social Science
UNFPA	United Nations Population Fund
UNRWA	United Nations Relief and Works Agency
USA	United States of America
WHO	World Health Organization

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EXECUTIVE SUMMARY

Cancer is a severe health problem in all of the Gaza Strip and the rest of the world. The Palestinian health authorities respond to cancer in a fragmented way. Palestine is a Low- and Middle-Income Country that concentrates its limited resources on the enormous burden of trauma, infectious diseases, including the Covid- 19 pandemic and maternal and child health. The Palestinian health authorities find it challenging to address the cancer burden due to limited financial resources, a shortage in cancer management expertise, and scarcity of diagnostic and treatment facilities and equipment. If effective cancer prevention, detection and management are delayed, the response becomes more expensive, lives are lost, and economic and human development remain stifled.

In the Gaza Strip (GS), breast cancer is the most common cancer, accounting for 18.0% of cancers, followed by colorectal cancer (CRC) (10.7%). Breast cancer represents 32.2% of cancers affecting females. CRC is the most common type among males, accounting for 13.2% of male cancers (MoH, 2020)¹.

Delayed cancer detection, diagnosis at a later stage, delayed fragmented treatment all contribute towards the much higher case fatality rates in the GS. This mapping study introduces the current services, challenges, gaps, needs, current priorities in cancer control and offers recommendations for improvement. Cancer is the second leading cause of death in Palestine at 14%, exceeded only by heart disease at 30%. The cancer burden in Palestine is expected to increase, reaching levels that further challenge the current healthcare system's financial and infrastructural resources. Economic and political uncertainty exacerbates the problem (Gale & Halahleh, 2018)². The shortage of cancer specialists limits cancer care in the Gaza Strip (GS). Restricted access to medical technology, reduced funding, lack and an interrupted supply of chemotherapy, unavailability of radiotherapy, limited access to nutritional counseling and psychosocial support, shortage of structured training programs, and denied or delayed access for treatment abroad also contribute to this.

¹ MoH (2020). Annual Health Report. PHIC

² Halahleh K. and Gale R. (2018). Cancer care in the Palestinian territories. The Lancet Oncology. VOLUME 19, ISSUE 7, E359-E364

Aim of the Study:

IRPAL conducted this mapping study to identify the service provision for cancer patients, to determine the cancer patients' accessibility to health care, and to improve the patients' quality of life.

Challenges facing the patients or facing the cancer care

1. Hospital's in Gaza have a limited ability to provide adequate diagnosis and treatment is due to an acute shortage of cancer medications, medical supplies, diagnostic facilities, radiotherapy, and the Israeli ban on the entry of new medical devices and laboratory equipment needed to conduct tests for patients.
2. The shortage of lab analysis, unavailability of flow cytometer and gene lab for diagnosis of cancer.
3. Radiotherapy equipment is not available.
4. Specialised cancer surgeons, subspecialised oncologists, and subspecialised pathologists are unavailable. There is also a shortage of qualified nursing staff and paramedical personnel.
5. There is no comprehensive cancer center in Gaza offering all needed modalities and services such as palliative care, nutrition services, psychosocial support, or rehabilitation.
6. Shortages in training programs deteriorate cancer care in Gaza. The cancer management multidisciplinary team could not get out of Gaza to joint training programs or conferences, and it is difficult for international medical experts to access Gaza.
7. The lack of integrated and effective coordination mechanism among the service providers.
8. Unavailability of reconstructive surgeries and the shortage of pain management and palliative care services.
9. Challenges facing cancer patients during a referral to hospitals outside Gaza.
10. Cancer patients face interrupted courses of medication.
11. Physicians usually discharged patients as soon as they get their treatment doses of chemotherapy, so they do not get the necessary supervision.

Challenges facing Non-Governmental Organisations

1. A deteriorating economic conditions deprive NGOs of the ability to provide quality supportive health services.
2. They may face a financial crisis in supporting cancer patients due to lack of funds.
3. They cannot cover running costs and employees' salaries.
4. Unable to employ and develop professional staff.
5. Lack of training of NGOs staff.
6. The lack of integrated and effective coordination mechanism among service providers.
7. Lack of well-organised referral system.

Gaps in service provision

The study concludes that there is a lack of coordination among different health providers. The study finds gaps in transparency and equity, service provision gaps, gaps in cancer-preventive programs, gaps in pathologists, oncologists, radiologists, surgeons, psychologists, psychiatrists, nutritionists, palliative, and rehabilitation therapists.

In the GS, several factors, including restricted medical technology, shortage of chemotherapy drugs, unavailable radiotherapy and radioisotope, and palliative therapy defect limit governmental, NGOs, and private cancer care facilities in providing appropriate care for cancer patients.

Needs

- Gaza's radiology department needs three MRI, one CT, a PET scan, and five mammography machines regarding the radiology diagnostic services. The Gaza needs include diagnostic, treatment, training, and database needs as well as diagnostic tools and materials
- Pathology labs need backup equipment, cytogenetic equipment, a flow cytometer, and other stains and materials.
- Gaza needs cancer medications to avoid interruption of cancer medication courses.
- Surgical departments need different equipment and supplies. Cancer patients in Gaza are in extreme need of radiotherapy and training for MDTs.
- There is a need for hardware and software programs to establish and strengthen the cancer registry.

Recommendation

For the international community:

- Call to lift 14 years longstanding suffocating blockade on Gaza and permit patients to go abroad for treatment.
- Support efforts to strengthen Palestinian health staff and services by the free movement of health service providers and health missions.
- Promote and support the development of the Palestinian health sector.

For the Palestinian authorities

- We call on the Palestinian Authority to abide by its commitment to hospitals who have been contracted to treat cancer patients in Gaza.
- We call on the Palestinian Authority to supply the GS with the necessary medications and medical devices needed to treat cancer patients.
- Develop a plan to build and establish a national cancer center- Gaza Cancer Center. It could be financed through national and international charitable organizations with coordination with MoH. As a starting point to develop breast cancer unit, colorectal unit, hepatobiliary unit, and thyroid unit.

- Support CBOs who provide supportive treatment to cancer patients.
- Strengthen collaboration and coordination at the technical level between health authorities in the West Bank and the Gaza Strip, and ensure that provision of health care to the Palestinian population is not politicised in the political divide.

Recommendations for the Ministry of Health

- Strengthen the existing breast cancer-screening program. Develop a colorectal screening program.
- Develop H. Pylori eradication program.
- Establish a multidisciplinary team (surgeon, radiologist, pathologist, oncologist, nurse).
- Support the use of telehealth services within cancer care in Gaza.
- Bridge the gap in the workforce by recruiting professionals for diagnosis and management of cancer patients.
- Find scholarships for subspecialties in different fields of cancer management.
- Coordinate and encourage medical missions with experts for cancer management.
- Develop a training program and continued medical education for medical students and doctors in different medical and surgical departments who are enrolled in the Board Program.
- Develop and update the health and information system, strengthen the cancer registry, and establish a cancer research center. Train the entire registry personal and unify the registration procedures using the ICD-03 classification and train doctors to help classify and manage cancer.
- Developing a plan to establish an E Cancer System.
- Address the availability of home care.
- Establish a specific department for palliative care.
- Develop a plan for regular training for staff who are included in cancer management about the proper communication and emotional support for cancer patients.

- Establishment of molecular pathology by having flow cytometry (FISH technique).
- Change the location of the Shifa pathology lab.
- Establish radiotherapy departments.
- Stress the equity and accessibility of cancer diagnostic and therapeutic facilities .
- Increase community awareness and attention to early detection of cancer.
- Address the high cost of cancer medications. This could be financed through charitable organisations.
- Double-check pathology specimens before discharging patients. This is very important because it leads to selected treatment options and prognostic prediction.

Recommendations for Ministry of Social Development

- To address the loss of income for both persons with cancer and their caregivers
- Support primary caregivers by establishing a caregiving strategy that includes access to income programs for caregivers such as employment and private disability plans. To better support persons who can work during treatment, increase efficiencies in terms of scheduling for diagnostic testing and chemotherapy.

Recommendations for Community Based Organisations

- Strengthen their roles in providing cancer preventive services for their communities as anti-smoking initiatives, self- examinations, physical activity, healthy nutrition practices, adequate sleep and coping with stress.
- Enhance their supportive services for cancer patients in terms of psychosocial support (PSS), nutrition support, education of children with cancer, rehabilitation services, and find small income-generating projects for the patients or their caregivers.

Recommendations for patients

- Cancer patients have to aware of their health and treatment (including privacy rights; rights to complain).
- Cancer patients should be informed about community support groups and NGOs.
- Encourage patients to live healthy life style including regular exercise, healthy diets, have a healthy body weight and to avoid obesity.
- Increase awareness of food nutritive value and healthy eating practices.
- Raising awareness of sleep as a healthy behavior.
- Get health checkups regularly.
- Encourage people to stop smoking.
- Consider exploring stress-management techniques.
- Support caregivers of patients with cancer.

PART 1: INTRODUCTION

Islamic Relief Worldwide (IRW) is an international aid and development charity, which aims to alleviate the suffering of the world's poorest people. It is an independent international NGO founded in the UK in 1984. As well as responding to disasters and emergencies, Islamic Relief promotes sustainable economic and social development by working with local communities, regardless of race, religion, or gender. Islamic Relief Palestine (IRPAL) supports the Palestinian people through three main programs: humanitarian, community development, and child welfare and education. IRPAL is an affiliate of IRW, active in the Palestinian territory since 1998. IRPAL has its main office in Gaza city. IRPAL is working to improve the wellbeing of vulnerable people, delivering lifesaving emergency aid, enhance the education environment, reduce the humanitarian impact of conflict, empower communities to reduce poverty, and protect communities from disasters.

Cancer is a large group of diseases that can start in almost any organ or tissue of the body when abnormal cells grow uncontrollably. They invade the adjoining part of the body metastasize (spread) to other organs. Globally, in 2018, there were an estimated 18 million new cases of cancer and 10 million deaths from cancer. The predicted global burden will double to about 29–37 million new cancer cases by 2040, with the most significant increases in Low Middle-Income Countries (WHO, 2020).³ Cancer rates are expected to increase as the population ages. Cancer is one of the most critical health problems due to its high incidence and its great financial and social impact.

Cancer is the second- leading cause of death in Palestine , accounting for 14% of deaths, which is at 14%, exceeded only by heart disease at 30%. The cancer burden in Palestine is expected to increase, reaching levels that further challenge the current healthcare system's financial and infrastructural resources. Economic and political uncertainty exacerbates the problem (Halahleh & Gale, 2018)⁴. Cancer care in the Gaza Strip (GS) is limited by the shortage of cancer specialists, restricted access to medical technology, reduced funding, lack, and an interrupted supply of cancer medications. Besides, radiotherapy's unavailability restricted access to nutritional counseling and psychosocial support, shortage of structured training programs and denied access for treatment abroad, etc.

Aim of the study:

IRPAL conducted this mapping study to identify the service provision for cancer patients in order to determine their accessibility to health care, and to improve the patients' quality of life.

Specific objectives

1. To provide an overview of the services in terms of coverage and distribution to cancer patients.
2. To update the current main challenges in meeting providing comprehensive and quality services to cancer patients in the GS.
3. Highlight general challenges encountered by cancer patients along the pathway from detection to post-treatment care.
4. To prepare a developmental plan for the cancer sector in cooperation with key stakeholders.
5. Offer key recommendations for system improvement of existing services.

³ WHO (2020). WHO Report on Cancer

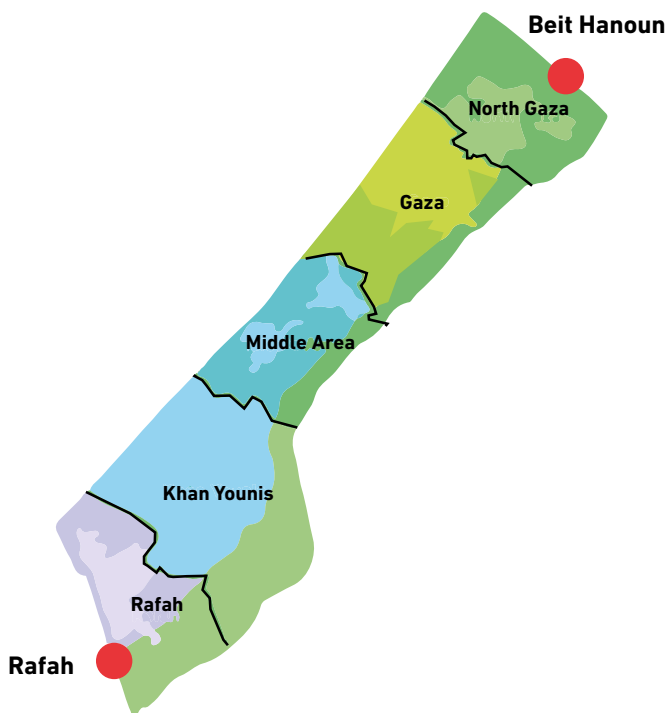
⁴ Halahleh K. and Gale R. (2018). Cancer care in the Palestinian territories. *The Lancet Oncology*. VOLUME 19, ISSUE 7, E359-E364, JULY 01, 2018

1.1. Gaza context of the study

The Gaza Strip context in the current study included geographic, landscape, demographic, and economic situation.

1.1.1. Geography

The Gaza Strip is a coastal band of land along the Mediterranean Sea, bordering Israel to the north and east and Egypt in the south-west. It is about 41km long and between 6km and 12km wide, with 360 km². The border with Israel is 51km; with Egypt, 11km. The Mediterranean coastline is 40km (UNRWA, 2020)⁵. Exit from Gaza is possible only via two crossings: through Beit Hanoun/Erez checkpoint to the north and Rafah border crossing to Egypt in the south. Palestinians living in the Gaza Strip have faced severe movement restrictions in and out since the start of blockade by land, sea, and air in 2007.



1.1.2. Demography

In 2020, the Gaza population reached 2.05, of which 1.04 million males and 1.01 million females. The percentage of individuals aged (0-14) constituted 41% of the total population in mid-2020 in Gaza Strip. The elderly population aged (65 years and above) constituted 3% of the total population in Gaza Strip. The GS's population density is generally high at 5,453 persons/km² in the Gaza Strip in mid-2019 (PCBS, 2020)⁶. Nearly 113,990 registered refugees live in the Jabalia refugee camp in the GS, which covers an area of only 1.4 square kilometers (UNRWA, 2020).⁷

1.1.3. Economic Situation

The increased pressure stemming from the Gaza Strip's prolonged blockade, restrictions imposed to contain Covid-19, the Palestinian Authority's (PA) financial crisis, the internal Palestinian divide, and frequent escalations of hostilities have affected the Palestinian economy and livelihoods. These have imposed high costs on the Palestinian productive and trade sectors, undercutting development prospects significantly. The economy is in 'free fall,' and poverty, unemployment, and food insecurity are increasing.

The Gaza Strip's unemployment rate during the second quarter of 2020 reached 49.1%, and 78% of women are unemployed. In the occupied Palestinian territories (oPt), food insecurity is caused by unemployment and poverty. These two indicators were on the rise in 2020 due to the overall slowdown of the economy. Nearly 72% of the food insecure, or over 1.4 million people, live in the Gaza Strip (OCHA, 2021)⁸.

⁵ UNRWA (2020). Working in the Gaza Strip. <https://www.unrwa.org/careers/duty-stations-gaza#:~:text=The%20Gaza%20Strip%20is%20a,area%20of%20360%20square%20kilometres>

⁶ PCBS (2020). On the Occasion of the International Population Day 11/07/2020

⁷ UNRWA (2020).

⁸ OCHA (2021). Humanitarian Needs Overview. oPt.

1.1.4. Health system

The Ministry of Health (MoH) is responsible for delivering a significant portion of primary, secondary, and tertiary healthcare services. There are 52 PHC facilities in the Gaza Strip own and supervised by MoH, and 22 PHC facilities owned and managed by UNRWA, NGOs provide management to 80 PHC facilities, and medical services run 5 PHC facilities. There is one PHC facility per 12,414 people in Gaza. The number of hospitals accounts for 34 (2,943 beds), out of which MoH manages thirteen hospitals, NGOs run 17 hospitals, the Ministry of Interior runs two hospitals, and the private sector runs two hospitals. The number of hospital beds accounts for 3,049 (2,343 MOH, 517 NGOs, 163 MOI, 25 Al-Hayat). There is 9.1 doctor and 13.3 nurses per 100,000 population in Gaza respectively (MoH, 2020)⁹.

Shifa Medical Compound

Shifa is the largest hospital in the Gaza Strip, with more than 850 beds and a staff of almost 2000 employees. It is one of 13 Ministry of Health hospitals in Gaza and is facing common chronic problems of shortages of medicines and medical disposables, lack of staff, unreliable power and fuel supplies, and very little training and capacity-building opportunities (WHO, 2016)¹⁰. Although Shifa hospital is the largest in the GS, it does not contain any beds or rooms for cancer patients. MoH transferred the oncology department to Al Rantisi hospital.

Nasser Medical Complex (NMC)

NMC is located in Khan Younis city and provides radiological, pathological, and surgical services for adult patients with cancer. Oncology services are provided in Al Amal hospital. NMC provides secondary health services to the population in Khan Younis and Rafah governorates.

The oncology department was transferred from European Gaza Hospital to Nasser Medical Complex (NMC) because European Gaza Hospital is used to isolate and treat Covid- 19 patients. MoH histopathology labs present only in Shifa hospital and NMC.

The Palestinian MoH is the only treatment provider for cancer patients in Gaza European Hospital (currently, in Al Amal hospital), and Al-Rantisi Children's Hospital. The MoH contracted Hayat Specialist Hospital (HSH) and opened an Oncology Department in April 2020 (PCHR, 2021)¹¹.

Dr. Abdel Aziz Rantisi Specialist Hospital for Children

Regarding cancer services, the hospital includes a pediatric cancer department and adult cancer department. It provides health services for all children with cancer in the Gaza Strip and provides services for adult cancer patients in north governorates in the Gaza Strip. Al Amal hospital provides cancer services for adult patients in Khan Younis and Rafah governorates.

Human resources in Ministry of Health-Gaza

A multidisciplinary team (MDT) is fundamental to the successful delivery of cancer treatment. The MoH reported 10.1 physicians per 10,000 population and 15.7 nurses per 10,000 population at the MoH health system. The total number of physicians working at the PHC facilities operated by the MoH is 387 physicians (268 general practitioners, 14 specialists, and 105 dentists). In addition, there are 207 pharmacists, 438 nurses, and 49 midwives. The medical and paramedical staff at MoH hospitals includes 1,617 physicians (1,249 general practitioners, 368 specialists, and 14 dentists). 170 pharmacists, 2,173 nurses, 241 midwives (MoH, 2020)¹².

⁹ MoH (2020). Annual Health Report. PHIC

¹⁰ WHO (2016). <http://www.emro.who.int/pse/palestine-news/sdc-deputy-director-visits-shifa-hospital-in-gaza-august-2016.html> Accessed on March 8, 2021

¹¹ PCHR (2021). On World Cancer Day: Gazan Cancer Patients' Health in Peril. <https://www.pchrgaza.org/en/on-world-cancer-day-gazan-cancer-patients-health-in-peril/>

¹² MoH (2020). Annual Health Report. PHIC

1.2.4. Conceptual framework

The current study's conceptual framework was designed based on the cancer care cycle (Figure 1), which displays how cancer patients pass through the health care system for cancer care. Typically, a cancer patient enters the care cycle continuum by being screened for cancer through a clinical exam and a screening. On one side, in case of normal screening results, the patient would go back into follow-up care to get another screening exam at the recommended interval. On the other side, in case of abnormal screening test results, the patient is referred to further diagnostic confirmatory services that could include Ultrasound, CT scan, MRI, Fine Needle Aspiration and True Cut Biopsy & histopathology.

If the patient's diagnosis is confirmed as cancer, then the treatment process starts. These may include chemotherapy, surgical, radiotherapy, hormonal therapy, immunotherapy, targeted therapy or palliative therapy. Post-treatment care could include physiotherapy, social support, and psychological support.

Education plays a major role in the cancer care cycle especially at the community level, where health promotion and awareness about cancer prevention and early detection are included as an important component of cancer care at the peripheral level.

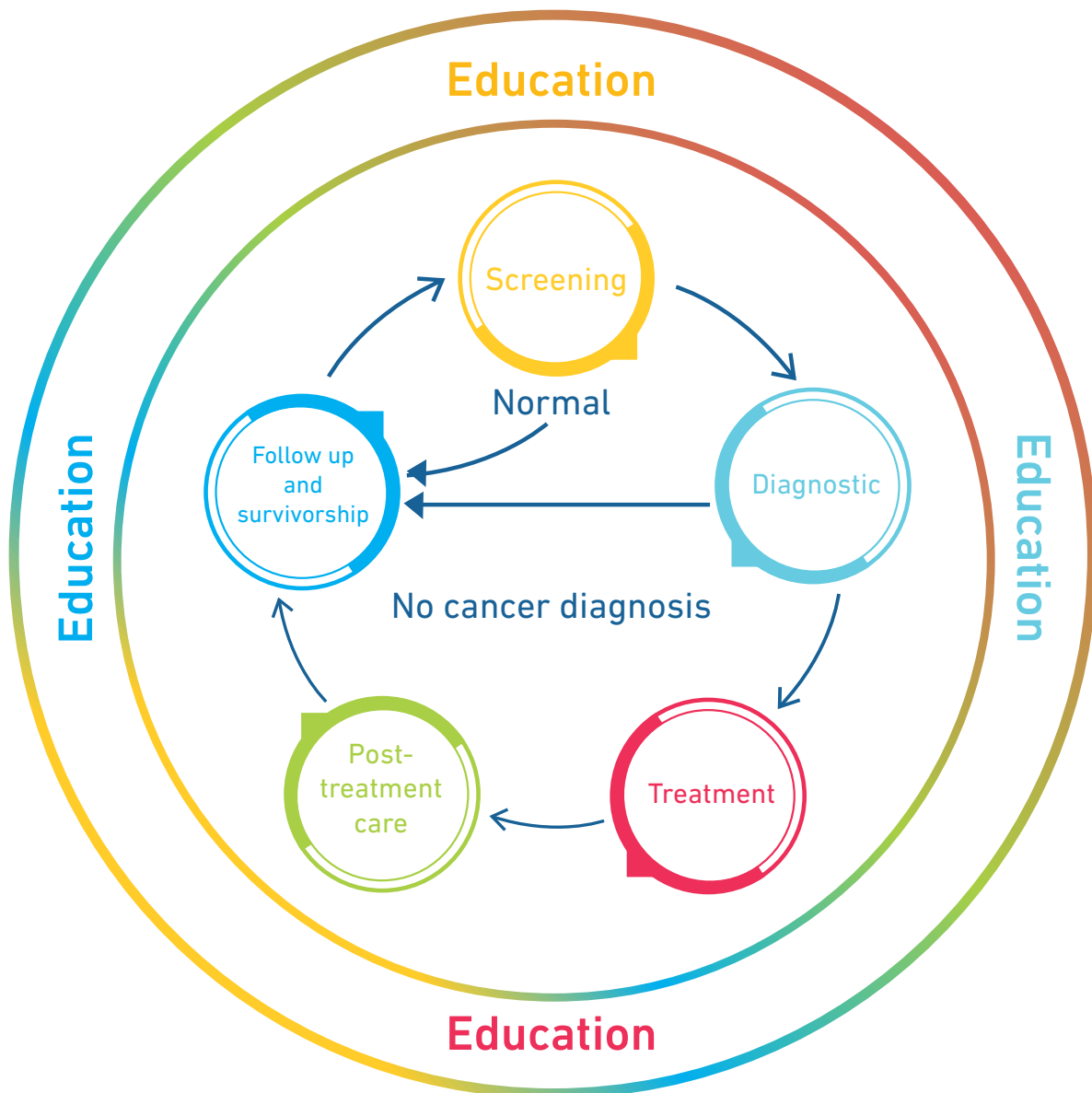


Figure 1: Cancer Care Cycle

Continuum of cancer care

Cancer control requires a comprehensive approach. Generally, interventions can be organised thematically along the “cancer continuum”, from prevention to survivorship or end-of-life care, each of which requires unique activities and supporting policies (Figure 2). In the Gaza Strip, the cancer care continuum is fragmented due to a lack of capacity among service providers (mainly the hospitals). The study finds that patients are discharged as soon as they get they receive chemotherapy treatment. They have to wait for surgical intervention due to the limited capacity of hospitals. Therefore, they do not get the necessary supervision in terms of medications and psychosocial support during the periods in which they are not in hospital, and there is a lack of integrated and effective coordination among service providers.

The service delivery concept is based on the understanding that effective cancer management should have sustainable services that start from primary prevention and early detection through to effective treatment, quality and safe care, pain management, and follow-up services. There should be a multidisciplinary effort to improve cancer prevention and control programs.

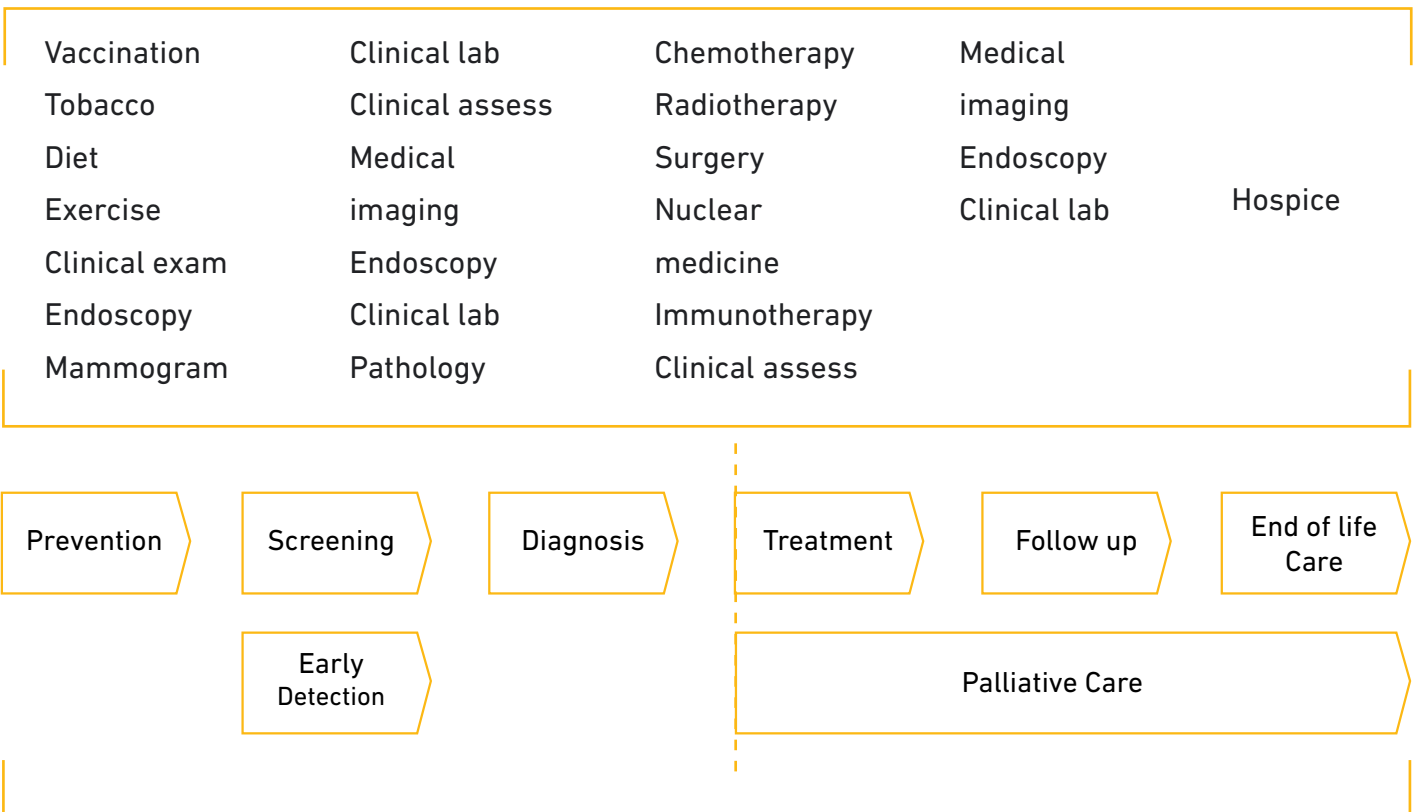


Figure 2: Interventions along the cancer continuum and examples of levels of care

PART 2: STUDY METHODS

To ensure full participation of all involved actors, the consultant performed the mapping study through a full collaboration between the research team and key stakeholders of IRPAL, the MoH health service providers, NGOs, and the private sector in the GS.

2.1. Preparation

The consultant conducted a preliminary meeting with IRPAL's project team to better understand detailed activities and agree on this consultancy's key deliverables. Accordingly, the consultant submitted a detailed adjusted methodology and work plan for IRPAL review and approval. At this stage, the consultant reviewed all relevant secondary information, including but not limited to MoH records and official files and essential studies and publications, and review standards of service delivery for cancer patients both at the international and regional level.

The study team leader formulated a team that includes a consultant radiologist, a pediatrician, two clinical nutritionists, and a quality assurance person. The supportive data collection team received training from the consultant on the designed questionnaires and other tools to understand the assignment's objective and related measures. The training also focused on the basic and ethical considerations of the mapping studies and standardised the methodology.

2.2. Period of the study

The preparation phase started on January 10, 2021. Data collection tools were prepared and delivered to IRPAL on January 20, 2021. The consultant presented research methods to IRPAL and partners for approval. Data collection started on February 1, 2021, to March 25, 2021. Analysis and draft report delivered on April 25, 2021.

2.3. The setting of the study

- MoH facilities (Hospitals and Rimal PHC center)
- HC providing screening and preventive services
- IRPAL partners' organisation
- NGOs providing related services
- Private sector providing services.

2.4. Sampling and sample frame

- All cancer inpatient and outpatients attending Rantisi Pediatric Hospital and Amal hospital
- Sample size: 90 cancer patients (we have restricted the number of 90 patients because of the tremendous stress throughout of their lives from time of diagnosis until conducting the study)
- 30 male with cancer (20 from Rantisi and ten from Nasser)
- 30 female with cancer (20 from Rantisi and ten from Nasser)
- 30 children (caregivers) with cancer from Rantisi hospital
- Sampling convenient samples.

2.5. Eligibility criteria

Inclusion criteria:

- Adult male and female patients undergoing cancer treatment
- Children patients younger than twelve years undergoing cancer treatment
- Young children's caregivers.

Exclusion criteria:

- Cancer patients still in the process of diagnosis
- Terminally ill cancer patients
- Caregiver of dying cancer patients
- Uncooperative patients.

2.6. Data collection

The study depends on the review of documents, in-depth interviews with key informants, and face-to-face interview questionnaire with cancer patients undergoing treatment.

2.6.1. Documentation review

The literature review conducted within the framework of this study used available information collected during the assessment period. It also used the results of extensive documentation provided by the partners in the Gaza Strip. As well as this, the review used documents available online. During the initial stage of the assessment, the consultant reviewed key reference documents, including:

- Palestinian MoH reports
- WHO reports
- IRPAL documents and IRPAL partners reports
- WHO reports
- UNRWA reports
- UNFPA reports
- OCHA reports
- PCRF reports
- PCHR reports
- Related published articles.

2.6.2. Semi-structured Key Informant Interviews (KIIs)

The data collection team conducted 32 in-depth, semi-structured interviews with MoH personnel and partners' staff in total. These were conducted in order to determine the appropriateness of service provision, coverage, accessibility, gaps, barriers, quality, staff knowledge and skills, whether activities meet guidelines and in order to match the provision of health services related to the use of resources. Before visits, the consultant informed the respondents about the time and date of the visit. Upon arrival, the consultant explained the purpose of the visit, introduced himself, presented the study authorisation letter, and received permission to begin data collection. They recorded the data by asking questions, listening, and observing. Three qualified interviewers who had medical backgrounds carried out an assessment of the health services for cancer patients. Interviews, lasting 30-60 minutes, were recorded and transcribed. Annex 1 shows the list of the key informants. 31 key informant interviews were conducted face-to-face from February 1, 2021, through to March 17, 2021. Participants are the directors of their organisation and were selected for their knowledge about community health needs

and barriers, including the needs of vulnerable and underserved populations. Interviews were transcribed and analysed using the qualitative thematic and sub-thematic analysis.

Mapping survey of 31 organisations 32	Semi-structured interviews with health care providers 31	Interview with cancer patients and their caregivers 90
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2.6.3. Face-to-face interview questionnaire

The study interviewed 90 cancer patients.

2.7. Data collection tools

The consultant designed the different data collection tools taking into consideration targeted stakeholders, patients, and facilities: Health facility assessment tool (annex 2), organisation assessment tool (annex 3), adult cancer patient questionnaire (annex 4), children with cancer questionnaire (annex 5), and list of in-depth questions for key informants (annex 6). After the comments of IRPAL are completed and considered, data collection began.

2.8. Pilot study

The purpose of conducting a pilot is:

- to examine the feasibility of an approach that is intended to be used
- to identify or refine a set of research questions
- to evaluate research methods
- to identify and resolve as many potential problems or issues as possible
- to estimate the time required for the study.

2.9. Data analysis

Data analysis includes quantitative and qualitative methods.

2.9.1. Quantitative data analysis

Steps for quantitative data analysis include:

- preparing SPSS and Excel spreadsheet
- data coding, entry, and cleaning
- arranging data in numbers where each data set has a numerical value, data with numerals identify numbers for qualitative information as 1 for yes and 2 for no, or categorised (grouped) qualitative data. The software analysis program used is Excel and Statistical Package of Social Science (SPSS) spreadsheet. By analysis, the raw meaningless data has been changed to meaningful information
- processing quantitative data analysis
- Analysing frequencies, cross-tabulation, and statistical tests.

2.9.2. Qualitative data analysis

The consultant analysed KII data by thematic and sub-thematic analysis. First, the consultant arranged qualitative data by converting it into a text format and manually typed and then organised this. Once the analysis is completed, an analytical document was developed which summarises the mapping findings, including visuals (graphics), highlighting currently available services, international standards, and gaps and areas for further consideration. This was then submitted for review by the project team.

2.10. Study limitation

Limitations	Solutions
Procrastination	Some key informants procrastinate, and ultimately never respond to the frequent request for an interview. The consultant gains access to the organisation website and their reports
Unresponsive	Few key informants did not respond to the IRPAL facilitation letter. The consultant gains access to the organisation website and its reports
Data inaccessibility	The Director of Information technology at MoH did not allow the consultant to gain access to data. The consultant depends on data at health facilities even though it is fragmented
Data unavailability	Some health organisations did not have a database or have fragmented data—the consultant gains data from different sources
Inaccurate data	Patients data at the EGH and Amal hospital is registered by a number of visits, not as unique beneficiaries
Cancer patients are distressed	The data collection team provided psychological support before asking patients

Table 1: Data Limitations and Solutions

PART 3: STUDY FINDINGS

The current mapping study explains the qualitative and quantitative data around cancer patients, whether children or adults, the health system, cancer prevention, early detection, confirmative diagnosis, and cancer management. The consultant illustrates points about challenges, gaps, needs, and recommendations

3.1. Cancer patients

The study elaborates the incidence of cancer in the GS, common types of cancer, and patients' suffering.

3.1.1. Incidence of cancer

The total number of new cancer cases from 2014 to 2018 was 8,326. Proportional distribution of cancer by gender shows females represent 55%, and males represent 45% (Figure 3). The number of cancer patients has been increasing in the same period. In the year 2014, the incidence rate was 83.9/100,000 people reaching to 90/100,000 people in 2018 (Figure 4), which increases the burden on the people of Gaza and severely impacts the quality of their lives. Besides, cancer increases patients' morbidity and mortality (MoH, 2019)¹³.

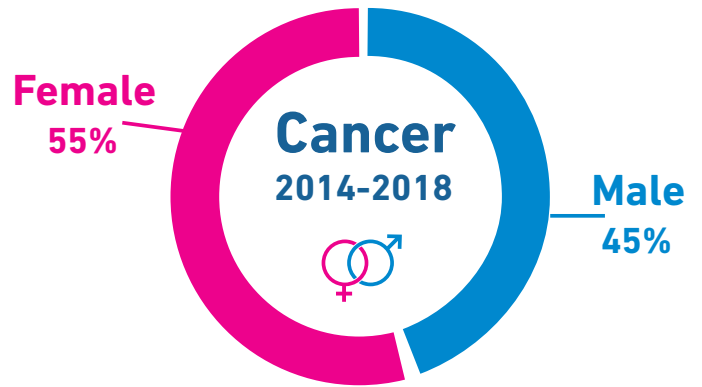


Figure 3: Proportional Distribution of cancer by gender

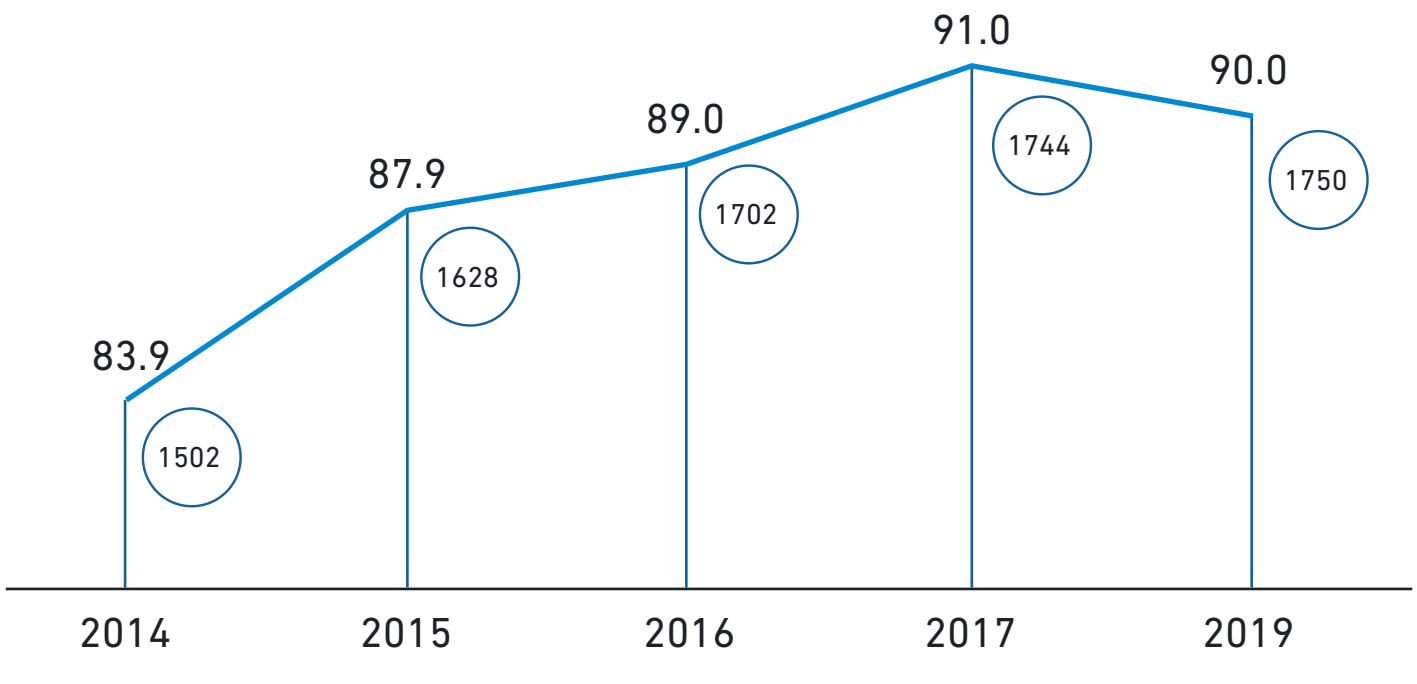


Figure 4: the number and incidence rate of all cancers per 100,000 population. 2014- 2018 Source: MoH, 2019

¹³ MOH (2019). Cancer Situation in the Gaza Strip. Facts & Figures

3.1.2. Common types of cancer

Breast cancer is the most common form of cancer, accounting for 18% of all cancers, followed by colorectal cancer (CRC) at 10.7%. Breast cancer is the most common form of cancer among women, representing 32.3% of all cases. CRC is the most common form of cancer among males, accounting for 13.2% of cases.

Cancer in females

Breast cancer is the most common type among females, accounting for 32.2% of cancer cases in women. Colorectal cancer is the second type, accounting for 9.1% of cases. Stomach cancer is the least common among women, accounting for 2.4% of cancer cases in women (MoH, 2019)¹⁴. Figure 5 shows the incidence percent of the most common ten cancers among females.

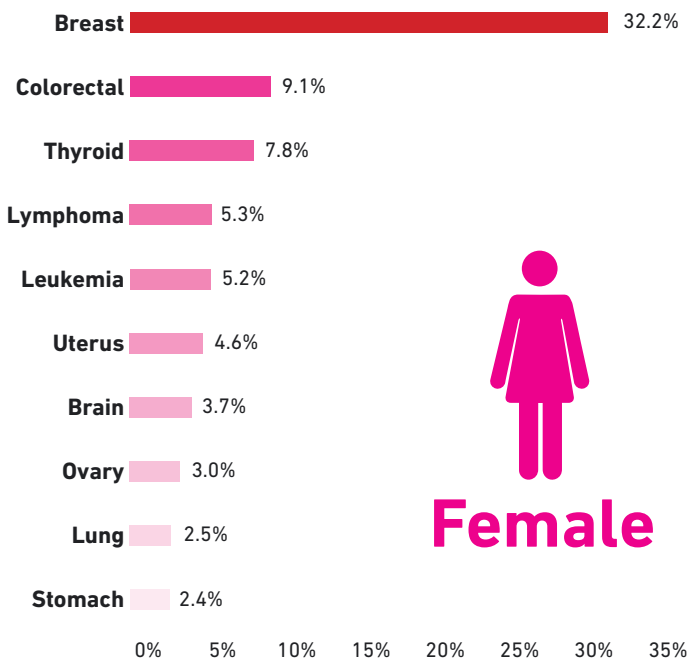


Figure 5: Percentage of the most common types of female cancers. Source: MoH 2019

Cancer in males

The most common type of cancer among males is colorectal cancer, accounting for 13.2% of male cancer cases. Lung cancer is the second most common, accounting for 11.4% of male cancer cases. Kidney cancer is the least common form among men, accounting for 2.2% of cancer cases (MoH, 2019)¹⁵. Figure 6 shows the incidence percent of the most common ten cancers among males.

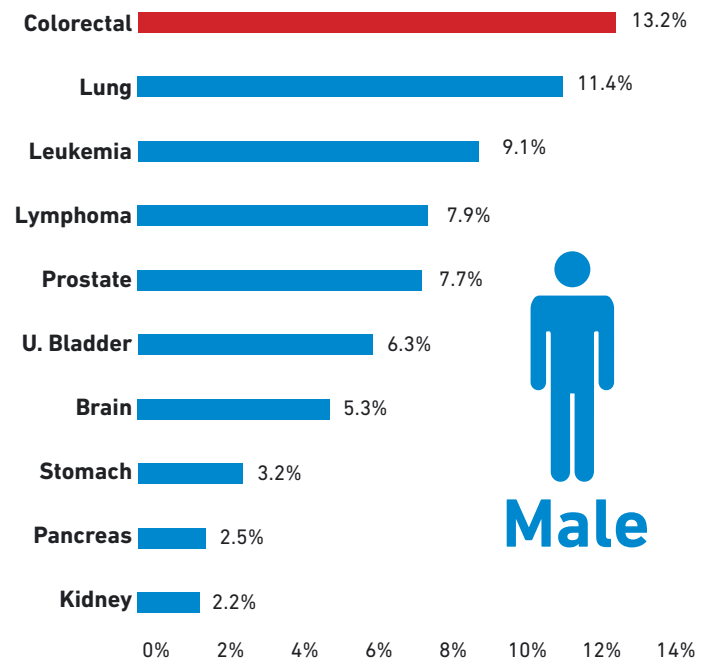


Figure 6: Percentage of the most common types of male cancers. Source: MoH 2019

¹⁴ MoH (2019).
¹⁵ MoH (2019).

Cancer in children

Leukemia is the most common form of cancer in children, accounting for 26.2% of cancer cases. Brain tumors are the second most common form of cancer in children at 17.1%. Bone tumors represent 16.8% of cancer cases in children (MoH, 2019)¹⁶. Figure 7 shows the incidence percent of the most common cancers among children.

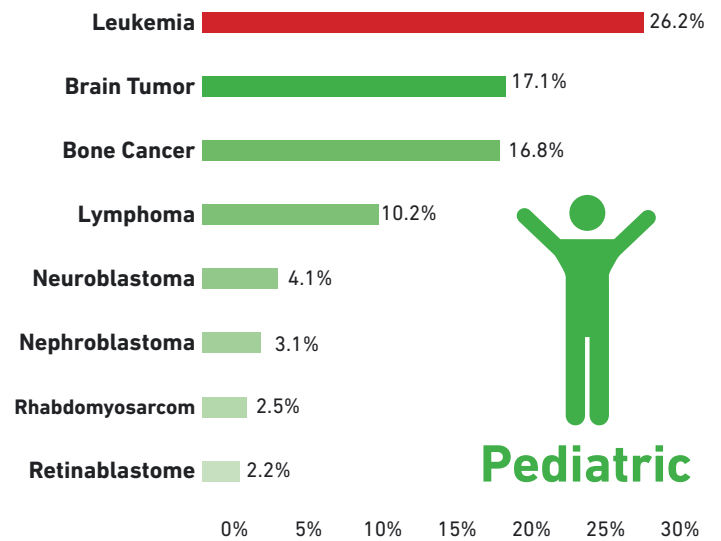


Figure 7: Percentage of the most common pediatric cancers. Source: MoH 2019

Cancer Patients at Rantisi, European Gaza Hospital, and Hayat Specialised Hospitals

Table 2 shows the number of cancer patients or hospital visits distributed by gender, age, and settings at Rantisi and Amal/European Gaza hospitals. The available registered number at Rantisi hospital reflects the current number of patients who receive cancer medications. The total number of children under treatment with cancer medications is 525 (228 female and 277 males). At the same time, the total number of adult cancer cases is 1813 (1170 females and 643 males).

Distribution by cancer types is not accessible. The director of the Information Technology department did not allow the consultant to access the patients' data. The staff member in charge of keeping patients' files at Amal hospital said, "We have no statistics for cancer patients. We are temporarily hosting the patients and the actual number at European Gaza Hospital".

The consultant found only the number of cancer patients' visits at the European Gaza Hospital, which was 8876 (6157 females and 2701 males).

Participants	Male	Female	Total	Settings	Time
Children ≤ 12 years with cancer (patients)	277	228	525	Rantisi Hospital	At time of study
Adult > 12 years with cancer (patients)	643	1170	1813	Rantisi Hospital	At time of study
Adult with cancer (number of visits)	2701	6175	8876	European Gaza H	1/1/2020 to 22/3/2021

Table 2: Current cancer patients distributed by gender, age, settings, and time

¹⁶ MoH (2019). Cancer Situation in the Gaza Strip. Facts & Figures

Table 3 shows the number of cancer patients at Hayat Specialized Hospital from April to December 2020 distributed by gender and cancer type. The Hayat Specialized Hospital director was highly cooperative and provide the consultant detailed information about cancer patients, as displayed in table 3. The study finds that Hayat Specialized Hospital is the only private hospital that includes chemotherapy and cancer medication for cancer patients.

	Cancer Type	Male	Female	Total
1	Breast Cancer	3	210	213
2	Prostate Cancer	137	0	137
3	Colon Cancer	19	22	41
4	Leukemia	41	0	41
5	Lung Cancer	26	0	26
6	Lymphoma	25	0	25
7	Brain tumor	13	3	16
8	Gastric cancer	5	7	12
9	Rectal Cancer	7	0	7
10	Urinary Bladder Cancer	6	0	6
11	Pancreatic Cancer	4	0	4
12	Larynx Cancer	2	0	2
13	Osteosarcoma	2	0	2
14	Nasopharyngeal Cancer	1	0	1
15	Skin Cancer	1	0	1
16	Testicular Cancer	1	0	1
17	Tongue Cancer	1	0	1
	Total	294	242	536

Table 3: Cancer cases statistics in Hayat Specialized Hospital: April - December 2020

The following table 4 shows the distribution of patients who are registered at Basmet Amal Association (Smile of Hope).

Gender	Children		Adults		Total	
	No.	%	No.	%	No.	%
Male	347	56%	1,128	36%	1,475	40%
Female	272	44%	1,975	64%	2,247	60%
Total	619		3,103		3,722	
		17%		83%		

Table 4: Cancer patients registered at Basmet Amal Association

Type of cancers among studied children

Currently, the study finds that the number of children with cancer aged under 12 years in Rantisi hospital is 525 (277 boys and 228 girls). The number of children's caregivers interviewed is 30. The underlying figure 8 displays the diagnosis of children's cancer. Acute lymphoblastic leukemia (ALL) is the most prevalent form of cancer in children (66.6% of cases). Nephroblastoma accounts for 13.3% of cancer cases in children, lymphoma accounts for 6.7%, reninoma accounts for 6.7% and adenocarcinoma accounts for 6.7%.

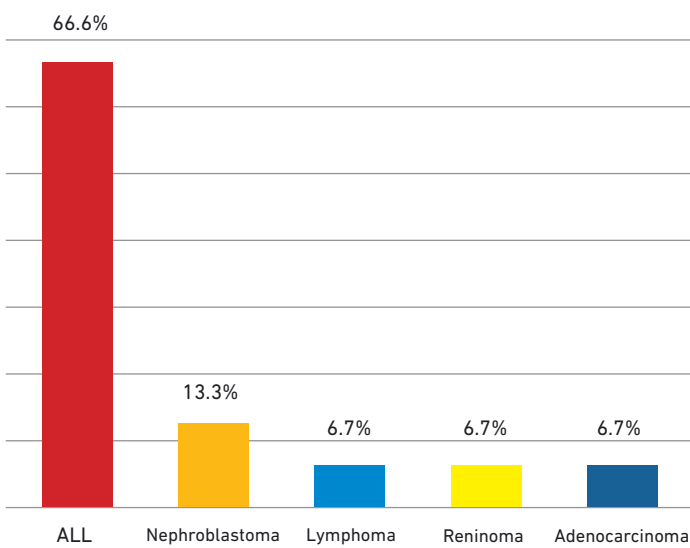


Figure 8: the Percentage and type of Cancer among Studied Children

The consultant reached and interviewed 60 adult cancer patients (30 male and 30 female).

The number of the adults with cancer (tumors and leukemia) is 2247 (836 males and 1384 females).

Type of cancer among studied adult males

One-third of adult males studied have colorectal cancer. 13.3%, have nasopharyngeal cancer 13.3% have pancreatic cancer, 13.3% have leukemia, 6.7% have lung cancer and 6.7% have liver cancer. Figure 9 also represents the percentages of other cancer types in males.

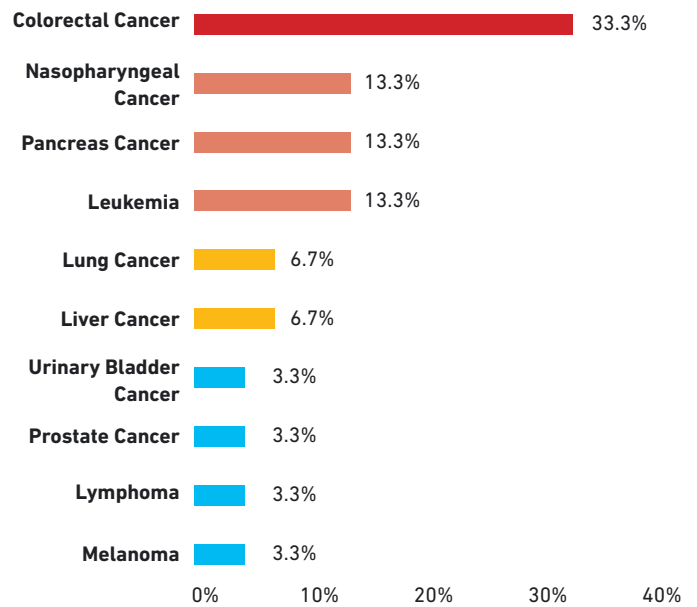


Figure 9: the Percentage and type of cancer among studied adult males

Type of cancers among studied adult females

Figure 10 displays the studied adult females with cancer. 60% have breast cancer, 20% have colorectal cancer while ovarian cancer accounts for 13.3%, lymphoma for 3.3% and stomach cancer accounts for 3.3%

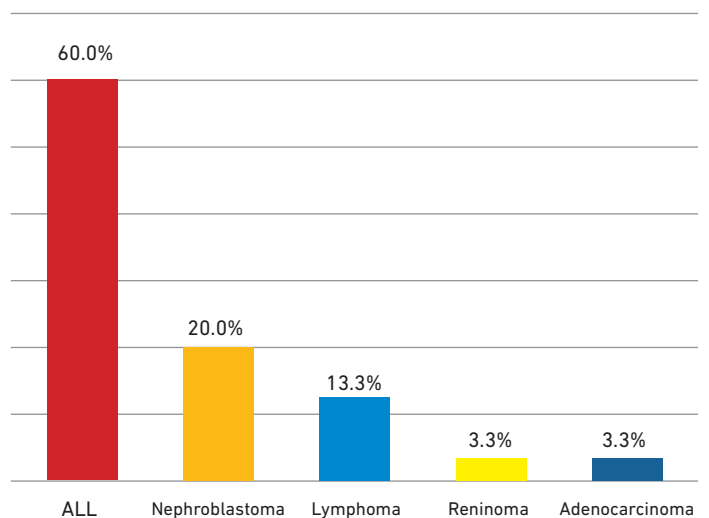


Figure 10: the Percentage and type of Cancer among Studied Adult Females

3.1.3. Patient adaptive behaviors

Cancer patients in the GS undergo a painful journey to cancer treatment. Services are fragmented, and patients face challenges finding a place to manage the case. They are not given answers to their questions regarding their pain, treatment, and consequences of the side-effects of treatment. Patients outside Gaza could not cover the travel expenses, and they suffer from Israeli checks on the border, delay of permission, and refusal without reasoning. All patients and their companions may be called for security interrogation as a prerequisite to permit processing.

The study identified different coping mechanisms the children’s caregivers used to relieve stress. Religious adult with cancer can cope with stress more than religious caregivers whose children have cancer, 98.3 % for the former and 86.7% for the latter. Other behaviours used to manage stress are shown in table 5.

#	Adaptive Behaviors	Caregivers (30)	Adult (60)
		No (%)	No (%)
1	Teaches the child or learns about the disease	16 (53.3)	34 (56.7)
2	Continue doing at least some of their usual daily activities	17 (56.7)	23 (38.3)
3	Checking emails	18 (60)	32 (53.3)
4	Using a cellphone to communicate with the hospital	24 (80)	26 (43.3)
5	Maintaining personal relationships (family and friends)	14 (46.7)	54 (90)
6	Spending time with other children and husband/wife	18 (60)	49 (81.7)
7	Finding out about support available to help them cope	9 (30)	38 (63.3)
8	A psychologist is helping them to cope	3 (10)	23 (38.3)
9	The caregiver/patient is religious, and find it easier to cope with the situation.	26 (86.7)	59 (98.3)

Table 5: Adaptive behaviors of caregivers and adult patients with cancer

Gender and age of children with cancer

The current study conducted 30 face-to-face interviews with children with cancer and their caregivers. Children interviewed under the age of five represent 40%, and the average age of interviewed children is 5.72 ±2.8 (minimum three years and maximum 12 years. Table 5: shows that male children represent 53.3% and female children represent 46.7% (Table 6).

Characteristics	No (%)	Characteristics	No (%)
Gender		Age	
Male	16 (53.3)	Under 5	14 (40)
Female	14 (46.7)	≥ Five	16 (60)

Table 6: Gender and age of Studied Children (Total 30)

3.1.4. Socioeconomic situation of patients

Based on the current study findings, about two-thirds of patients are refugees, which is the same percentage of refugees in the GS. The poverty rate among studied families is 81.1%. Only 10% of patients live in rural areas, 26.7% in refugee camps, and 68.3% in urban areas. Table 7 shows other socioeconomic characteristics.

Characteristics	No. (%)	Characteristics	No. (%)
Poverty (< \$1.9/capita/day)*		Refugee Status	
Not poor	17 (18.9)	Refugee	60 (66.7)
Poor	73 (81.1)	Non-refugee	30 (33.3)
Governorate		Marital Status	
North	15 (16.7)	Single	9 (10)
Gaza	36 (40)	Married	68 (75.6)
Middle	17 (18.8)	Divorced	1 (1.1)
Khan Younis	11 (12.2)	Widowed	11 (12.2)
Rafah	11 (12.2)	Seperated	1 (1.1)
Geo-locality		Type of house	
Urban	76 (63.3)	Asbestos	12 (10)
Rural	12 (10)	Zinco	18 (15)
Camp	32 (26.7)	Cement	90 (75)
Father/Husband Education		Mother/Mother Education	
Illiterate	6 (7.1)	Illiterate	4 (4.4)
Primary	16 (18.8)	Primary	11 (12.2)
Preparatory	17 (20)	Preparatory	15 (16.7)
Secondary	25 (29.4)	Secondary	33 (36.7)
University	21 (24.7)	University	26 (28.9)
Father/Husband Occupation		Mother/Wife Occupation	
Not working	36 (42.4)	Housewife	80 (88.9)
Skilled & unskilled worker	34 (40)	Unskilled manual worker	3 (3.3)
Trade/business	1 (1.2)	Trade/business	1 (1.1)
Semi-professional	14 (16.5)	Semi-professional	5 (5.6)
Female headed family		Family bedridden member	
Yes	11 (12.2)	Yes	22 (24.4)
No	79 (87.8)	No	68 (75.6)

* <https://www.worldbank.org/en/topic/poverty/overview>

Table 7: Socioeconomic Situation of Patients with Cancer (Total 90)

About one-fifth (22.2%) of studied cancer patients can cover part of their medication, transportation, and accommodation costs. The average price they could cover was NIS 8038.1. However, the others could not cover these expenses at all. Even though most

patients are poor, many patients said they paid to have a biopsy and paid for pathology analysis. Half of the children’s caregivers also complain of discontinuation of treatment, and said there is a shortage in psychosocial support (PSS) and nutrition services.

3.1.5. Environmental pollution and residential places of patients

The underlying table 8 shows the environmental pollution that patients are exposed to.

Environmental Risk	No (%)	Environmental Risk	No (%)
House close to dumping places	50 (55.6)	House close to a sewage plant	32 (35.6)
House close to a power plant	35 (38.9)	House close to tiles factory	17 (18.9)
House close to a marble factory	18 (20)	House close to a painting factory	33 (36.7)
House close to a battery factory	35 (38.9)	Smoking	57 (63.3)

Table 8: Patients' Residential Place and Environmental Health (Total 90)

The study also reveals that 26.7%, 90% and 60% of children's families having bedridden members, chronic disease members, and cancer members, respectively. Children with blood group O represent 73.3%, blood group A represent 20% and those with blood group B represent 6.7%. Children's mothers gave a history of taking drugs during pregnancy of the child.

3.1.6. Gestational and birth history of children with cancer

The underlying table 9 shows the gestational age and birth history of children with cancer. The studies show the percentages of children exposed to cancer risk factors including In Vitro Fertilization (23.3%), preterm (30%), mothers taking drugs during pregnancy (76.7%), and those exposed to x-rays (23.3%).

Characteristics	No (%)	Characteristics	No (%)
In Vitro Fertilization	7 (23.3)	Preterm (< 37 weeks gestation)	9 (30)
Low birth weight (<2.5 kg)	11 (36.7)	Mother contracts an infection while pregnant	23 (76.7)
The child admitted to the Neonatal Intensive Care Unit	9 (30)	Exposure to x-ray during pregnancy	7 (23.3)

Table 9: Gestational and Birth History of the Children with Cancer (Total 30)

3.2. Health insurance

Compared to other countries, cancer patients in the GS receive treatment without possessing health insurance. Patients diagnosed with cancer receive the diagnostic services and treatment free, and are exempt from payment. The Palestinian government health insurance program covers basic cancer chemotherapy and radiotherapy for Palestinians with cancer in public hospitals in Gaza, and in those hospitals outside of Gaza to which they have been referred. At the same time, UNRWA sponsors the care of cancer patients by covering the cost of enrolling them in the government-funded health scheme (Rand, 2007)¹⁷.

The number of families possessing health insurance reached 227,642 by the end of 2019. This includes 117,368 health insurance systems and 110,274 free health insurance for those in poverty, disabled persons, and people with deteriorated social conditions (MoH, 2020)¹⁸. According to the latest report issued by the Health Insurance Unit at the MoH in 2020, about 100,000 health insurance plans were issued and renewed, which indicates that the number of insured families in the Gaza Strip increased to more than 210,000 families. The same report suggests that some categories were listed under the category of free insurance. Among these categories are more than 64,000 laborers, in addition to more than 700 health insurance for the Israeli occupation prisoners' families', graduate, and marginalized groups (MoH, 2021)¹⁹.

3.3. Health Information System

A Health Information System (HIS) refers to a system designed to manage healthcare data. This system handles data related to providers' activities, patients' personal and medical data, and health organisations. The health system aims to set priorities in health conditions and help health policymakers and planners make the right decisions in favour of patients' outcomes, and prevent duplication of services among different health providers.

"We develop our needed software; at the IT unit, there is a team of IT specialists consist of 115 (22 female and 93 male). "We have a shortage of computers and networks", says The director of the Information Technology (IT) unit.

However, the IT unit director did not permit the consultant to access cancer patients' data.

"We use mixed-method, paper, and paperless during our work. We do not completely depend on the electronic method". The director of women's health said: "There is a lack of a database for breast cancer screening. Some women exposed to mammogram twice per year in different locations while others could not get access", says The pediatric Oncology Director.

Cancer registry

A cancer registry is an information system designed for collecting, storing, and managing data on cancer patients. It provides population-based data that monitors geographic variation and changes in risk factors, survival rates, morbidity, and mortality over long periods (National Cancer Institute, 2021)²⁰.

"The cancer registry is not well-developed, and the system needs a lot more, and for the quality, it is self-propelled", says IT Specialist.

¹⁷ RAND Corporation (2007) Building a Successful Palestinian State <https://www.rand.org/pubs/monographs/MG146-1.html>

¹⁸ MoH (2020). Annual Report. Health Department PHIC

¹⁹ MoH (2021). Health Insurance. <http://www.moh.gov.ps/portal/about-100000-health-insurance-issued-by-the-ministry-of-health-gaza-during-2020/> accessed on March 8, 2021

²⁰ National Cancer Institute (2021). https://seer.cancer.gov/registries/cancer_registry/index.html

3.4. Hospitals providing health services for cancer patients

During the interview, the pediatric oncology department director pointed out that Dr. Musa and Suhaila’s Pediatric Cancer consists of: two wards, 16 rooms, 16 beds for inpatients and 12 daycare beds as well as a playroom, lab, pharmacy, and many other amenities. PCRf opened Dr. Musa and Suhaila Nasir Pediatric Cancer Department in Gaza in February 2019. It is the first and only pediatric oncology department for children in the Gaza Strip.

“There are two pediatric oncologists and a hematologist, and one experienced general practitioner; the majority of nurses are volunteers or temporarily employed by job creation program. There is a shortage in the number of nurses: 18 nurses cover the two pediatric departments and we need a further five nurses.

“Dr. Musa and Suhaila Pediatric Cancer Department was founded and established by PCRf. The latter is a strategic partner contributing significantly in providing cancer medication for children with cancer”.

Adult Oncology department in Rantisi hospital

An interview with the consultant oncologist at the adult oncology department in Rantisi hospital revealed that there was only three oncologists in the oncology department. The department includes 13 rooms equipped with 30 beds. There are 16 nurses, eight at the women’s ward and eight at the male’s ward. The oncologists work three days per week (Sunday, Monday, and Wednesday) for outpatient clinics and daily for inpatients.

Table 10 shows the number of rooms and beds at oncology departments in different hospitals. Compared to the number of cancer patients, these facilities are inadequate, affecting the comfort and privacy of patients and quality of care, This also increases the spread of infection among the immunocompromised cancer patients.

Hospital	Inpatient care Department		Daycare Department		Comments
	No. of rooms	No. of beds	No. of rooms	No. of beds	
Al Shifa	0	0	0	0	Under construction
Rantisi Children	16	16	Hall	12	
Rantisi Adult	13	30	0	0	
European Gaza H.	7	29	4	30	Temporary suspended
Amal Hospital	8	25	0	0	
Al Hayat	10	22	Hall	18	
Total	54	102	4 & 2halls	60	

Table 10: Distribution of rooms and beds in oncology departments in the Gaza Strip

Surgical Department in Shifa Hospital

“The number of newly diagnosed patients with cancer is 120 per month, but not all need surgical interventions. We conducted about eight operations for cancer patients monthly, and we also conduct palliative surgery. Regarding the number of surgical staff, they are sufficient—however, the quality and the department need specialised oncosurgeons. In our surgical department, there is no operating room and ward for cancer surgery. Consequently, the cancer patients need to wait for more than one month for surgery”, says Director of Surgical Department from Shifa Hospital.

The same source said, *“We could not do preservative surgery because there is no radioisotope and radiotherapy and some patients denied by the Israeli side to be referred; we are forced to do radical surgery to keep the life of patients.”* He pointed to two committees, the first for breast cancer and the second in coordination with MAP UK for CRC surgery. *“There is no reconstructive surgery, and the services are fragmented with no PSS or nutrition support. We face difficulties in coordination with PHC. Regarding the radiological diagnosis we usually receive, the problem is a shortage of radiologists who have subspecialties”, he adds.*

Pathology Department in Shifa Hospital

“The pathology lab in Shifa is partially collapsed, and the employee safety is in danger. The side photos display the lab ceiling and walls, the number of pathologists is at the minimum of international standards- there are seven pathologists in the GS, and three out of them are working in Shifa pathology lab”, says Pathologist from Shifa Hospital.

He pointed out that the pathology lab includes four microscopes, two processing machines, one staining machine, one embedding machine, one automated immune-stainer, and one microtome, and one non-functional frozen section nonfunctional decalcifier due to scarcity of materials.



“All equipment, materials and medical supplies are available. However, sometimes, there is a shortage of materials. There is a shortage of materials for the immunostainer, which means there is no backup for the equipment. In case of stoppage of equipment, we do not have an alternative. We require a refrigerator to keep the staining materials.

“The average time of pathology report delivery is two weeks, some cases delivered after one week, and rarely after three weeks in case of bone biopsy. We have an appointment system. Some stains like immunostaining take longer because the used materials are expensive and carcinogenic. The staff works just two days in immunostaining- we try to develop the pathology lab by introducing new technology as molecular pathology, which needs new equipment, new materials, and staff training. We also hope to establish the immune-histology from manual to automated one.

“Gaza is in need of a pediatric pathology department as it is entirely different from the general pathology lab. Pathologists need to be subspecialized in pediatric pathology.

To develop MDTs for all types of cancer, now there is breast cancer MDT, and the CRC in process, develop pediatric cancer Multidisciplinary team”, pathologist from Shifa hospital says.

Radiological department in Shifa Hospital

“The radiological department in Shifa hospital is operated by 28 doctors (4 consultant radiologists, six specialists, two general practitioners, 16 residents on-duty doctors), 65 technicians, two nurses, and eleven secretaries. At the radiological department, there are seven basic x-rays (six functional and one nonfunctional), five functional ultrasound, one digital mammogram, two CT scanners (1 functional and one nonfunctional), one functional MRI and two fluoroscopies (functional and one nonfunctional), says” Dr. kamal Jaber, Director of the radiology department in Shifa hospital.

“We are not satisfied with the offered services to the patients as the few equipment types than patients’ needs. Consequently, the delivery of radiological reports for patients sometimes takes a long time. The number of technical staff is sufficient and suitable when compared with the number of patients. However, there is an extreme shortage in the number of radiologists compared to the number of patients. The writing of radiology reports for cancer patients needs a well-experienced radiologist. At the department, there is only six radiologists on whom we depend for radiological diagnosis. The other doctors are under training”, says Radiological Department Director.

He recommends sending doctors for training on subspecialties. He adds that there are private centers for radiological diagnosis, but it is not organised. All the diagnostic radiological services are available in Gaza except the PET scan and radioisotopes. Gaza is under siege and it is difficult to import the radioactive substances, because of their dual-use and the radioisotopes’ short life.

“Political reasons are hindering the entrance of the radioactive substances in Gaza. The patients, are sometimes obliged to seek radiological services outside MoH because of the shortage of staff and equipment and the time taken for maintenance of nonfunctional equipment. To cope with these problems, MoH or UNRWA purchase the service from the private sector but for a limited number of cases”, he adds.

He also adds that there is a long waiting time for patients because they have only one MRI for Gaza and North governorate (more than one million people). The MRI can serve 20 patients per day. Out of the 20 patients, five are cancer patients. This leads to a long waiting list. The report takes an average of six days to be delivered to the patient.

Nasser Medical Complex (NMC)

“Currently, new cancer cases are diagnosed at NMC and followed up at Amal hospital. The radiology department’s professional staff consists of nine radiologists, eight males and one female, and 20 technicians. The department includes one analog mammogram, three basic x-rays (one is nonfunctional). It also includes one CT scan, three ultrasounds (two are nonfunctional), nonfunctional panorama, and fluoroscopy). The narrow department that could not accommodate the needed equipment. Upgrading the department requires two basic digital x-rays, two colored Doppler ultrasounds, 1 CT scan, 1 MRI, one digital mammogram, and one digital panorama”, says the Radiology Consultant at NMC.

“There are seven certified surgeons in the surgical departments in NMC. They complain of a shortage of staff and experienced staff with subspecialties. The department requires ECRP equipment, accessory for the laparoscope, harmonic equipment, endo-stapler and staples, articulate stapler, facilities of the frozen section”, says the consultant surgeon he adds.

Al Amal Hospital at PRCS

“The oncology services for adult cancer patients were transferred from EGH to Al Amal hospital. The oncology department includes eight rooms with 25 beds in the inpatient ward, and the ward needs further ten beds. The staff consists of four oncologists, and one has experience but not certified. The hospital oncologists examine 50- 60 patients per day; working days for the outpatient are Sunday and Tuesday. In 2020, the number of cancer patients’ visits was 7000”. However, the EGH about cancer patients was only 8876 visits (6175 females and 2701 males)”, says Consultant Oncologist at Amal Hospital.

European Gaza Hospital (EGH)

Because of the outbreak of Covid-19, the EGH was equipped to receive infected cases. In this context, the oncology services provided at the EGH have been transferred to Amal hospital in PRCS, and the radiological and surgical services have been transferred to the Nasser Medical Complex.

“There are 12 radiologists at EGH, 35 radiology technicians and 28 surgeons. The Nasser Medical Complex provides health services to these patients, indicating that the medical staff of the EGH, including doctors, nurses, and administrators, has been integrated, and work in the Nasser Medical Complex”, says a consultant surgeon at NMC.

Hayat Specialized Hospital (HSH)

“HSH is a private hospital in the Gaza Strip. It consists of 1000 square meters for the oncology department, 1000 square meter for the surgical department, and 1000 square meter for endoscopies. The oncology department was licensed in 2017, and we started to provide cancer medication in March 2019. We provide clinical diagnosis, radiological diagnosis, endoscopic examination, taking the biopsy for cancer patients, sending the biopsy to Sham pathology center for diagnosis, occasionally providing PSS and nutrition services, and providing cancer medications. In addition, we conduct surgical operations for cancer patients. The hospital contains ten rooms with 22 beds in the inpatient department, four beds, and 14 chairs in the outpatient department. The number of unique patients who attended HSH from April 2020 to December 2020 is 536 (294 male and 242 female). However, the number of beneficiaries (visits) in outpatient is 1808 and in inpatient is 1538”, says the Chairman for the hospital’s Board of Directors.

3.5. Cancer care team

In this section, we reviewed the workforce who are offering healthcare services and support for cancer patients in the GS. This shortage in the workforce increases the burden and pressure on staff, particularly due to the increase in the number of cancer patients in the Gaza Strip. This strain on staff will increase the number of medical errors and decrease the quality of care and treatment plan provided to patients.

Oncologists:

The mapping study finds that in total there are eight oncologists in Gaza for treating cancer patients. There are five oncologists in Rantisi hospital (two pediatric oncologists and three adult oncologists). There are three oncologists at Amal hospital, and four at HSH (one oncologist and three part-time). The oncologists in the GS represent 0.4 per 100,000 population, compared to 0.7 per 100,000 in Turkey and 13.1 per 100,000 in the UK (Statistica, 2018)²¹. The shortage of human resources is not restricted to oncologists, but it also includes pathologists, radiologists, psychologists, and nutritionists.

Pathologists:

Pathologists are considered the core in the confirmative diagnosis of cancer on which a management plan is built. The mapping study finds that there are seven pathologists in the GS: Six at governmental hospitals and one at a private lab. All pathologists in the GS represent about 0.35 per 100,000.

In Germany, there is 2.1 pathologist per 100,000 inhabitants.

The density of pathologists in Germany to the population is the second-lowest in Europe (Märkl et al., 2020)²².

Radiologists:

The mapping study finds that there are 18 radiologists in the four governmental hospitals who serve all patients(not only cancer patients), representing about 0.9 per 100,000. The UK had an estimated 4.8 consultant radiologists per 100,000 people and seven radiologists (including trainees) per 100,000 people. This is one of the lowest in Europe and compares to a mean of 12 radiologists per 100,000 population for Western Europe (GE Healthcare Partners, 2018)²³. However, a consultant radiologist at PRCS said that *“the number of the radiologist is sufficient compared to the number of patients attending the PRCS center. We have a network partner, we are implementing a breast screening program with UNRWA, and we are also partnering with a woman’s health center in the Bureij refugee camp. We conduct radiological diagnosis, take a biopsy, make a pathological diagnosis, then the patient referred to the oncologist. In HSH, almost all of the radiologists are part-time. Also, the radiologist at AAH is part-time, and the technician has a full-time job.*

²¹ Statistica (2018). A number of oncologists per one million people in select countries as of 2018.

²² Märkl et al. (2020). Number of pathologists in Germany: comparison with European countries, USA, and Canada

²³ GE Healthcare Partners (2018). Aligning demand and capacity in a changing healthcare environment. Accessed on February 9, 2021

Radiotherapists, medical physicist, and nuclear medicine specialist

There are two radiotherapists in the Gaza Strip: the first working in Al Shifa hospital and the second in Al Rantisi hospital. In addition, three medical physicists and one nuclear medicine specialist is available in Gaza.

Nutritionist

Healthy nutrition is part of cancer patients' treatment because both the illness and its treatment can affect a patient's appetite and have other side effects. Both cancer and cancer treatments can also negatively affect on patient's body's ability to tolerate certain foods and use nutrients. Nutrition therapy is used to support cancer patients to preserve their health. However, there are no nutritionists for cancer patients in GS hospitals. There are two part-time nutritionists at HSH occasionally available to provide nutrition services for cancer patients. Table 11 shows how the workforce is distributed in hospitals.

	Shifa	EGH Amal	NMC	Rantisi	Indonesian	Hayat	AAH	PRCS	Total
Oncologist	0	3	0	5	0	4 (3*)	0	0	12
Pathologist	3	1	2	0	0	0	1*	1*	6
Radiologist	6	12	9	2	1	5*	1*	3	33
Radiotherapist	1	0	0	1	0	0	0	0	2
Nuclear medicine	1	0	0	0	0	0	0	0	1
Medical physicist	3	0	0	0	0	0	0	0	3
Surgeons	43	28	7	0	4	6*	4	0	86
Psychologist	0	0	0	1	0	2*	0	0	1
Nutritionist	0	0	0	0	0	2*	0	0	0
Total	57	44	18	9	5	1	4	3	144

*Part-time

Table 11: Cancer Care Team distributed by sectors

Psychologist

Apart from Dr. Musa and Suhaila from the pediatric oncology department, the mapping study discovers that no other governmental facility provides psychosocial support for cancer patients. Some NGOs and CBOs provide PSS to cancer patients.

3.6. Cancer prevention

It is not usually possible to know exactly why one person develops cancer and another does not. However, research has shown that certain risk factors may increase a person's chances of developing cancer. People can do things that reduce the risk of developing cancer while some risk factors such as family history, genetic changes and cancer, and hereditary cancer syndromes are unavoidable. Controlling the avoidable cancer risk factors is considered an effective way to prevent cancer. Promoting a healthy diet, increasing physical activity, reducing weight, and avoiding exposure to hazardous materials like smoking, asbestos, or excessive sun exposure could eventually reduce cases of cancer.

The following three definitions typically categorise prevention activities:

1. Primary prevention: Intervening before health effects occur, through measures such as vaccinations, altering risky behaviors (poor eating habits, tobacco use), and banning substances known to be associated with a disease or health condition.
2. Secondary prevention: Screening to identify diseases in the earliest stages, before the onset of signs and symptoms, through mammography and fecal occult blood test measures.
3. Tertiary prevention: Managing disease post-diagnosis to slow or stop disease progression through chemotherapy and rehabilitation measures. Cancer management can be effective when it starts prevention, including health education and promotion to the healthy population and those living with a cancer diagnosis after their treatment, in addition to regular screening programs to detect the disease early.

Primary preventive services:

"The MoH activities towards cancer prevention is based around community awareness on breast health in MoH health facilities and coordinating with 25 CBOs partners. This awareness is usually conducted through video films, information, education, and communication (IEC) materials. Social events and world health days, and the distribution of booklet and brochures . We are part of a global tobacco survey, a tobacco-free initiative", says Director of Health Education and Promotion for the MoH.

The MoH has a significant role in the national breast cancer and colorectal cancer committees. Table 12 shows beneficiaries of preventive services.

Services	No. of beneficiaries annually (average)				Target area
	Adult male	Adult female	Children	Total	
Ahli Arab Hospital					
Breast-Self Exam	0	3243	0	3243	Gaza Strip
Basmet Amal					
Breast-Self Exam	0	1380	0	1380	Gaza Strip
Health Education*	530	820	491	1841	
Sport Sessions	0	331	577	908	
Nutrition Education	259	463	245	967	
Palestinian Society for the care of cancer patients					
Breast-Self Exam	0	413	0		Middle

*supportive education for children with cancer, Hebrew language courses, recitation courses, handcrafts courses
 Table 12: accessed number of beneficiaries to preventive services (Health education programs)

3.7. Early detection services

The World Health Organization (WHO) has defined two distinct but related strategies to promote the early detection of cancer: early diagnosis, which is the recognition of symptomatic cancer at an early stage, and screening, which is the identification of asymptomatic disease in a target population of apparently healthy individuals. Figure 11 displays the difference between diagnosis and screening.

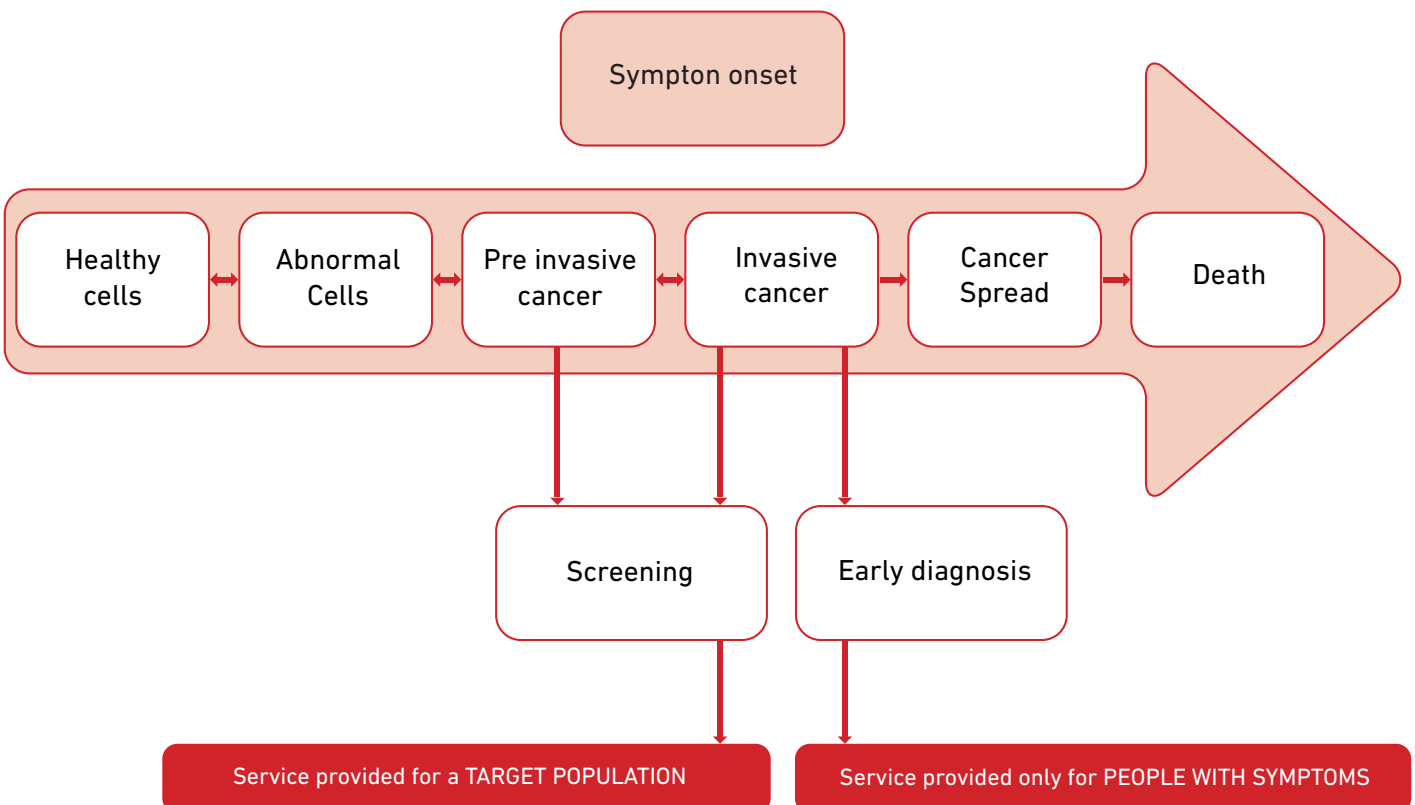


Figure 11: Distinguishing early diagnosis from screening

3.7.1. Screening

Screening of breast cancer, colorectal cancer, and prostate cancer

Screening of breast cancer

Palestinian MoH Strategic plan 2021- 2025 includes early detection and intervention of breast cancer and colorectal cancer. However, no clear national screening guidelines are available in the GS. The only screening for early detection of cancer in the GS is the screening of breast cancer. The study did not find any governmental or NGOs that run screening programs to detect cancer other than breast cancer. However, there is no national program for breast cancer screening, and the provided breast screening is fragmented and duplicated. The machine used for screening is the mammogram. In the Gaza Strip, a well-organised national mammography screening program is unavailable. Routine breast screening is provided to women aged 40 years, and women with risk factors at age 35. Biennial screening mammography is recommended for women aged 50 to 74 years. The decision to start screening mammography in women prior to age 50 years should be an individual one. Women who place a higher value on the potential benefit than the potential risks may choose to begin biennial screening between the ages of 40 and 49 years (AAFP, 2017)²⁴ There are two types of mammography: analog and digital. Table 13 clarifies the national screening services compared with Israel and the United States of America.

Gaza Strip	Israel	United States of America	Recommended to GS
The national mammography screening program is not available in Gaza (in progress). However, it starts early as age 40	Israel runs a National Mammography Screening Program for women between the ages of 50-74 (Israel Cancer Association, 2021) ²⁵	All women should begin having yearly mammograms by age 45 and change to having mammograms every other year beginning at age 55. Women should choose to start screening with yearly mammograms as early as age 40 (American Cancer Society, 2021) ²⁶ .	The recommends biennial screening mammography for women aged 50 to 74 years. The decision to start screening mammography in women prior to age 50 years should be an individual one. years (AAFP, 2017) ²⁷

Table 13: Comparing features of breast cancer screening program

²⁴ American Academy of Family Physicians (2017). Summary of Recommendations for Clinical Preventive Services

²⁵ Israel Cancer Association (2021). National Program for Early Detection of Colorectal Cancer https://en.cancer.org.il/template_e/default.aspx?PageId=7747

²⁶ American Cancer Society (2021). American Cancer Society Breast Cancer Screening Guideline <https://www.cancer.org/latest-news/special-coverage/american-cancer-society-breast-cancer-screening>

²⁷ American Academy of Family Physicians (2017). Summary of Recommendations for Clinical Preventive Services

3.7.2. Mammogram machine

Currently, there are 17 mammography machines available in Gaza. Only four are available for screening, and the other thirteen for diagnostic services. A private appointment costs NIS 50-60 in Gaza, which is too expensive for many women in an economy where 50% of people live in poverty. Table 14 displays the type of mammography distributed by sector and functionality.

Sector	Number	Type	Functionality	Use
Governmental Hospital and Clinic				
Rimal PHC center	1	Digital	Good function	Screening
Al Shifa Hospital	1	Digital	Good function	Diagnostic
Nasser Medical Complex	1	Analog	Good function	Diagnostic
Indonesian Hospital	1	Analog	Nonfunctional	Diagnostic
Palestine Turkey Friendship H.	1	Digital	Good function	Diagnostic
Semi and NGOs				
Ahli Arab Hospital	2	Digital & Analog	Good function	Screening
Al Quds	1	Analog	Good function	Screening
Al Awda	1	Analog	Good function	Diagnostic
Palestinian Red Crescent Society	1	Analog	Good function	Screening
Patient's Friends' Society	1	Analog	Good function	Diagnostic
Private				
Ajjour center	1	Analog	Good function	Diagnostic
Al Hayat Hospital	2	Analog	Nonfunctional	Diagnostic
Al Helou International Hospital	1	Analog	Good function	Diagnostic
Gaza diagnostic Center	1	Analog	Good function	Diagnostic
Gaza Scan	1	Digital	Good function	Diagnostic
Total	17			

Table 14: Mammogram Machine Distributed by Sector, Type, and Functionality

Figure 12 displays the geographical distribution of mammography machines

- Four in the governmental hospitals, one nonfunctional
- Six in the private hospitals and centers, two nonfunctional
- Six in the semi and non-governmental hospitals.

In 2019, at MoH facilities, 1,504 mammograms were conducted, while 6,253 mammograms at NGOs (MoH, 2020)²⁸.

“We have a mammogram, and a well-trained female doctor with three female technicians conducting screening for women. In 2019, we usually conduct 15 mammograms per day. In 2020, the service was suspended from contributing to the mitigating spread of COVID- 19.

We also have at the screening unit ultrasound to examine the suspected cases”, says The director of Women’s Health for the technical committee on early detection of breast cancer.

Out of the 17 mammograms in the Gaza Strip, only four used for screening are present in Rimal PHC center, PMRS, AAH, and Al Quds hospital. This represents 0.7 devices per 100,000 population, which is very low compared to other countries like Turkey (1.9 mammogram devices per 100,000 population), USA (65.3 devices per 100,000 populations) (OECD, 2019)²⁹.

MoH usually runs mammography at hospitals for at-risk women. The estimated number of females living in the GS was 1.01 million in 2020 (PCBS, 2020)³⁰. Women aged 40 years and older represent 9.4% of females (MoH, 2017)³¹. Therefore, the number of women aged 40 years and older was 94,940 and all of them are at average risk.

Every mammogram machine capacity is performing 15 mammogram per day. The working days per month is 22 days (five days per week). So, the machine can perform 330 mammogram per month. Therefore, the machine capacity is 3960 mammogram per year (330*12). There are 18 mammogram machine in Gaza, so the capacity of all machine to perform mammograms is 71,280 (3960*18)

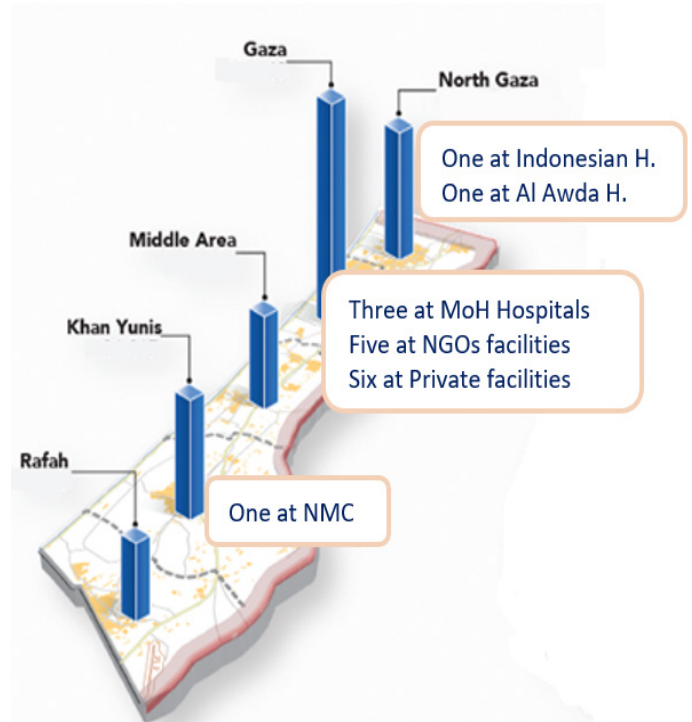


Figure 12: Geographical Distribution of Mammography

²⁸ MoH (2020). Health Annual Report. PHIC

²⁹ Organization for Economic Co-operation and Development [OECD] (2021), Mammography machines (indicator). doi: 10.1787/685c9c5e-en (Accessed on 13 February 2021)

³⁰ PCBS (2020). On the Occasion of the International Population Day 11/07/2020

³¹ MoH (2017). Health Annual Report

Screening of colorectal cancer

- There is no national program for the screening of colorectal cancer and there is a need to establish a national committee of colorectal cancer which will conduct colorectal cancer screening for everyone aged 50 years and older using the Fecal Occult Blood Test (FOBT). People will be called for a colonoscopy to look for cancer or other small growths if the initial FOBT is positive.

Gaza Strip	Israel	United States of America	Recommended to GS
National CRC screening program is not available in Gaza	Every individual over 50 is summoned to undergo a Fecal Occult Blood Test. Patients at high risk are entitled to a colonoscopy examination, according to their primary physician's recommendation.	CRC cancer guideline screening recommends that average-risk adults aged 45 years and older undergo regular screening with either a Fecal Occult Blood Test or a visual exam, based on personal preferences. All positive results on the Fecal Occult Blood Test should be followed up with a colonoscopy. Yearly Fecal Occult Blood Test Flexible Sigmoidoscopy every five years Colonoscopy every ten years (American Cancer Society, 2018) ³²	Conduct colorectal cancer screening for everyone aged 50 years and older using the Fecal Occult Blood Test (FOBT). People will be called for a colonoscopy to look for cancer or other small growths if the initial FOBT is positive

Table 15: Comparing features of CRC screening program

Screening of prostate cancer

Prostate cancer represents 7.7% of male cancers. The number of males with cancer 2018 was 787, and prostate cancer represented 60 patients in the same year. Prostate-specific antigen (PSA) is the test used for screening of prostate cancer. We must run discussions with men age 50 with at least a 10-year life expectancy and then periodically. If PSA is 2.5 ng/ml or greater, testing should be repeated yearly. Men with a PSA of less than 2.5 ng/ml may be tested every other year. The digital rectal exam (DRE) may also be done as a part of screening.

³² American Cancer Society (2018). Colorectal Cancer Screening Guidelines <https://www.cancer.org/health-care-professionals>

3.7.3. Clinical diagnosis

A clinical examination of a patient suspected of having cancer is a crucial first step in diagnosis and treatment plans. The diagnosis process needs multidisciplinary efforts, which include a good referral process and timely coordination of services. A medical history, a clinical exam, imaging studies, biopsy of lesions, pathology studies initiate the treatment plan. The study revealed that late diagnosis occurs because of inadequate coordination.

The study finds that a delay in the diagnosis and management of cancer patients. The causes of this delay are:

- Hundreds of new cancer cases are waiting for clinical diagnosis, radiological diagnosis, and pathological diagnosis. This process usually takes months while every day counts. Delay of diagnosis leads to cancer spread, where it becomes inoperable and not responding appropriately to treatment.
- The shortage in highly sophisticated diagnostic and intervention equipment and facilities
- Unavailability of radiotherapy and radioisotopes in the Gaza Strip
- Israeli blockade hinders cancer patients from leaving for diagnosis and treatment abroad
- Barriers to cancer-seeking behavior, the patients are afraid of unexpected results, or fearful of social stigma, or emerging family problems (the husband may remarry if his wife has breast cancer).

Cancer patients in Gaza undergo a painful journey to cancer treatment, finding it difficult to find somewhere to manage their case, and not finding answers to many of their questions regarding their pain, treatment, and the side-effect of treatment, as well as sufficient nutritional counseling and psychosocial support. Being referred outside of Gaza for treatment means extensive travel costs and continued suffering from Israeli denials, delays, and security checks.

3.8. Confirmatory diagnostic services

The diagnosis process needs a multidisciplinary team’s efforts with timely coordination of services. It starts with the evaluation of the patient complaint, medical history, and clinical examination

3.8.1. Ultrasound

The study found 45-ultrasound machine all over the Gaza Strip (Table 15). UNRWA PHC clinics include 22 ultrasound machines for antenatal care, not used for breast mammography.

Sector	Number		Number
Governmental Hospital and Clinic		Semi and NGOs	
Al Shifa Hospital	5	Ahli Arab Hospital	3
Al Rimal PHC	1	Al Awda Hospital	4
European Gaza H.	2	Al Quds Hospital	4
Nasser Medical Complex	2	Patients Friends Society	3
Al Aqsa	2	Public Aid Hospital	2
Indonesian	2	Palestinian Red Crescent	1
Rantisi	1	Hamad Rehabilitation Hospital	2
Abu Yousef Al Najjar H.	1	Dar Essalam	1
Private			
El Helo International Hospital	4	Al Hayat Specialized Hospital	2
Ajjour	2	Gaza Scan	1
Total = 45			

Table 16: Distribution of ultrasound imaging through GS hospitals and centers

Figure 13 displays the geographical distribution of ultrasound machines. 30 ultrasounds out of 44 are present in Gaza governorate, six at North governorate, five at Khan Yousnis governorate, two at Middle governorate, and one at Rafah governorate

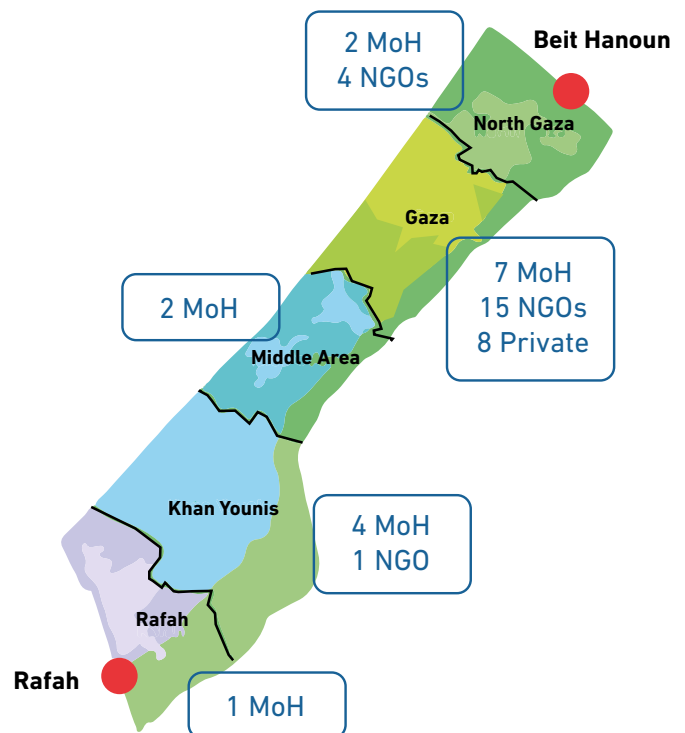


Figure 13: Distribution of ultrasound by governorate

3.8.2. Magnetic Resonance Imaging (MRI)

Magnetic Resonance Imaging (MRI) is a technique designed to visualise the body’s internal structures using magnetic and electromagnetic fields, which induce a resonance effect of hydrogen atoms. There are nine MRI machines in the Gaza Strip. One out of nine is nonfunctional. Three good functioning MRI are present at MoH hospitals, three at NGOs, and two at private sectors. Three governmental functioning MRI units per two Million in Gaza. OECD in 2019 ³³ reported that 5.2 MRI unit per Million in Israel and 40.4 MRI unit per Million in the United States of America (Table 16).

Sector	Number	Functionality
Governmental Hospital and Clinic		
Al Shifa Hospital	1	Good Function
Prince Naif Center	1	Nonfunctional
European Gaza H.	1	Good Function
Palestinian Turkish Friendship Hospital	1	Good Function
Semi and NGOs		
Al Quds	1	Good Function
Palestinian Red Crescent Society	1	Good Function
Dar Essalam Hospital	1	Good Function
Private		
Al Hayat Hospital	1	Good Function
Palestinian German Company for Diagnosis	1	Good Function
Total	9	

Table 17: The MRI Machine in Gaza distributed by Sector

Figure 14 displays the geographical distribution of MRIs. There are seven at Gaza governorate (3 at MoH, one is non-functional, two at NGOs hospitals, and two at private hospitals and centers. In Khan Younis, there is one at EGH and one at Dar Essalam hospital (recently installed).

No MRI machine is available at North, Middle, and Rafah governorates

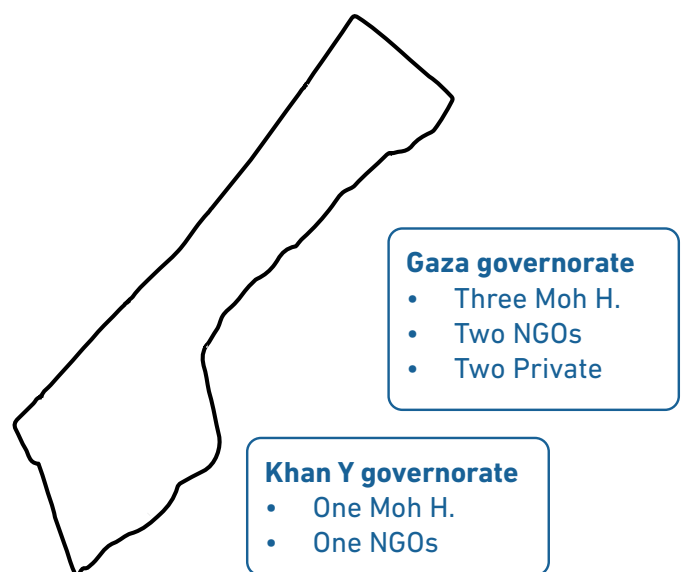


Figure 14: Distribution of MRI by Gaza governorates

³³ OECD (2019). Magnetic resonance imaging (MRI) units <https://data.oecd.org/healtheq/magnetic-resonance-imaging-mri-units.htm>

3.8.3. Computed Tomography (CT) Scan

Table 17 shows 16 CT scans in the Gaza Strip. Eight CT scans present at MoH facilities, and seven well functioning. Five present in Semi and NGOs. Three present at private centers and hospitals. This means 3.5 governmental CT scans per Million inhabitants. In Israel, there are 10 CT scan per Million, and in the USA, 15 per Million (OECD, 2019).³⁴

Sector	Number	Functionality
Governmental Hospital and Clinic		
Al Shifa Hospital	2	1 Good Function & 1 nonfunctional
European Gaza H	1	Good function
Al Aqsa Hospital	1	Good function
Nasser Medical Complex	1	Good function
Indonesian H	1	Good function
Al Rantisi	1	Good function
Palestinian Turkish Friendship H	1	Good function
Semi and NGOs		
Al Quds	1	Good function
Palestinian Red Crescent Society	1	Good function
Public Aid Hospital	1	Nonfunctional
Hamad Rehabilitation Hospital	1	Good Function
Dar Essalam H	1	Good Function
Private		
Al Hayat Hospital	1	Good Function
El Helou International Hospital	1	Nonfunctional
Gaza Scan	1	Good Function
Total	16	

Table 18: CT scan devices in Gaza distributed by sector and functionality

³⁴ OECD (2019). Computed tomography (CT) scanners. <https://data.oecd.org/healtheqt/computed-tomography-ct-scanners.htm>

At Prince Naif Diagnostic center in the MoH, there is nonfunctional Gamma camera equipment and simulator CT scan or linear accelerator. Gaza needs radioisotope and PETs CT scan and radiotherapy to mitigate referral of cancer patients and their suffering.

There is one linear accelerator device at Shifa (Prince Naif) and at the Palestinian German Diagnostic center there are two functioning PETs scans.

Figure 15 displays the geographical distribution of CT scans and the sector of the service provider

Table 18 shows the diagnostic and treatment of cancer patients distributed by sector

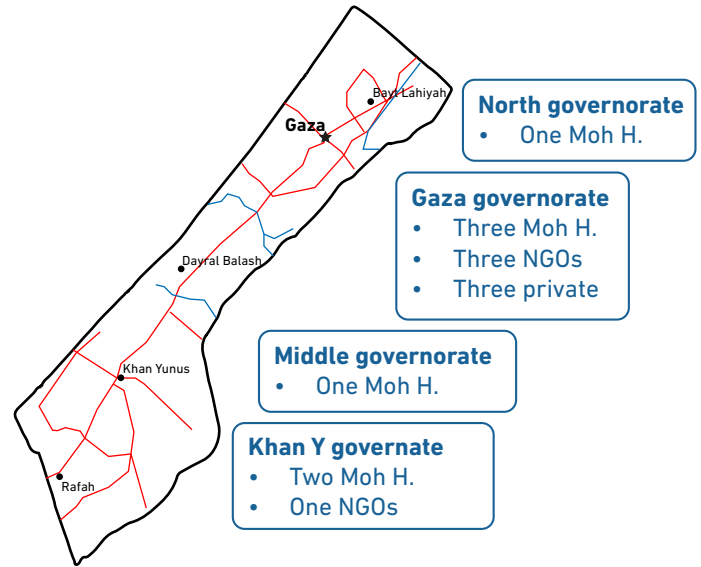


Figure 15: Geographical distribution of functional CT machine by Gaza governorates

Cancer care services	MoH	NGOs	Private	UNRWA	Total
Mammography	5	6	6	0	17
Ultrasound	16	20	9	22*	67
MRI	5	3	2	0	10
CT scan	7	4	3	0	14
Biopsy	4	7	6	0	17
Histopathology lab	2	1	5	0	8
Surgical treatment	6	4	1	0	11
Chemotherapy	2	0	1	0	3
Endoscopies	5	12	2	0	19
Radiotherapy	0	0	0	0	0

Table 19: Organizations providing the different cancer care services, distributed by sector

*Ultrasound at UNRWA PHC centers for Antenatal care

3.8.4. Endoscopies

There is nonfunctional endoscopy at Indonesian hospital (Table 19) and geographical distribution of endoscopy. (Figure 16)

Governmental Hospitals	#	Semi and NGOs	#
Al Shifa Hospital	2	AAH	2
European Gaza Hospital	2	Al Awda hospital	1
Nasser Medical Complex	1	Al Quds Hospital	2
Private Hospitals		Patient Friends Society	1
Al Hayat Hospital	1	Public Aid Hospital	2
El Helou Hospital	1	Dar Essalam	1
		Red Crescent Society	2
		Al Karama Center	1

Table 20: Endoscopies distributed by Sector

In 2019, at MoH hospitals, 7,704 endoscopies took place, 3,700 at NGOs facilities and 204 at private centers (MoH, 2020).³⁵

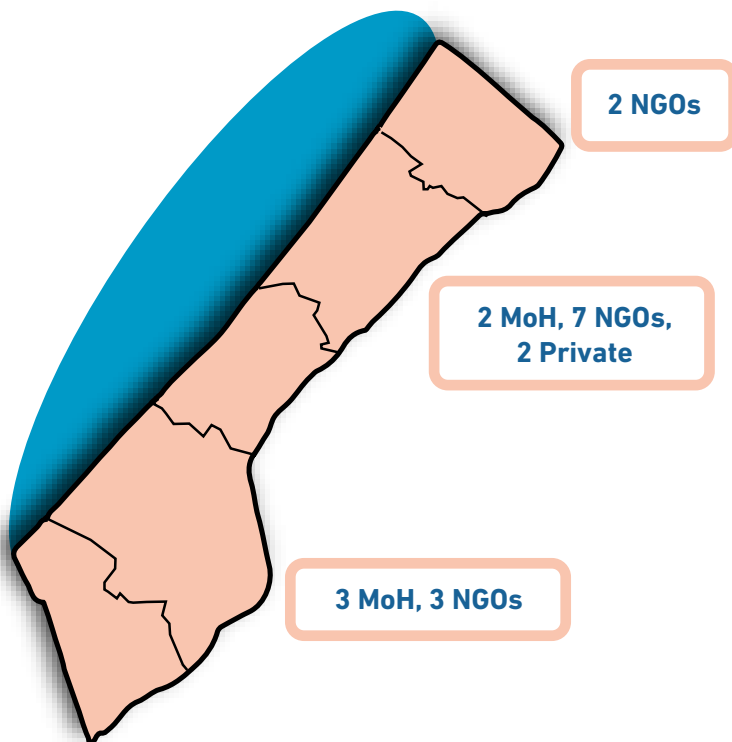


Figure 16: Geographical Distribution of endoscopies

³⁵ MoH (2020). Health Annual Report. PHIC

3.8.5. Diagnostic laboratories

Laboratory tests are usually conducted if doctors suspect a patient may have cancer. Samples of blood, urine, other bodily fluids, or tissue are examined for abnormal cells or tumor markers that may determine whether a person has the disease or a precancerous condition. Lab tests may also be used to examine abnormal cells, tumor markers or high-risk screen patients.

These tests are occasionally available at MoH labs. However, more are available at the private lab.

Gene and molecular pathology lab

MoH laboratories does not have a gene lab. A manager at the Palestinian Medical Relief Society (PMRS) informs the consultant that they already purchased Flow cytometry. The company from which they bought this will provide training for PMRS staff. Furthermore, there is a genetic lab in the Islamic University- Gaza, and a private gene lab in Gaza.

Tumor markers

Tumor markers are not always available in the studied hospitals. Shifa hospital has a tumor marker, while an Indonesian hospital (KII interview) does not. MoH strategy 2021- 2025 includes early detection and intervention in cancer and colorectal cancer to control the disease and prevent complication and increase community awareness, especially for those at risk.

3.8.6. Histopathology

Currently, there are approximately seven consultant histopathologists in the GS. However, the majority of consultants are general pathologists. The pathology lab consists of three divisions: histopathology, cytopathology, and a tissue tumor marker. Three histopathology labs are available at governmental hospitals. The first is at Al Shifa hospital, operated by three histopathologists. The second is at NMC, operated by two histopathologists, and the third is at

EGH, operated by one histopathologist. There is one histopathology lab at PRCS in Gaza (KII). There are no pathology labs in The Middle, North, and Rafah governorates. Patients from these areas often travel to the nearest governorate's health facilities to receive such services.

MOH (2020) reported that pathology labs are only available at Al Shifa hospital and Nasser Medical Complex. These labs conduct 7,963 histopathology tests and 2,057 cytology in the same year.

Pathology laboratories distributed by the governorate

- Gaza governorate: Pathology lab at Al Shifa Hospital (MoH), pathology lab at PCRS (NGOs), Dr. Alaa Al-Bayouk pathology lab (private), Dr. Hussam hamada pathology lab (private), Dr. Abdelmoneam Lubbad pathology lab (private), a specialised center for histopathology (private), Sham pathology center (private).
- Khan Younis governorate: pathology lab at NMC (MoH), pathology lab at EGH (MoH), and private pathology lab.
- In the Gaza Strip, there are seven histopathologist, two with subspecialties, nephropathologist, and hematopathologist.

The average time for delivery of histopathology results is 18 days at Al Shifa, ten days at NMC, and three days at private labs (KII).

“The pathology lab at Shifa hospital includes four microscopes, two processing machines, one staining machine, one embedding machine, one automated immune-stainer, and one microtome. Moreover, the lab also contains one nonfunctional frozen section and one nonfunctional decalcifier due to the scarcity of materials” Says consultant pathologist).

In 2019, at MoH hospitals, pathologists conducted 7,963, histopathology examinations (biopsies) and 2,057 cytology examinations (MoH, 2020)³⁶. Figure 17 displays the distribution of pathology labs in the Gaza Strip. Table 20 shows the number of pathology labs and the average cost distributed by governorates.

Sector	North	Gaza	Middle	Khan Younis	Rafah
	No. of facility & cost (NIS)	No. of facility & cost (NIS)	No. of facility & cost (NIS)	No. of facility & cost (NIS)	No. of facility & cost (NIS)
MoH	0	1 (0) Shifa	0	2 (0) NMC & EGH	0
PRCS	0	1 (120)	0	0	0
Private	0	4 (137)	0	1 (137)	0

Table 21: Histopathology services distributed by governorates in the Gaza Strip

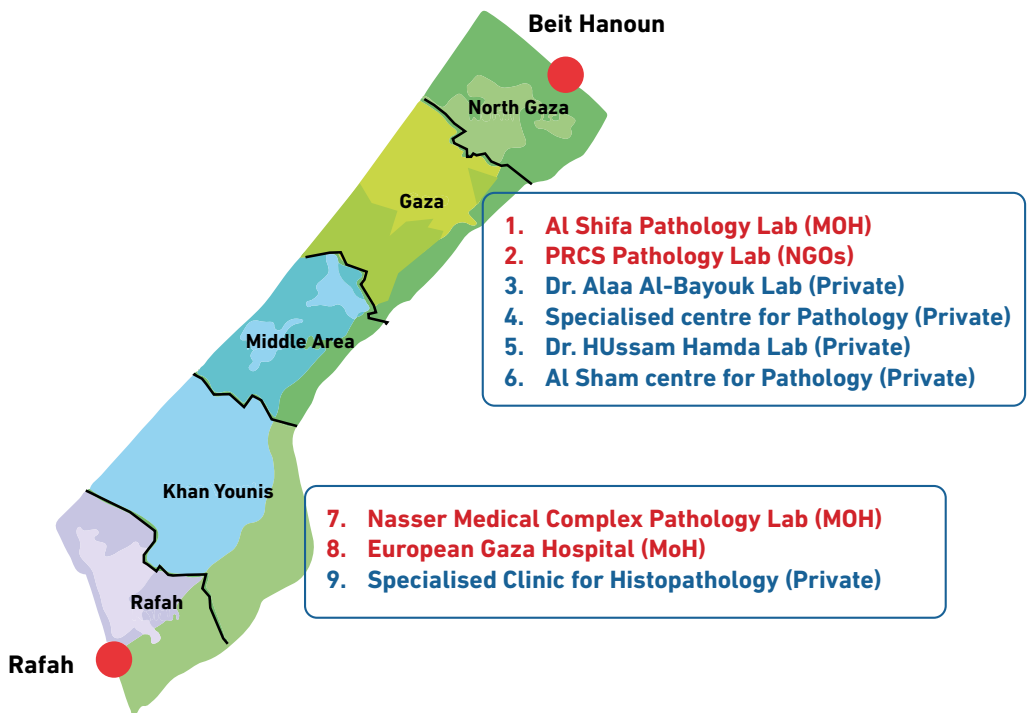


Figure 17: Mapping of Pathology Diagnostic Centers

³⁶ MoH (2020). Health Annual Report. PHIC

Ghada's leukemia treatment journey



Four-year-old Ghada lives with family in Jabalia refugee camp, where they live in squalid, crowded conditions. Ghada's father works as a carpenter, where he does not earn enough to cover the family's expenses and the family receive no support from others. In the past, they received aid from the Ministry of Social Affairs, but this has been stopped, and the family also have no health insurance.

When Ghada was two-years-old, she suffered repeated infections, including a sore throat. However, her mother could not afford for her to seek medical advice. Sadly, her condition then worsened- she suffered a high temperature and was unable to walk, eat or drink, causing her to become very weak. Her mother visited a pharmacy, where she was told that her child urgently needed a blood test. Without any money, Ghada's mother found an NGO who offer free blood tests, and her daughter was found to have low hemoglobin levels and a high white-blood-cell count. She was immediately referred to Kamal Edwan Hospital.

At the hospital, Ghada received blood units and was admitted to the Intensive Care Unit, where she was diagnosed with leukemia. Ghada was then referred to the oncology department at Al Rantisi Pediatric Specialized Hospital for a bone marrow biopsy.

Ghada's parents were extremely distressed by the news, and the Director of Al Rantisi Hospital provided them with psychosocial support. The pediatric oncologist-hematologist assessed Ghada's condition and requested further tests, including a deep blood analysis, CT scan and bone marrow biopsy. He suggested that Ghada be referred to the specialist hospital in Beit Jala at the West Bank.

Four days later, Ghada was transported by an ambulance to the hospital in Beit Jala. She was re-assessed at the hospital, her blood was analysed again and she was found to have a low platelet count, so she could not begin chemotherapy. Ghada's bone marrow biopsy was sent to King Hussein Cancer Center in Jordan, and she was found to have acute lymphoblastic leukemia. Ghada received supportive therapy and a platelet transfusion, from which she suffered an allergic reaction and severe vomiting. Thirteen days later, Ghada's platelet count rose, and her chemotherapy treatment began.

The chemotherapy was given via IV cannula every week during the first month, and Ghada suffered severe pain. Then, she was referred to the Arab Society Hospital for insertion of a port catheter.

"Arab society hospital was unclean. The level of disinfection was low, and there was no coordination between Beit Jala Hospital and the Arab Society Hospital. With severely ill Ghada, I waited three hours on a chair. Carelessly, they took Ghada, inserted the catheter without explaining anything to me. After that, they admitted Ghada to the medical department with elderly people", says Ghada's mother.

Ghada's mother observed bleeding from the catheter and informed a nurse, who called a doctor. The doctor was busy with another patient and only came to check on Ghada two hours later to stop the bleeding.

Because there was no coordination with Beit Jala hospital, the Arab Society Hospital requested Ghada's mother to pay for the operation. However, she had no money at all, not even for food.



At Al Rantisi hospital in Gaza, Ghada was isolated with her mother for eight days. Ghada suffered from severe physical and psychological pain during this time. Then, Ghada was discharged and told to complete her treatment at home for one week. Ghada went to the receive another dose of chemotherapy from the hospital, before returning home.

Ghada then suffered from a severe oral ulceration with a fungal infection and cracked lips that prevent her from eating or drinking. Her mother took her to hospital, and the doctor advised her that Ghada should be admitted to hospital. However, Ghada's mother had to take care of her son who was also ill, and could not take Ghada to hospital.

Two days later, Ghada health condition deteriorated, and she was admitted to hospital. The doctor's manner towards Ghada's mother was rude and abrasive . Ghada is now in hospital completing her treatment.

"This is Ghada's treatment journey from cancer that has not ended until today. It is a difficult journey full of difficulties because there is no specialised place that provides all services to children with cancer in the Gaza Strip like in other countries. We as a families of the sick children need support during the treatment journey, such as psychological support, transportation fees, suitable meals, specialised doctors. I hope that other children will never suffer the way Ghada has", says Ghada's mother.

"I tried called the treating doctor at Beit Jala hospital many times while my daughter sat exhausted on the chair for long hours", says Ghada's mother.

Eventually, she got through and resolved the issue. Ghada and her mother returned by ambulance to Beit Jala hospital. Doctors took another bone marrow biopsy. They informed her that they would send the results to Al Rantisi hospital and that they could return to Gaza. Ghada's father coordinated with the local authorities in Gaza to get permission from the Israeli side to allow Ghada and her mother to return to Gaza. In addition to the hours on the road, they spent six hours at Qalandia checkpoint and three hours at Erz/Beit Hanoun cross point.

In Gaza, they went to Al Rantisi hospital to complete Ghada's chemotherapy course for a further month. Ghada's immune system weakened, which meant that her chemotherapy course had to be suspended. Precise clinical and lab examinations revealed that Ghada had suffered a bacterial infection at the site of the port-catheter. At that point, war broke out in Gaza.



3.9. Cancer care management

Every cancer patient has the right to a comprehensive health approach, including timely access to diagnostic facilities, referral to specialist oncologists in an efficient way, evidence-based treatment, and regular effective follow-up care to ensure the best possible prognosis and quality of life. This means accessing quality and adequate healthcare and enjoying life conditions that support staying healthy. Proper and early cancer diagnosis and effective treatment are essential to improve patients' prognosis and survival chances. The ability of Gaza's hospitals to provide adequate diagnosis and treatment to cancer patients is severely limited. However, in the GS, only 65% of women with breast cancer survive five years after diagnosis. Restrictions to accessing essential health services are among the significant barriers to the right to health for Palestinians living in the GS. Restrictions affect cancer patients at a vulnerable point in their lives when they need specialist care and services for diagnosis and treatment (WHO, 2019³⁷).

3.9.1. Supportive care in cancer

Support for cancer patients and their families is an integral part of cancer care. Supportive care includes psychosocial support, religious and spiritual support, supportive counseling, group or peer counseling, rehabilitation, financial advocates, integrative medicine, including physical activity, massage, strength and conditioning, oncology dieticians, psychiatric care, social workers, and a robust palliative care program—which is an entire field unto its own and includes many of these programs and more under its own umbrella. (Figure 18).



Figure 18: Supportive Oncology

Source: <https://voice.ons.org/news-and-views/supportive-care-programs-for-patients-with-cancer>

³⁷ WHO (2019). Gaza patients' painful journey to cancer treatment <http://www.emro.who.int/pdf/pse/palestine-news/gaza-patients-painful-journey-to-cancer-treatment.pdf?ua=1>

Dr. Musa and Suhaila Nasir Pediatric Cancer Department

The department was opened in February 2019 and it is the first and only pediatric oncology department for children in the Gaza Strip. Before the department opened, every child in Gaza with cancer had to travel to receive treatment - often away from their families.

The study found that the new department has 16 rooms and 14 outpatient beds, a playroom, lab, pharmacy, and many other amenities that were not previously seen in any hospital in Gaza.

The Palestine Children's Relief Fund (PCRF) also provides tutoring for children during their stay in the department, as well as other important services.

In 2020, PCRF continued to support a team of mental health professionals to provide counseling, therapy, and other mental health services to children undergoing cancer treatment in our Dr. Musa and Suhaila Nasir Pediatric Cancer Department (PCRF, 2020)³⁸.

Basmet Amal Association (Smile of Hope for the Care of Cancer Patients)

Basmat Amal is a non-profit NGO that aims to empower cancer patients' families, strengthen their resilience and contribute to health, rehabilitation, and educational services for cancer patients. "The working team consists of 19 youth volunteers (twelve male and seven female). They provide medical consultation as part of a panel with specialised physicians and online medical consultants. They provide free of supportive services for cancer patients in the Gaza Strip.", Says the Executive manager of Basmet Amal.

They also provide psychosocial support and debriefing sessions, medical sessions, individual counseling, group counseling, relaxation, meditation, and skills acquisition.

Together, the team provide social and emotional support, cognitive support, information support, and behavioral support. They also provide transportation for patients referred outside the GS. They deliver education for children with cancer who are unable to attend formal school classes, in partnership with the Ministry of Education.

Palestinian Society for Care of Cancer Patients

This society is located in Nusearat in the Middle governorate. They provide supportive services for cancer patients. There are nine members of staff in total (3 male and 6 female). They provide psychosocial support to cancer patients, provide training on the self-breast exam, medical days and food parcels.

³⁸ PCRF (2020). <https://www.pcrf.net/dr-musa-and-suhaila-nasir-pediatric-cancer-department>

Al Shefa Association for Cancer Patients' Care

This is a non-profit NGO that aims to support cancer patients and their families. The association is mainly operated by seven volunteers (five male and two female). Al Shefa association in Khan Younis governorate provides supportive services for cancer patients, such as as:

- social and psychological support
- renovation of cancer patients' homes
- training breast self-examination and provide clinical breast examination
- educational sessions for children
- providing insulin pens for children with cancer whose condition complicated with diabetes mellitus
- providing screening of colorectal cancer for patients' family members.

Table 21 displays available information about the acting organisations and the number of beneficiaries distributed by the activity.

Services	No. of beneficiaries annually (average)			
	Adult male	Adult female	children	Total
	Basmat Amal Association			
Rehabilitation services				
PSS and Debriefing	589	2280	2367	5236
Entertainment	115	415	528	1058
Clown doctor	0	0	935	935
Skincare and wig service	0	287	473	760
Physiotherapy	173	1352	261	1786
Supportive Education	0	0	421	421
Treatment Services				
Nutrition intervention	510	757	528	1795
Specialized medical consultations	319	975	386	1680
Free Medical days	512	1002	645	2159
	Palestinian Society for Care of Cancer Patients			
Education classes for children	0	0	88	88
PSS and Debriefing	315	413	0	728
Free medical days (a day per month)				

Table 22: Supportive services provided to cancer patients by NGOs

United Nations Relief Works Agency for Palestine Refugees in the Near East (UNRWA)

UNRWA runs the King Salman project for Relief and Humanitarian Aid (KSrelief) to provide vital healthcare services in Gaza. This essential contribution from KSrelief enhances healthcare service delivery to more than 1.5 million refugees in Gaza at local hospitals and clinics, facilitating mammography for 5,000 women. It also covers the cost of diagnostic and medical procedures related to early detection of breast cancer. Additionally, it provides critical and lifesaving medicines for 23,000 patients, facilitates medical screening for 35,000 UNRWA students, and provides training for 700 health workers (UNRWA, 2020)³⁹.

UNRWA aims to provide mammography services for women with an average risk of BC who are over 40 years of age. It also provides services to women with a high risk of breast cancer who are over 30 years (personal history of breast, ovarian, tubal peritoneal cancer), and who have a family history of breast, ovarian, tubal peritoneal cancer, known carrier of pathogenic mutation for hereditary breast and ovarian cancer syndrome in self or relative, previous breast biopsy indicating high-risk lesions or radiotherapy to the chest between the age of 10-30.

Diagnostic mammography is used to investigate suspicious breast changes at any age, such as new breast lump, breast pain, an unusual skin appearance, nipple thickening, or nipple discharge.

In cases of suspected positive mammography, a confirmatory Ultrasound (US) has to be performed. Moreover, in cases where the disease is highly suspected and mammography services are contraindicated, US alone should be performed. After a mammogram or US, each patient should receive a detailed written report

The project is also covering the cost of biopsy with histopathology, CT scan, or MRI. UNRWA refers the patient to a contracted hospital. UNRWA contracted with Al Quds hospital and PRCS for MRI, CT scan services, Dar Elsalam, Amal, Gaza scan center, and HSH for CT (UNRWA, 2020).

³⁹ UNRWA (2020). KSRELIEF Supports Vital Healthcare Services for Palestine Refugees in Gaza. <https://www.unrwa.org/newsroom/press-releases/ksrelief> Accessed on January 30, 2021

⁴⁰ Woman Health Center (2020). <http://web.cfta-ps.org/CenterActivities.aspx?center=5>

⁴¹ MAP (2019). Breast cancer in occupied Palestine

Al Bureij Woman Health Center

"We are coordinating our work with the Bureij woman health center regarding screening program. They provide services for breast cancer women, such as as providing psychosocial support, food supplements, wig, bra, breast prostheses, and tamoxifen", says Dr. Maha Amami, the director of the women's health department at MoH.

The Women's Health Center founded in 1995, provides education, preventative and curative health services for women at all stages in the cancer life cycle, offering therapy, consultation, education and a sports center located in Bureij Camp. The Woman's Health Center embraces a holistic approach to healthcare by providing a range of high-quality integrated services and programs. These are designed to help build healthy families- physically, psychologically, and socially, as well as healthy communities.

Among the Woman Health Center's most important programs are breast cancer prevention and early detection, as well as psychosocial support and a pap smear screening for detection and prevention of cervical cancer (Woman Health Center, 2020)⁴⁰.

3.9.2. Surgical treatment

No specialised surgeons (onco-surgeons), are available for different types of cancers such as cancers of the breast, esophagus, lung, pancreas, liver, etc. Israeli restrictions on movement out of Gaza mitigate medical staff opportunities to receive training in specialist fields of cancer surgery.

The national committee (a multidisciplinary team includes a consultant pathologist, a consultant radiologist, consultant surgeon, and consultant oncologist) of breast cancer updated a protocol for breast surgery. There is no reconstructive surgery conducted at the Indonesian hospital", says a Consultant Surgeon from The Indonesian Hospital.

There are two main types of intervention: Breast-conserving surgery (lumpectomy) and Mastectomy (removal of the whole breast). The number of women receiving total mastectomy in the GS is high due to late diagnosis and the increased need for radiotherapy for women receiving lumpectomy. Surgeons change the method of treatment to mastectomy to avoid adding additional risk to the patient's life, who may have waited a long time for radiotherapy or could not get permission to leave Gaza (MAP, 2019)⁴¹.

3.9.3. Cancer medications

Hospitals in Gaza suffer from chronic shortages of many essential medicines. According to the WHO, 47 percent of what is deemed to be “essential” medicines were at zero stock level (less than one month’s supply) at Gaza’s Central Drug Store at the end of September 2020 (Human Rights Watch, 2021)⁴². The shortage of chemotherapy medications is not an exception.

Currently, 32% of cancer medication at zero stock. When these vital medications run out in hospitals, patients face the stark choice of interrupting their treatment or paying themselves through the private sector. However, drugs for cancer are usually unavailable in private pharmacies. If it is available, it is too expensive, and paying such expenses is not an option for most cancer patients in Gaza. A drug shortage of 30% actually means 100%. Interrupting a course of treatment can severely reduce effectiveness and increase the risk of drug resistance in patients, and switching to a new medication mid-treatment is like going back to square one and the treating doctor has to restart the regimen or change the management protocol. The cancer medications’ suppliers are Palestinian Authority, direct purchase the local government, IRPAL, PCRf, MAP-UK, Qatar Red Crescent Society, and Al Taawon association”, says the Director of Central Drug Store (CDS).

He added that there are extreme shortages in the complementary drug list that the delivery of drugs needs the specialised committee’s approval.

This complementary drug includes target therapy and immunotherapy, which are highly expensive. Regarding the preservation of cancer medication, the CDS director says *“If all the needed drugs are available, we need refrigerators because most of the drugs should be kept in refrigerators.”*

“There is 30-40% sustained shortage of cancer medications and 80% shortage of medical supplies for cancer patients. We face a significant challenge in the shortage of palliative care medications; pain killers are unavailable most of the time”, says The Director of Pharmacy from Al Rantisi Pediatric Hospital.

Providers of cancer medications:

“Cancer medications include chemotherapy, hormone therapy, immunotherapy, and drugs for palliative therapy. The cancer medications providers are MoH hospitals (Al Rantisi pediatric hospital and Al Amal Hospital in PRCS) and Al Hayat specialized hospital”, says the Director of CDS.

Figure 18 displays the geographical distribution of cancer medication providers. Al Rantisi hospital and Al Hayat hospitals situated in Gaza and Al Amal hospital situated at Khan Yunis. While there are no providers of medication in North, Middle, and Rafah governorates. Figure 19 displays the distribution of cancer medication by governorate

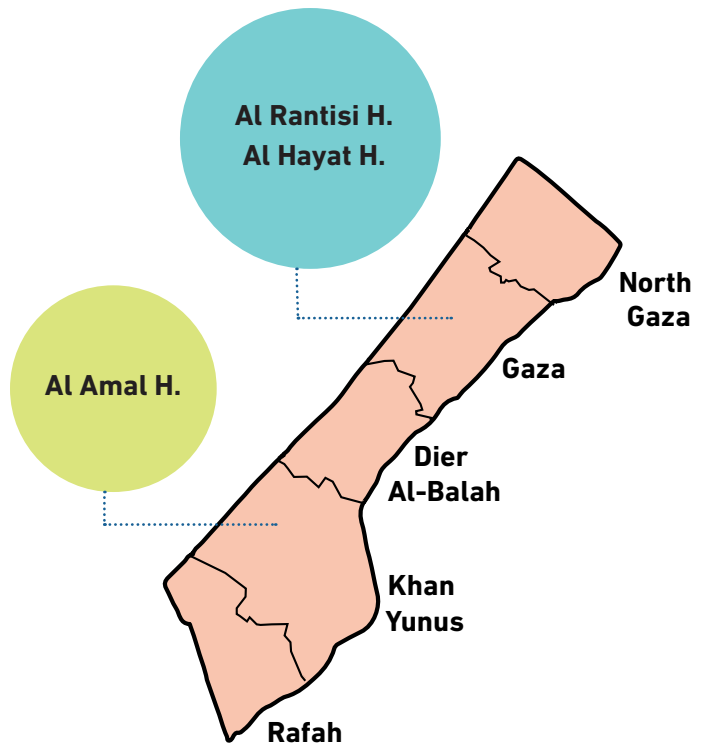


Figure 19: Distribution of cancer medications

⁴² Human Right Watch (2021). Israel and Palestine. Events of 2020. <https://www.hrw.org/world-report/2021/country-chapters/israel/palestine>

3.9.4. Radiotherapy and Radioisotopes

“Prince Naif Diagnostic and Intervention radiology center includes a nonfunctional CT scan and MRI. Also, there is a nonfunctional gamma camera and linear accelerator, which was installed in 2007. We need at least three linear accelerators, based on international standards, one accelerator per 500,000 to 600,000 people”, says Dr. Mohamad Qano, Consultant Radiologist.

Gaza lacks radioisotope diagnosis due to the highly restrictive Israeli policies. It is even more difficult for patients from Gaza to get radiotherapy treatment. Gaza’s Shifa Hospital has a linear accelerator, but it has never worked because of restrictions on entry to Gaza for technicians and financial constraints. Women must therefore be referred for treatment outside Gaza. However, the Rafah crossing into Egypt remains shut for all but a few days a year. So the only option is to apply to the Israeli authorities to leave through the Erez crossing into Israel.

The current study finds two unsuccessful trials to establish radiotherapy center in Gaza:

1. The Prince Naif center in Shifa hospital is equipped with nonfunctional CT, MRI, PET scan, and gamma camera. The building includes nonfunctional linear accelerators.
2. In collaboration with MD Anderson in Huston, USA, Ahli Arab Hospital designed a radiotherapy building plan with three underground floors. It proposed three radiotherapy accelerators, in addition to an operating plan. However, unfortunately, the could not be completed due to a lack of funds since it will cost **approximately \$20 Million**.
3. Even though there are no facilities or equipment for radiotherapy and radioisotopes, two medical radiation therapist, one nuclear medicine specialist, and three medical physicists are present in the GS, but they do not practice their specialties.

3.9.5. Palliative treatment

Palliative care focuses on providing patients relief from pain and other physical symptoms by using several approaches to mitigate patient suffering, regardless of the diagnosis or stage of the disease. Palliative care teams aim to improve the quality of life for both patients and their families. This form of care is provided alongside treatment. Palliative care includes physical, psychosocial, and spiritual support. Dr. Khamis Elessi has trained a team of palliative care doctors, nurses, psychologists, and physiotherapists in various aspects of palliative care provision. This nuclear palliative care team at Rantisi hospital, headed by Dr. Bushra Lubbad, and a new palliative care team at EGH, was also trained by Dr. Khamis Elessi but was suspended due to the Covid-19 pandemic.

The key informant interviews’ show that Gaza’s palliative and emotional care gaps were still evident. *“We conduct surgical palliative care by doing colonic stent for colorectal cancer inserting a stent to relieve obstruction of the bile duct in case of inoperable cancer head of the pancreas”,* says Consultant Surgeon from the Indonesian Hospital.

3.9.6. Treatment abroad

The MoH refers the cancer patients for treatment abroad because of the constant shortage of medicines and medical supplies. However, they were denied or delayed access to treatment. Israel blockade, the tight restrictions on travel via Beit Hanoun, the almost complete closure of Rafah Crossing, and restrictions imposed due to the outbreak of Coronavirus pandemic hinder patients from leaving Gaza.

The number of referred patients was 24,614, 20,589, 30,867, and 26,855 in 2016, 2017, 2018, and 2019 respectively. In 2019, MoH referred 6,520 cancer patients out of 26,855. The referred patient for radioisotope in 2019 was 1088. The cost of treating referred cases was 161, 154, 179.7, and 136.4 Million NIS in 2014, 2015, 2016, and 2017 respectively (MoH, 2018)⁴³.

Medical reasons for referral of cancer care continues to be the single most prominent reason for purchasing services by the Palestinian MoH in 2018, comprising 22% of Gaza all referrals. In 2018, 70% of Gaza referrals needed access via Beit Hanoun/Erez – to Palestinian hospitals in the West Bank, including East Jerusalem and Israeli hospitals. These patients required Israeli-issued permits to cross to access healthcare. The approval rate of 61% for patient applications in 2018 represents the second-lowest recorded by WHO.

WHO carried out survival analysis for referred cancer patients from 2008 to 2017. The study found that patients initially delayed or denied permits from 2015 to 2017 were nearly 1.5 times less likely to survive. The findings demonstrate the critical importance of timely access to treatment for cancer patients. Cancer treatment and diagnosis was the single largest medical specialty for patients requiring permits to exit Gaza in 2018, accounting for more than a quarter (28%) of Gaza patient applications (WHO, 2019)⁴⁴.

After being diagnosed with cancer, Gaza patients often have to wait for months before receiving treatment. Getting a permit to access healthcare can be stressful and unpredictable, and many apply multiple times before being able to exit. Even then, some patients are never able to secure the permits they need to access care.

In 2019, the approval rate for patient applications to leave the GS was 65%. The vast majority of unsuccessful patient permit applications do not receive an explanation of the reason for denial or delay. Patient permit applications to access cancer care account for 31% of the total and constitute the single most significant reason for patients' referral from the GS. The process for exit through Rafah is confusing and obscure. The Sinai journey is long, with many checkpoints (WHO, 2020)⁴⁵.

"The cancer patients in need of targeted therapy are usually referred to specialized hospitals as Specialised Hospital in Gaza, to Augusta Victoria Hospital in Jerusalem, to Istishari Arab Hospital in Ramallah, and An-Najah National University Hospital", says the Director of CDS.

He says that more than 90% of patients were referred to specialised hospitals in the West Bank and about 5% to Hayat Specialized Hospital in Gaza.

A consultant oncologist said that the causes of referred patients are for diagnosis because there is a gap in genetic diagnosis and molecular diagnosis for radioisotope scanning, radiotherapy treatment, and chemotherapy.

⁴³ MoH (2020). Health Annual Report. PHIC

⁴⁴ WHO (2019). Gaza patients' painful journey to cancer treatment <http://www.emro.who.int/pdf/pse/palestine-news/gaza-patients-painful-journey-to-cancer-treatment.pdf?ua=1>

⁴⁵ WHO (2020). Health Conditions in the occupied Palestinian territories, including Jerusalem, and in the occupied Syrian Golan

PART 4: CHALLENGES

Ministry of Health and NGOs face challenges in providing comprehensive and quality services to cancer patients. In addition, cancer patients encounter challenges along their pathway from detection to post-treatment care. NGOs, patients, and their caregivers also face challenges.

4.1. Challenges facing Ministry of Health

1. The acute shortage of cancer medications and medical supplies in Gaza's hospitals are obstacles to appropriate cancer management.
2. Shortages in the available diagnostic facilities.
3. The Israeli ban on the entry of new medical devices and laboratory equipment needed to conduct tests for patients.
4. In the GS, deteriorating economic conditions deprive cancer patients of receiving treatment and medical services commensurate with their severe health conditions.
5. The ability of Gaza's hospitals to provide adequate diagnosis and treatment to cancer patients is severely limited due to:
 - lack of medical equipment and medical supplies
 - nuclear medicine scanning needed for staging cancers is not available
 - shortage of lab analysis, unavailable flow cytometer and gene lab for diagnosis of cancer
 - radiotherapy equipment is not available
 - shortage of specialised cancer surgeons, subspecialized oncologists, and subspecialized pathologists, lack of dosimetrists
 - lack of qualified nursing staff and paramedical personnel.
6. There is no comprehensive cancer center in Gaza offering all needed modalities and services such as palliative care, nutrition services, psychosocial support, or rehabilitation.
7. The unavailability of systemic treatment exceeds 60%, and there is a complete shortage of some essential drug types. Persistent drug shortages due to:
8. complicated socio-political situation
9. the financial crisis, and especially lack of funds, is a known phenomenon in the Gaza Strip.
10. Lack of in training programs to improving cancer care in Gaza. The cancer management multidisciplinary team could not get out of Gaza to joint training programs or conferences, and it is difficult for international medical experts to access Gaza.
11. The cancer continuum of care is not intact due to a lack of capacity in the service providers and facilities.
12. The lack of integrated and effective coordination mechanism among service providers.
13. Lack of well-organised referral system.
14. Challenges posed by restrictions on the right to movement for both patients and doctors, shortages of essential medicines, and the shortcomings of the health system in the GS all constitute obstacles to continuous and effective treatment and care for Palestinian patients with cancer.
15. Lack of reconstructive surgeon affects the confidence and self-esteem of cancer patients.
16. No proper coordination with surgeons, oncologists, and radiologists.
17. The health system in Gaza is facing challenges in offering quality pain and palliative care services due to pressure and resource limitations.
18. Blockade hinders equipment maintenance.

4.2. Challenges facing Non-Governmental Organisations

1. In the GS, deteriorating economic conditions deprive NGOs of providing quality supportive health services to cancer patients.
2. NGOs cannot support cancer patients due to a lack of funds.
3. Inability to cover running costs and employee's salaries.
4. Lack of funds to develop professional staff.
5. Lack of training for NGO staff
6. The lack of integrated and effective coordination mechanisms among service providers.

Lack of well-organised referral system.

4.3. Challenges encountered by cancer patients

7. Challenges encountered during referral to hospitals outside Gaza:
 - Many patients have to wait long periods for Ramallah MoH's approval of the referral form. This delay increases the risk of morbidity and mortality of cancer patients.
 - Most cancer patients do not succeed in obtaining the needed permissions to exit Gaza and receive their treatment or diagnosis.
 - Patients cannot afford to cover their transportation and accommodation expenses.
 - Most patients are unemployed and unable to work to support their families.
 - Patients suffer interrupted courses of treatment.
 - Patients are exposed to sustained stress and malnutrition, which makes them more vulnerable to cancer complications.
8. Patients in Gaza rely on institutions such as MoH Hospitals to receive drugs and private or NGO health centers to receive lab tests, diagnosis and advice.

Patients are discharged as soon as they receive their chemotherapy treatment, so they do not have the necessary supervision when they return home.

PART 5: GAPS IN MANAGEMENT OF CANCER PATIENTS

Gaps in the management of cancer patients are diverse and include socioeconomic gaps, coordination gaps, doctor-patient relationship gaps, and gaps in service provision.

5.1. Socioeconomic gaps

“The Ministry of Social Development (MoSD) does not run a comprehensive program for cancer patients. If the patient is the breadwinner like the father, the family’s economic and social situation collapses. The family income to meet the expenses of the family and treatment of the patient is greatly affected. We provide partial and temporary social and economic support for cancer patients. We provide \$100 for cancer patients to cover transportation. Not all cancer patients are able to benefit, only those who are registered in the MoSD as needing help. We sometimes provide assistive devices for cancer patients with disabilities”, says Director General from the Ministry of Social Development (MoSD).

Approximate cost of cancer treatment

“The cost of cancer treatment is extremely high. Treatment of leukemia during the first month costs one million NIS”, says DR. Mahmoud Shbair, Pediatric Oncologist.

5.2. Gaps in service provider-patient relationship

The study reveals that 21 caregivers were shocked when told of their child’s diagnosis. 2- children were diagnosed at hospital 20 (66.7%), 9 at private centres (30%), and 1 through an NGOs (3.3%). 16 (53.3%) children were diagnosed at a late stage because of ignorance and negligence of the family. The below table shows examples of service provider-patient relationships.

#	Service provider-patient relationship	Children 30	Adult 60
		No. (%)	No. (%)
1	The doctor answers caregivers/patient their questions	25 (83.3)	49 (81.7)
2	The doctor supports the caregivers/patient and their families	22 (73.3)	26 (43.3)
3	The doctor helps caregivers/patient to find places for more help	1 (3.3)	3 (5)
4	The doctor discusses caregivers/patients concerns	13 (43.3)	22 (36.7)
5	The doctor explain child/patient pathology report	16 (53.3)	33 (55)
6	The doctor tells caregivers/patient treatment options	14 (46.7)	37 (61.7)
7	The doctor tells patient about the possible side effects of treatment	18 (60)	34 (56.7)
8	The doctor tells how treatment affects a daily patient life	17 (56.7)	28 (46.7)
9	The doctor communicate appropriately with the caregiver	17 (56.7)	41 (68.3)

Table 23: Service provider-patient relationship

Due to a shortage in Oncologists, many patients have to wait for a long time to receive treatment.

“We are waiting for five hours, we came from 07:30 am to get our treatment because there aren’t enough doctors. We are not satisfied with the services provided to us. We are tired, depressed, frustrated, and insulted”, says one patient.

The table displays the average time the cancer patients have to wait

“Not all the health services for cancer patients are available at our hospital. There are two consultant surgeons and two surgeons. However, there is no pathology lab, no tumor marker, and no oncologist. Therefore, a patient with cancer has to rotate between Shifa hospital for pathological diagnosis and Rantisi hospital for chemotherapy. This affects the patient’s physical and mental health”, says Consultant Surgeon from Indonesian Hospital.

“I am waiting from 6 hours to see the doctor because there are a large number of patients and a limited number of doctors”, says another patient.

“I waited a long time. It was too crowded, and the doctors are nervous and shouting. I am exhausted”, says another patient. Table 23 shows the average waiting time for diagnosis and treatment.

Waiting time	Children 30	Adult 60
	Mean (days)	Mean (days)
The time between clinical and radiological diagnosis	8.24	9.4
The time between clinical and pathological diagnosis	20.1	23.9
The time between diagnosis and surgical treatment	10.4	24.3
The time between diagnosis and chemotherapy	18.93	44.5

Table 24:: Mean waiting time for diagnosis and treatment

The current mapping study concluded that Gaza’s oncology services are unavailable or inadequate, with many gaps. Limited spaces, overcrowded rooms and increased waiting time reduce privacy and comfort for patients. Poor ventilation also increases the risk of Covid-19 spreading through wards. This may influence the quality of care, staff performance, morbidity, and morality.

5.3. Coordination gaps

The study concluded that there is a lack of coordination among different health providers. *“The provided services for cancer patients are fragmented”*, says Consultant Surgeon.

“There is defect incoordination, and usually we do not receive feedback from the referred suspected cases”, says Director of Women’s Health at MoH.

Movement of patients between service providers, duplication, and the absence of effective coordination mechanisms are among the gaps in the current system which impact patient’s health. *“We are trying to coordinate with Sant Jude Global Alliance, but it is in progress, and we face administrative obstacles”*, says Pediatric Oncologist.

5.4. Transparency and equity gaps

Cancer treatment and care should be equal for all patients – no matter who they are or where they live. Medicine and treatment are a basic right for Gaza’s cancer patients. In Gaza, cancer patients suffer immensely due to restrictions on their travel for treatment. Israel’s imposed blockade, the acute shortage of medicine and medical supplies in Gaza’s hospitals, especially radiotherapy, and the Israeli ban on the entry of new medical devices and laboratory equipment needed to conduct tests for patients increase morbidity and mortality of cancer patients.

“When it comes to high expensive needed cancer medications, some patients get prompt approval, some patients have to wait for a long time, and others never get approval”, says Hospital Director.

5.5. Service provision gaps

In the Gaza Strip, governmental, NGOs, and private cancer care facilities are limited by several factors, including a lack of cancer specialists and subspecialists. Furthermore, restrictions of cancer patients’ movement for treatment abroad, the difficulty of the national and international medical and surgical team to get out or get in Gaza and lack of coordination among service providers, and recent decreased funding from international organizations affect the management of cancer patients dramatically.

The current and anticipated workforce shortages will compromise the ability of systems to provide high-quality cancer care. These gaps are mainly related to poor financial and administrative coordination, scarcity in health care human resources and inadequate staffing, inappropriate infrastructure of oncology buildings, and deficiencies in necessary equipment and supplies.

“The surgeon changes his/her management plan from lumpectomy to radical mastectomy because of a lack of resources. In the pediatric oncology department, we provide treatment for patients based on current and updated protocols”, says a Pediatric Oncologist.

5.6. Gaps in cancer preventive programs

Primary prevention efforts, early detection, appropriate treatment, and follow-up of non-communicable diseases, especially cancer, are insufficient efforts, such as anti-smoking measures or education initiatives to promote a healthy diet and lifestyle.

“No national screening programs are available in the GS. Breast cancer screening is performed in a fragmented manner”, says Consultant.

The mapping study shows duplication of service and deprivation of women in need. There is an ongoing trial to organise breast cancer screening and plans to form a colorectal cancer committee.

5.7. Gaps in cancer care team

The study concludes a significant shortage of specialised oncologists, nurses, cancer specialists, surgeons, radiologists, pathologists, psychologists, palliative therapists, pain management specialists, and cancer-specialised nutritionists.

A multidisciplinary team (MDT) is fundamental to the successful delivery of cancer treatment. Human resources play a crucial role in the process of cancer management. Every cancer patient has the right to a holistic health approach, including timely access to diagnostic facilities, referral to specialists’ oncologists in an efficient way, evidence-based treatment, and regular effective follow-up care to ensure the best possible prognosis and quality of life. Most of the key informants agreed that the shortage in the human resources constitutes a barrier in cancer management.

5.7.1. Gaps in Pathologists

In the GS, there is a lack of pathologists. The study finds that there is seven pathologists representing 0.35 pathologist per 100,000 population in the Gaza Strip. The number of pathologists dropped from 5.16 to 3.94 per 100,000 population in the United States (Parry, 2019)⁴⁶.

The study concludes that the number of pathologists in Gaza's governmental hospitals was only six, representing about 0.3 per 100,000 distributed as three at Shifa hospital, two at the NMC, and one at EGH. Pathologists are considered key in understanding the disease for patient diagnosis and management. We can conclude a severe shortage of pathology specialists in Gaza compared to the total number of patients.

There are ten pathology labs in the GS, three governmental, at Shifa hospital, NMC, EGH. One at PRCS and six private pathology labs. Regarding geographical distribution, six out of nine pathology labs are located in the Gaza governorate, and three are located in the Khan Younis governorate. There are unavailable pathology labs in the North, Middle, and Rafah governorates.

"The great majority of the seven pathologists in Gaza are general pathologists. However, nephropathologist and hematopathologists are available"; says Consultant Pathologist at Shifa hospital.

Besides the shortage of general pathologists, the study finds a gap in pathology subspecialties as a dermatopathologist, a gastrointestinal pathologist, a neuropathologist, and a pediatric pathologist. Pathologist shortages in the Gaza health systems have resulted in suboptimal patient care, including delayed cancer diagnoses and diagnostic errors. This inadequate staffing has resulted in diagnostic delays and increased costs on cancer patients for private labs.

"The department is considered as the largest and the principal department of pathology in the GS, which receive at average 6000 cases per year, which is a huge number compared to the number of staff which overload on the team and increase the number of errors"; says Consultant Pathologist at Shifa hospital.

5.7.2. Gaps in radiologists

The study finds that the number of radiologists in the three governmental hospitals was 17 radiologists who served all the patients, not only cancer patients, representing about 0.9 per 100,000. The UK had an estimated 4.8 consultant radiologists per 100,000 people and seven radiologists (including trainees) per 100,000 people.

This is one of the lowest in Europe and compares to a mean of 12 radiologists per 100,000 population for Western Europe (GE Healthcare Partners, 2018)⁴⁷. A Key informant said, *"There are a few radiologists who can read MRI, which may affect the process of cancer management in the Gaza Strip."*

5.7.3. Gaps in medical radiation therapists

In the Gaza Strip, there are two medical radiation therapists (MRT), nuclear medicine specialist, and three medical physicists. However, they do not practice their job due to lack of facilities. They are in need of training and there is no dosimetrist in Gaza. Though there is a linear accelerator (the machine used for radiotherapy) at Prince Naif Diagnostic Center in Shifa Hospital, it has never worked. MoH has been unable to fix it, particularly given the difficulties of getting the spare parts for maintenance and specialist technicians into Gaza. Without guaranteed access to radiotherapy, surgeons are told undertake mastectomy and clearance procedures as the safest way to ensure the patient's survival. The number of expert radiologists is scarce. Functional imaging is unavailable in Gaza.

Gaps in safety of radiologist

By observation, the consultant finds an extreme shortage in radiologists' safety and the technician. They do not have a Thermoluminescent Dosimeter, a passive radiation detection device used for personal dose monitoring to measure the patient dose.

⁴⁶ Parry N. (2019). US Pathologist Supply down Relative to Diagnostic Demands <https://www.medscape.com/viewarticle/913755>

⁴⁷ GE Healthcare Partners (2018). Aligning demand and capacity in a changing healthcare environment. <https://emea.gehealthcarepartners.com/images/pdfs/Rapid-Review--Radiology-Workforce-Review-FINAL.pdf>. Accessed on February 9, 2021

5.7.4. Gaps in oncologists

The total number of oncologists in the GS is eight (which represent about 0.4 per 100,000), responsible for treating and make a follow-up for all the cancer patients in the GS. However, during an interview with a pediatric oncologist, he said *“We have sufficient pediatric oncologists, but the department needs supporting staff. In addition, the nursing staff is sufficient, but they are temporary employed based on job creation program.”*

This situation will increase the burden and pressure on oncologists because of an apparent increase in the number of cancer patients in the Gaza Strip. This will increase the medical mistakes and decrease the quality of care and treatment plan to the patients. The rate is 0.4 per 100,000 in the GS compared to 0.7 per 100,000 in Turkey and 13.1 per 100,000 in the UK (Statistica, 2018)⁴⁸. This means that the oncologists' numbers in the GS are too little compared to GS total population.

An oncologist said that MOH does not invest or provide enough attention or care to the GS oncology departments.

“We need further and subspecialised oncologists to meet patients' needs and to bridge the oncologists' gap”, he says.

The total number of nurses who work in oncology departments in inpatient and outpatients departments equal (51), which is too low compared to the total number of cancer patients in the GS, so this will exhaust the staff and the quality of care provided to the patients.

5.7.5. Gaps in surgical team

“In the GS, no oncosurgeons, no specialized surgeons are available for different types of cancers such as cancers of breast, colon, esophagus, lung, pancreas, liver, and reconstructive surgeons.” He continued to say, *“The lack of access to further specialist training outside Gaza for surgeons, nurses and other health professionals. This means surgeons cannot leave to learn updated guidelines and more advanced techniques to develop their surgical skills—furthermore, there is a significant gap in liver surgeries, plastic surgeries, and reconstructive surgeries”,* says Consultant Surgeon.

5.7.6. Gaps in psychologists

There is just one psychosocial worker at Rantisi hospital, which represents 0.05 per 100,000 population, which is inadequate and affects the patients' quality of care and psychological status. In Egypt, there are 0.13 psychologists per 100,000 population (WHO, 2011)⁴⁹. This gives an insight into the shortage of psychosocial workers in oncology departments in Gaza to support patients and decrease the disease burden.

Cancer patients are often emotional and feel both hopeless, and helpless. They need emotional and psychological support. However, a key informant explained that *“Apart from pediatric oncology department, social and emotional support in other oncology departments are almost absent, and MOH doesn't provide any sense of this care.”*

5.7.7. Gaps in clinical nutritionists

For many patients, the effects of cancer and cancer treatments make it hard to eat well. Cancer treatments that affect nutrition include chemotherapy, hormone therapy, radiation therapy, surgery, and immunotherapy. Nutrition therapy helps cancer patients keep healthy body weight, maintain strength, keep body tissue healthy, and decrease side effects during and after treatment (NCI, 2021)⁵⁰.

The current study finds no clinical nutritionist for cancer patients in all three governmental hospitals, which increases the patients' burden, as they need to know what foods they should eat. There also a significant variation among countries as it ranged from 39.3/100,000 in Japan to 0.1/100,000 in Pakistan (ICDA, 2016)⁵¹.

5.7.8. Gaps in Palliative Care and Pain Management

Despite being available, palliative care services are not well-framed in Gaza's hospitals

The pain of cancer is usually constant. A person with well-managed pain has improved quality of life. They are likely to sleep better and have more energy during the day.

⁴⁸ Statistica (2018). Number of oncologists per one million people in select countries as of 2018. <https://www.statista.com/statistics/884711/oncologists-density-by-country-worldwide/> Accessed on February 9,

⁴⁹ WHO (2011). Mental Health Atlas. Department of Mental Health and Substance Abuse, Egypt

⁵⁰ National Cancer Institute (2021). Nutrition in Cancer Care.

⁵¹ The International Confederation of Dietetic Associations (ICDA) (2016). Dietitians-nutritionists around the World

PART 6: NEEDS THAT EMANATE FROM OUR RESEARCH STUDY

In the Gaza Strip, governmental, NGOs, and private cancer care facilities are limited by several factors, including shortage of cancer care teams, inappropriate infrastructure, lack of equipment, tools, materials, cancer medications, and training, as well as restricted medical technology.

According to our research meetings with consultants and decision-makers in MOH and NGOs and Private health Sectors, these needs are based on this study's research findings and can be changed anytime in the future.

Some of these machines, like MRI, are consumable its liquid helium needs to be maintained under 269 0C; other equipment is prone to wear and tear. Some devices get malfunctioning and need spare parts. Some reagents could be depleted or developed. The needs in the current mapping study are based on international standards, or compared with the lowest rate at other countries, or recommended by the interviewed key informants.

6.1. Needs of cancer care teams

Providing high-quality health services for cancer patients requires appropriate cancer care staff with different subspecialties, and they also need to upgrade their capacity. The health system needs to send specialists for various subspecialties and fellowships in oncology, pathology, radiology, surgery, palliative therapy, and rehabilitation medicine.

The needs of cancer care teams are summarised as follows:

1. The need to build the histopathologists' capacity by increasing the numbers and finding fellowships for different pathology subspecialties.
2. The need to build radiologists' capacity by increasing the number of radiologists and including intervention radiologists, breast radiologists, and cerebrovascular radiologists.
3. The need to build endoscopists' capacity and skills and to improve their skills.
4. The need for radiotherapists, radiotherapy technicians, physicist and refreshment courses for the available radiotherapy staff.
5. The need to create a surgical staff specialised in different system cancer surgeries.
6. The need to enforce the cancer care team with experienced oncology nurses.
7. The need to enforce the cancer care team with skilled pain management specialists.
8. The need to enforce the cancer care team with qualified nutritionists.
9. The need to enforce the cancer care team with experienced psychologists.
10. The need to enforce the cancer care team with experienced physiotherapists.
11. The need to enforce the cancer care team with professional rehabilitation physicians.

6.2. Facility infrastructure needs

1. The need to renovation of Shifa hospital histopathology lab.
2. The need to establish histopathology labs in the Indonesian, Aqsa, and Najjar hospitals.
3. The need to develop pediatric pathology lab.
4. The need to establishment a gene lab.
5. The need to increase the surface area of the radiology department at Nasser Medical Complex.
6. The need to renovate and establishing the radiotherapy department at Shifa hospital.
7. The need to renew and provide furniture of radiology, pathology, and oncology departments.
8. The need for patient beds at the ultrasound units and recovery beds at the radiology department.
9. The need for patient's unique bed used while taking a stereotactic biopsy.
10. The need to allocate operating room for cancer patients only.

6.3. Equipment Needs

Pathology Equipment

1. Backup equipment for the existing two histopathology labs in Shifa hospital and Nasser Medical Complex.
2. Need for Fluorescence In Situ Hybridization (FISH) technique and equipment.
3. Gaza labs in need of flow cytometry equipment and its reagent.
4. Training of the operating staff on this new equipment.
5. Cytogenetics equipment and probes for genetic analysis of genetic diseases and organ transplantation.
6. Automated immunohistology equipment.
7. Enforce the tissue culture and facilities of the frozen section.

Radiology equipment

1. CT scan machine for Shifa and Najjar hospitals.
2. MRI machines for Indonesian, Aqsa, and Najjar hospitals.
3. Mammogram machines for Indonesian, Aqsa, and Najjar hospitals and Al Zaiton and Sorani primary health care centers.
4. Need two basic digital x-rays, two colored Doppler ultrasound, one CT scan, one MRI, one digital mammogram, and one digital panorama at the radiology department in NMC.
5. Need for construction radiotherapy center, six linear accelerators, hot lab, Gamma camera, two PETs scan, CT simulator and treatment planning system, quality control tool, equipment and radioisotopes.

Surgical equipment

1. Upper and lower gastrointestinal endoscopies for Indonesian, Aqsa, and Najjar hospitals
2. Endoscopic retrograde cholangiopancreatography (ERCP) equipment.
3. Endoscopy for renal system.
4. Endoscopy mucosal resection instruments for Barrett's esophagus.
5. Endoscopic ultrasound.
6. Intraoperative ultrasound.
7. Ultrasonic wave devices for surgery.
8. Coagulation electrode knife.
9. Ligasure ultrascissor is an electrosurgical bipolar vessel sealing system, which can fuse and divide tissue by applying a combination of pressure and energy.
10. Accessory for the laparoscope, harmonic equipment.

6.4. Materials needs

1. Materials for the immunostainer.
2. Radioisotope materials for positron emission tomography (PET) scan.
3. Radioactive iodine for thyroid scans.
4. Radioactive substances used to biopsy axillary lymph nodes and, therefore, assess breast cancer spread.
5. Radiopaque substances and injectable apparatus.
6. Colostomy bags.

6.5. Tool needs

1. Wire guided excision biopsy.
2. Breast tissue marker (clip) .
3. Magseed is a marker that is placed into the patient to help guide surgeons during a breast lumpectomy for impalpable breast cancer,
4. Endo-stapler and staples, articulate stapler.
5. Stereotactic software program and tools for biopsy.
6. Thermoluminescent Dosimeter (TLD) for the safety of radiologists and radiology technicians.

6.6. Cancer medications needs

1. Annex 7 and annex 8 show the needed lists for cancer medications and palliative drugs based on an interview with the CDS director.
2. Annex 9 shows the list of required cancer medications and palliative medications based on an Interview with Al Rantisi, pharmacy director.
3. Annex 10 shows antibiotics and antifungal medication based on an interview with the pediatric oncologist.

6.7. Training needs

Training and upgrading the skills of the cancer care team is the backbone for all professions for diagnosis and treatment of cancer. Almost all Gaza health workers require continuous training since there is a limitation in movement because of Gaza's longstanding blockade. Training of the multidisciplinary team in providing an adequate service to the cancer patient and his/her family is vital for the quality of provided services. Training health workers offer the opportunity to improve their abilities and skills, and performance.

Training needs as summarised as follows:

1. Training for General Practitioners who work at PHC facilities and oncology departments. Training on cancer early detection. General practitioners work in oncology and surgical departments and act as primary care providers to all society individuals. They function effectively within interdisciplinary health care teams, including within the hospital environments, participating and facilitating communication between primary care and hospital physicians.
2. Specialist physician: They may have helped diagnose cancer and continue to play a role in the patient's treatment team. They may be a dermatologist, pulmonologist, ear/nose/throat doctor, urologist, ob-gyn, or other specialists, depending on the type of cancer the patient has
3. Nurses at oncology departments: Training for nurses who administer chemotherapy and immunotherapy. Oncology nurse also involves direct patient care and assessment, patient and family education, coordination of care, and supportive care.
4. Training of the hematologist/oncologist: training to diagnose and treat cancer and use of chemotherapy and other drugs to treat cancer.
5. Surgeons: Training of surgeons on conducting surgery for cancer patients.
6. Develop training program on cosmetic and reconstructive surgery.
7. Pathologist: Training pathologist in molecular biology, gene diagnosis, flow cytometer, and other pathology subspecialties
8. Radiologist: Training these doctors on different body imaging
9. Radiation oncologist: Training radiologists to be specialized in the treatment of cancer using radiation.
10. Social worker: Social and emotional needs and provide services necessary to meet them. They are training to help patients cope with cancer and its treatment, such as financial, transportation, and home care needs.
11. Pharmacist: Training how to prepare and dispense medications.
12. Psychiatrist and psychologist: Training them how to help patients and their caregivers manage and cope with feelings, thoughts, worries, and behaviors. Psychiatrists have a medical degree and have the ability to prescribe medication.
13. Registered dietitian: Training how to help patients maintain a healthy diet and get proper nutrition during their treatment and recovery.
14. Rehabilitation specialist: Training to help patients maintain or regain their ability to perform daily activities.
15. Training for palliative care personnel: Palliative care training courses focus on improving the communication of prognosis with patients and families; managing pain and symptoms for patients with advanced disease; and other topics.

6.8. Information database needs

1. There is a need for hardware and software programs, a need to establish and strengthen the cancer registry, and a data allocation tool to avoid service duplication, especially while implementing the breast-screening program.
2. Need for Picture Archiving and Communication System (PACS).
3. Need for computers and network.
4. Need to develop and enforce cancer registry.

Fayza's story

54-year-old Fayza lives with her older sister. They have never married and both of their parents have passed away. Both sisters have little education, live in poor housing conditions and are unemployed.

The Ministry of social affairs provides them 500 ILS



every five months, but the sisters have accumulated debt in order to cover their basic needs.

“Three years ago, while Fayza was taking a shower, she found a lump in her left breast. However, she ignored the lump because she has no money for doctors fees, and because she found the lump in a sensitive part of her body. **The lump started to grow every day, but Fayza still had no money, and lacked the courage to seek medical help**”, says Fayza's sister.

Neighbors then advised Fayza to go to Al Awda hospital (NGO), where doctors told her that she has advanced breast cancer, and that he could not help her. She then went to Al Aqsa governmental hospital in the Middle governorate, where the doctor referred her to the breast department at Al Shifa hospital in Gaza. Breast biopsies were taken for pathology to reveal that the lump was malignant. The surgeons remove her breast (radical mastectomy). The surgeon referred her to an oncologist at Al Rantisi hospital, who put her on chemotherapy. She has received 12 courses of chemotherapy. She was sent for CT scanning, which revealed that she suffered from metastasis in the liver and bone. **Now, she lies in a coma due to liver failure, and she is on palliative therapy without psychosocial support.**

Fayza's medical condition deteriorated due to ignorance, delaying seeking medical treatment, fear of social stigma, abject poverty, and a lack of family support.

In Gaza, there are no primary care centers that conduct periodic examinations for women over the age of 50.

There was a long delay from diagnosing Fayza at Al-Aqsa Hospital, to taking samples and a biopsy at Al-Shifa Hospital, to transferring her to the specialist hospital for oncology in Gaza, to finally receiving chemotherapy. Appointment times were very long, which led to the deterioration of Fayza's health.

Fayza's psychological condition also deteriorated greatly, and she did not find anyone to provide her with the psychological support she desperately needed.

Fayza's sister hopes that other women will not suffer the bitterness of her sister's experience and hopes that health services in hospitals improve, which will save patients' time and money.

She also hopes that **women will be aware of the importance of early detection** and identification, to increase their chances of recovery.

“Women need psychological support during the treatment phase to help them to accept their illness and work to confront it”, says Fayza's sister.



PART 7: CONCLUSION

Cancer is one of the biggest killers in the Gaza Strip, and we have to make it a key priority for health authorities. The mapping study revealed that cancer is increasing in the Gaza Strip, and we have limited resources to help combat the issue. Where resources are limited, diagnosis and treatment services should initially target all patients presented with curable and easily detected cancers, like breast and oral cancers. They could also include childhood acute lymphatic leukemia, which has a high potential for cure. Above all, we need to provide services equitably and sustainably. Also, the Mapping study has clarified a diversity of organisational settings for cancer care in the Gaza Strip, as cancer care is provided to patients by the Ministry of Health, NGOs and the private sector. The MoH offer free access to treatment for cancer patients.

Overall, there was an increase in cancer cases of almost 6.8% between 2014 and 2018. According to this mapping study, we're seeing an increase in breast cancer and colorectal among adults and lymphoblastic leukemia among children. In addition to the physical problems and emotional distress caused by cancer, the high costs of care are also a burden to patients, their families, and the community.

The government is responsible for the whole cancer care process, working with other providers to cover the various stages of the cancer continuum of care. If cancer services are unavailable within MoH facilities, cancer patients are referred to non-governmental and private healthcare facilities based on clinical protocols for referrals.

In terms of the availability of screening services, MoH Strategic plan 2021- 2025 includes early detection and intervention of breast cancer and colorectal cancer. However, no clear national screening guidelines for breast cancer are available in the Gaza Strip, and the provided breast screening is fragmented and duplicated. The MoH has been focusing on enhancing free mammogram screening of breast cancer at Al Rimal primary health center. MoH is also planning to run mammography screening at level four PHC centers in each governorate. Missions by UNRWA and international NGOs support (such as Australian Overseas Aid) breast cancer screening programs. The screening was conducted at Palestinian Red Crescent Society, Ahli Arab Hospital, Alquds Hospital, and Awda

Hospital. The study finds that colorectal cancer is the second most common form of cancer affecting people in Gaza. However, there is no screening program for early detection of colorectal cancer in Gaza.

The study concluded a delay in cancer diagnosis at two levels. In the first level, patients fail to recognise suspicious cancer symptoms. The primary care physician may not identify and investigate patients with cancer symptoms or refer them on time in the second level, so in the third level, there is a delay in secondary care. Thus, broadcast awareness in the community using social media increases public knowledge of cancer symptoms and the importance of seeking timely medical attention. Regularly training general practitioners at primary care about alarming cancer symptoms, guidelines to identify these symptoms, promoting care continuity, and enabling access to a specialist through prompt referrals should help prevent cancer complications and the spread of the illness.

Interviews with patients and their caregivers also revealed that they often face delays in diagnosis because of severe shortages among pathology staff in the Gaza Strip. Five pathologists working at governmental labs are too low compared with the Gaza Strip population. Also, radiologists in Gaza are overstretched with many patients, not only cancer patients. The delays in treatment and the interrupted supply of cancer medication may lead to an unprecedented rise in diagnosis of advanced cancers and an increase in the number of deaths due to cancer within the coming years. The mapping study has also revealed fragmentation of the health system and complex pathways that patients with cancer care have to pass through during the various continuum of care phases.

Political factors and restricted movement imposed on Palestinians in the Gaza Strip complicate the referral process of cancer patients outside the Gaza Strip for radiotherapy and specialised chemotherapy and prolong the time needed between different steps in the process from detection to treatment. Despite the availability of services across all sectors, the lack of coordination between providers and facilities adds to the challenges of receiving cancer care that is already complex, involving treatment and support from multiple providers and services.

The study concluded most of the studied cancer patients live in an unsanitary environment. More than half of patients live close to dumping places, more than one-third live close to the sewage plant, and close to the painting factory. More than two-thirds are smokers or exposed to smoking.

The study concluded that predisposing factors to child cancers are In Vitro Fertilization (which could be due to exposure of the pregnant mother to hormone therapy), mothers exposed to infections or x-ray and if the child was born with low birth weight or admitted to the neonatal intensive care unit.

By preventing cancer, the number of new cases of cancer will decrease. This will reduce the burden of cancer and lower the number of deaths caused by cancer. The study concluded that there is an extreme shortage in cancer prevention programs, such as an anti-smoking program, combating obesity program, healthy diet, physical activity program, and program to help eradicate oncogenic infections such as Helicobacter Pylori.

The physician-patient relationship is at the cornerstone of the medical profession. A sound patient-physician relationship strengthens trust and encourages continuity of care, both of which contribute to patient health and wellbeing. The study found an unsatisfactory relationship that negatively affects patient care.

The study concluded fragmented care due to a delay in diagnosis, delay in surgical intervention, interrupted chemotherapy treatment, denial of patients referred for radiotherapy or radioisotope scanning, shortage of pain killers and narcotic analgesics. The study found unavailable services for cosmetic or reconstructive surgery and surgeons specialised for cancer surgery. Also, a shortage in radiotherapy services push surgeons to operate highly invasive surgeries to save the patients' life. The study concluded a small trial for palliative care training. However, there is an extreme shortage of palliative care services and a palliative multidisciplinary team.

The number of cancer patients continues to grow in the Gaza Strip. This is a time of great challenge but also an excellent opportunity to improve cancer services. The MoH is responsible for health needs to formulate overall an health policy, establish policy direction, and create an appropriate management environment to implement these policies. The current study finds that the MoH creates a National Committee to convert the Palestinian Turkish Hospital into a National Cancer Care Center (NCCC). This center depends on a multi-facet approach for the cancer care continuum, from cancer-preventive, screening, early detection, diagnosis, treatment, and palliative care. This center will include all the needed services as screening (i.e., mammogram, ultrasound), radiological (i.e., MRI, CT scans) and pathological machines (all equipment and backup) for cancer patients. It also will include all endoscopy sets and the development of surgical departments to be appropriate for cancer surgery, in addition to providing anti-cancer medicines.

Close to the NCCC, MoH plans to establish a radiotherapy and nuclear medicine department (KI said). MoH plans to equip this department with four linear accelerators, gamma camera, CT simulator, fixation tool, and treatment planning system, quality control tool and equipment.

Furthermore, MoH plans to develop a practical guide on how to implement effective cancer prevention by controlling major avoidable cancer risk factors, how to implement effective early detection of major types of cancer that are amenable to early diagnosis and screening, and how to implement effective cancer treatment, and palliative care.

The MoH plans also to build up consolidated multidisciplinary teams for cancer care and the positioning of the patient to be at the center of the care plan. MoH plans to develop training programs for the general practitioners at primary health care level to detect and suspect cancer during their daily work. MoH keens to find scholarships for pathology, radiology, oncology, surgery, psychology, physiotherapy, rehabilitation, and palliative care medicine. At the same time to find fellowships for intervention radiology, radiotherapy, nuclear medicine, pediatric pathology, and surgical oncology.

The MoH urges to upgrade the cancer registry and plans a cancer research foundation in the Gaza Strip coordinating with international advanced cancer research centers.

PART 8: RECOMMENDATIONS

Recommendation for the international community, for Palestinian Authority, Ministry of Health, and Ministry of Social Development.

8.1. Recommendations for the international community

- Call for Israeli authorities to lift 15 years longstanding suffocating blockade on Gaza and to give permission for patients to go abroad for treatment
- Ensure protection of medical personnel and medical facilities
- Support efforts to strengthen the Palestinian health staff and services by the free movement of health service providers and health missions.
- Promote and support the development of the Palestinian health sector

8.2. Recommendations for Palestinian Authorities

- Strengthen collaboration and coordination at the technical level between health authorities in the West Bank and the Gaza Strip, and ensure that provision of health care to the Palestinian population is not politicised in the political divide
- Calls on the Palestinian Authority to abide by its commitment to the hospitals it contracted to treat cancer patients in Gaza
- Call on the Palestinian Authority to supply the Gaza Strip with the necessary medications and medical devices to treat cancer patients.
- Develop a plan to build and establish a national cancer center, Gaza Cancer Center (GCC). It could be financed through national and international charitable organizations with coordination with MoH. As a starting point to develop breast cancer unit, colorectal unit, hepatobiliary unit, and thyroid unit. Best surgery from the first time, and not everyone works based on his interests.
- Support the CBOs who provide supportive treatment of cancer patients

8.3. Recommendations for Ministry of Health

- Enhance a common cancer care strategy amongst all health care providers
- Strengthen the existing breast cancer screening program, develop a colorectal screening program, and develop a Helicobacter Pylori eradication program.

- Focus on early diagnosis and treatment for cancers
- Establishment of a multidisciplinary team (surgeon, radiologist, pathologist, oncologist, nurse)
- Support the use of telehealth services within cancer care Gaza.
- Bridge the gap in the workforce by recruitment professionals for diagnosis and management of cancer patients
- Find scholarships for subspecialties in different fields of cancer management
- Coordinate and encourage medical missions with experts for cancer management
- Develop a training program and continued medical education for medical students and doctors in the different medical and surgical department who are enrolled in the Board program
- Develop and update the health and information system, strengthen the cancer registry, and establish a cancer research center. Train the entire registry personal and unify the registration procedures using the ICD-O3 classification and train doctors to help classify and manage cancer.
- Developing a plan to establish an Electronic cancer system
- Address the availability of home care
- Establish a specific department for palliative care.
- Develop a plan for regular training for staff who are included in cancer management about the proper communication and emotional support for cancer patients
- Establishment of molecular pathology by having flow cytometry (FISH technique)
- Change the location of the Shifa pathology lab
- Establishment of the intervention radiotherapy department
- Stress on equity and accessibility of cancer diagnostic and therapeutic facilities
- Increase community awareness and attention to early detection of cancer
- Address the high cost of cancer medications. It could be financed through charitable organisations
- Double-checking up pathology specimens before

sign out is very important because it guides selected treatment options and prognostic prediction.

- Coordination with universities and creation higher degrees based on needs

8.4. Recommendations for Ministry of Social Development

- To address the loss of income for both persons with cancer and their caregivers
- Support primary caregivers by establishing a caregiving Strategy that includes access to income programs for caregivers such as employment and private disability plans
- To better support persons who can work during treatment, increase efficiencies in terms of scheduling for diagnostic testing and chemotherapy,

8.5. Recommendations for Non-Governmental Organisations

- Develop cancer advocacy groups
- Strengthen extensive promotion of cancer awareness through promoting of the Self-Breast Exam, Fecal Occult Blood Test, Prostate-Specific Antigen, and other selective and effective screening programs
- Address the stigma of cancer, misconception, and myths
- Enhance coordination of cancer care, referral networks, and when patients face delays or lack information about their treatment, or must travel long distances and incur additional travel and accommodation costs
- Strengthen psychological support to cancer patients and their families, as well as respond to unmet needs of cancer patients and their families
- Develop and upgrade the supportive services for cancer patients
- Provide training for caregivers on how to communicate with cancer patients

8.6. Recommendations for the community

- Community members must be aware of early cancer symptoms, such as persistent cough, persistent unexplained pain, change in bowel/ bladder habits, and persistent difficult swallowing. They have to be aware of unexplained bleeding and change in the appearance of a mole, swelling, a sore that does not heal, and unexplained weight loss.
- Community members have to be aware of the risk factors of cancer as smoking, physical inactivity, overweight and obesity, processed food, and saturated fat.
- Community members must seek healthcare if they have any of the previous symptoms.
- Community members must seek treatment for H. pylori infections, hepatitis viruses, and genital warts.

8.7. Recommendations for cancer patients and their caregivers

- Inform cancer patients about their rights to healthcare .
- Service providers must inform patients about their privacy rights. They cannot disclose their medical information to anyone without patients' written permission. Patients can complain if their rights have been violated. They have permission to ask questions to ensure that their medical information is being protected.
- Inform cancer patients about the support groups and NGOs providing supportive services.
- Consider exploring stress-management techniques
- Increase awareness of food nutritive value and healthy eating practices and maintaining a healthy bodyweight.
- Raising awareness of sleep as a healthy behavior.
- Get health checkups regularly.
- Encourage people to stop smoking.
- Supporting caregivers of patients with cancer programs.

Annexes Annex 1:

Interviewed key informants

#	Name	Position	Health Facility
Ministry of Social Development (MoSD)			
1	Riyad Al Bitqar	Planning Director General	Ministry of Social Development
Ministry of Health			
2	Dr. Mohamad Qanoa	Consultant radiologist	Prince Naif center at Shifa H.
3	Mr. Moen Al Kariri	Director of health education	Rimal PHC, MoH
4	DR. Maha Amami	Director of women health	Rimal PHC, MoH
5	Dr. Zakri Abu Qamar	Director of central drug store	MoH, drug store
6	Eng Alaa Al Shorafa	Director IT	MoH, IT department
7	Dr. Khalid Thabet	Director of adult oncology	Rantisi hospital
8	Dr. Mahmmoud Shbair	Director of pediatric oncology	Rantisi hospital
9	Dr. Mohd Al Habeel	Director of pharmacy	Rantisi hospital
10	Dr. Hani Al Anqer	Director of pathology department	Shifa hospital
11	Dr. Kamal Jaber	Director of radiology department	Shifa hospital
12	Dr. Mohammad Al Ron	Director of surgical department	Shifa hospital
13	Dr. Naser Radwan	Director of surgical department	Indonesian Hospital
14	Dr. Alaa M. Al Bayouk	Director of pathology department	Nasser Medical Complex
15	Dr. Tareq Abu Mostafa	Director of radiology department	Nasser Medical Complex
16	Dr. Salem Saqar	Consultant surgeon	Nasser Medical Complex
17	Dr. Zaki Husni Zaqouk	Director of oncology department	Al Amal Hospital, PRCS
18	Eng. Anwar Attallah	Director of Arabic Relation	Ministry of Health
Semi and NGOs			
19	Dr. Sobhi Skak	Head of national committee of breast cancer	Ministry of Health
20	Dr. Sohail Al Madbak	Dean faculty of medicine	Al Azhar university
21	Dr. Elias Artin	Consultant surgeon	Al Quds hospital
22	Dr. Maher Ayyad	Medical director	Ahli Arab Hospital
23	Dr. Abdurrahman Qasem	Director	PRCS radiology department
24	Dr. Bassam Zaqout	Projects Manager	PMRS, projects coordinator
25	Dr. Raid Hamad	Director of Public Relations	Dar Essalam Hospital
26	Dr. Heba Abu Asi	Radiologist	Hamad Rehabilitation Hospital
27	Dr. Mohammad Mansour	Executive manager	Basmet Amal Association for cancer
28	Riziq Hasan Al Sous	Head Board of Trustees	Palestinian Association for care of Cancer patients
29	Fedaa Fayez	Director of health file	Al Shifaa Association for Cancer Patients' Care
Private Centers			
30	Dr. Mohammad El Helo	Deputy Chairman of Board of Directors	El Helo International Hospital
31	Dr. Abedrabo abu Hashish	Director of the center	Palestinian German Company for diagnosis
32	Dr. Rafiq Al Zant	Chairman of Board of Directors	Al Hayat Specialized Hospital

Date: / /2021

No.

Annex 2: Health Facility Assessment

My name isI work for Islamic Relief Palestine. Currently, I am involved in the “Mapping Study for Cancer Services in Gaza Strip” aiming at improving the health of cancer patients and service delivery in Gaza.

I will ask you about the structure and processes of cancer care delivery and perceived facilitators of and barriers to patients obtaining their prescribed treatments. Your decision to participate in this interview is voluntary. All information discussed today will be held in confidence. Information you provide will be summarised and reported with the responses of others, and will not be linked to you or any individual. There is no direct benefit from being interviewed. However, taking part may help identify strategies to improve cancer services in the future. The information will be secured and confidential and will be used only for research and development plan for cancer patients. Do you have any questions about your participation in this interview?

A. Information about the respondent

#	Name of person interviewed	Official Position	Contact number
1			
2			
3			

B. Information about the health facility

1. Name of the facility			2. Location			
3. Department	1.Radiology	2.Pathology	3.Oncology	4. Surgery	5.Nutrition	6. PSS
4. # population in catchment area			5. Area covered			
6. Geo-locality	1. Urban		2.Rural	3. Camp		
Interviewer:			Start time			

C. Information about service providers (medial and paramedical)

Service Providers	1.Male	2.Female	Total
No. of professional staff			

D. What are oncology subspecialties (based on certification) available in your facility?

#	Oncology Specialties	1.Yes	2.No	#		1.Yes	2.No
1	Medical oncologist			9	Neuro-oncology		
2	Pediatric oncologist			10	Hemato-oncology		
3	Surgical oncologist			11	Reconstructive surgeon		
4	Gynecology oncologist			12	Oncology nurse		
5	Uro-oncologist			13	Anesthetist		
6	Pathologist			14	Palliative therapist		
7	Radiation oncology			15	Physical therapist		
8	Interventional oncology			16	Psychologist		

E. What are the services provided for cancer patients?

1.Screening	2.Clinical diagnosis	3.Radiological diagnosis
4.Pathological diagnosis	5.Lab diagnosis	6.Chemotherapy
7.Surgery	8.PSS	9.Nutrition services
10.Palliative surgery	11.Palliative chemotherapy	12.Other, specify

F. Equipment availability at the facility

Equipment type	1. Functioning	2. Not-functioning
1.		
2.		
3.		
4.		
5.		
6.		
7.		

G. Cancer Patients

Number of cancer patients		1.Adult Male	2.Adult Female	3.Children ≤ 12 years	3. PWDs	Total
# of cancer patients receive treatment in 2020						
# of cancer patients currently receive treatment						
Types of common cancers, number and rate of recovery						
Male cancer						
1.CRC	2.Lung	3.Leukemia	4.Lymphoma		5.Prostate	
6.UB	7.Brain	8.Stomach	9.Pancrease		10.Renal	
Female cancer						
1.Breast	2.CRC	3.Thyroid	4.Lymphoma		5.Leukemia	
6.Uterine	7.Brain	8.Lung	9.Ovarian		10.Stomach	
Childhood cancer						
1.Leukemia	2.Lymphoma	3.Brain	4.Osteosarcom		5.Neuroblastoma	
6.Nephroblastoma	7.Thyroid	8.Retinoblastoma		9.Rabdomyosarcoma		
10. Others	Specify					

H. Cancer Prevention and Screening

Cancer prevention		
Do you implement a cancer prevention program?	1.Yes	2.No
If yes, what? Where?		
If no, why?		
Do you implement an education program for patients? 1. Yes 2.No		
If yes, what? Where?		
If no, why?		

Screening of common cancers						
Cancer	Gender		Age	Guidelines, if yes, what? If no, why		
	1.Male	2.Female		1.Yes	2.No	
Breast cancer						
Colon cancer						
Prostate cancer						
Skin cancer						
Other cancers						

H. Diagnosis of cancer

Diagnosis	1.Yes	2.No	if yes, what? If no, why
Clinical diagnosis			
Lab diagnosis			
Radiological diagnosis			
Pathological diagnosis			

I. Provided Treatment

Treatment	1.Yes	2.No	Shortages	Cost
Chemotherapy				
Targeted chemotherapy				
Hormonal therapy				
Surgical				
Radiotherapy				
Intervention radiology				
Nuclear radiology				
Palliative chemotherapy				
Palliative surgery				
Medical rehabilitation services				
Supportive services				
Psychological social services				
Supportive counselling				
Group or peer counselling				
Professional counselling				
Physical rehabilitation				
Occupational therapy				

Annex 3: CBOs Assessment

Date: / /2021

No.

My name isI work for Islamic Relief Palestine. I am currently involved in the “Mapping Study for Cancer Services in Gaza Strip” aiming at improving the health of cancer patients and service delivery in Gaza.

I will ask you about the structure and processes of cancer care delivery and perceived facilitators of and barriers to patients obtaining their prescribed treatments. Your decision to participate in this interview is voluntary. All information discussed

today will be held in confidence. Information you provide will be summarized and reported with the responses of others, and will not be linked to you or any individual. There is no direct benefit from being interviewed. However, taking part may help identify strategies to improve cancer services in the future. The information will be secured and confidential and will be used only for research and development plan for cancer patients. Do you have any questions about your participation in this interview?

A. Information about the respondent

#	Name of person interviewed	Official Position	Contact number
1			
2			
3			

B. Information about the CBO

1.Name of the CBO		2. Location	
3. # population in catchment area		4. Area covered	
6. Geo-locality	1. Urban	2.Rural	1. Camp
Interviewer:		Start time	

C. Information about service providers

Service Providers	1.Male	2.Female	Total
No. of professional staff			

D. Equipment availability at the CBO

Equipment type	1. Functioning	2. Not-functioning
1.		
2.		
3.		
4.		
5.		
6.		
7.		

E. Cancer Patients

Number of cancer patients	1.Adult Male	2.Adult Female	3.Children ≤ 12 years	3. PWDs	Total
# of cancer patients receive treatment in 2020					
# of cancer patients currently receive treatment					

F. Cancer Prevention and Screening

Cancer prevention						
Do you implement a cancer prevention program?				1.Yes		2.No
If yes, what? Where?						
If no, why?						
Do you implement an education program for patients? 1. Yes 2.No						
If yes, what? Where?						
If no, why?						
Screening of common cancers						
Cancer	Gender		Age	Guidelines, if yes, what? If no, why		
	1.Male	2.Female		1.Yes	2.No	
Breast cancer						
Colon cancer						
Prostate cancer						
Skin cancer						
Other cancers						
Supportive services						
Psychological social services						
Educational Services to children						
Supportive counselling						
Group or peer counselling						
Professional counselling						
Physical rehabilitation						
Occupational therapy						
Describe in detail your provided services for cancer patients						

Annex 4: Face-to-Face Interview Questionnaire (Adult with Cancer)

SN

Date:

Personal Information						
P1	Patient Name		P2. ID	P3.Mobile		
P4	Gender	1. Male	2. Female	P5. Age (years)		
P6	Refugee Status	1. Refugee	2. Not Refugee			
P7	Marital Status	1. Single	2. Married	3. Divorced	4. Widowed	5. Separated
P8	Governorate	1. North	2. Gaza	3. Middle	4. Khan Y	5. Rafah
P9	Female headed family		1.Yes	2.No		
P10	Address					

Family Situation

Family socioeconomic Situation		
P10 Level of education	Husband (F)	Wife (M)
Illiterate	1	1
Primary	2	2
Preparatory	3	3
Secondary	4	4
University	5	5
Postgraduate	6	6

P11 Occupation		
	Husband	Wife
Non-working/housewife	1	1
Unskilled manual worker	2	2
Skilled manual worker/farmer	3	3
Trades/business	4	4
Semi-professional/clerk	5	5
Professional	6	6

P12 Family income/month = ILS; Number of family members = Number of rooms =

#	P13 Residency Environment			
1	Geo-locality	1. Urban	2. Rural	3.Camp
2	Type of house	1.Asbestos	2.Zinco	3.Cement
3	Resident house	1.Owned	2.Rented	
4	Are you smoker or passive?	1.Yes	2.NO	if yes, how long?
5	House close to dumping places	1.Yes	2.NO	
6	House close to sewage plant	1.Yes	2.NO	
7	House close to power plant	1.Yes	2.NO	
8	House close to tiles factory	1.Yes	2.NO	
9	House close to marble factory	1.Yes	2.NO	
10	House close to paint factory	1.Yes	2.NO	
11	House close to battery factory	1.Yes	2.NO	

#	Patient Family History			
1	Family bedridden member	1.Yes	2.NO	if yes, who, why
2	Family member with chronic diseases	1.Yes	2.NO	if yes, who, why
3	Family member with cancer	1.Yes	2.NO	if yes, who, why
4	Other, specify			

#	Patient Medical History				
1	Chronic disease	1.Yes	2.NO	if yes, what	
2	Hormone therapy	1.Yes	2.NO	if yes, what	
3	Have you get pregnant using In Vitro Fertilization	1.Yes	2.NO		
4	Drugs	1.Yes	2.NO	if yes, what	
5	Exposure to x-ray	1.Yes	2.NO		
6	H. pylori infection	1.Yes	2.NO		
7	Patient BMI before diagnosis	1.underweight	2.normal weight	3.overweight	4.obesity

#	Patient Present Cancer					
1	Did you delay seeking health?	1.Yes	2.No	If yes why? Reasons for delayed diagnosis		
2	What was the diagnosis?					
3	How you discovered that you have cancer?	1.Screening		2.Clinical Diagnosis	3.BFE	
4	What makes you seeking healthcare?	1.Self-exam		2.advice	3.radio	4.internet
5	Where did you have the diagnosis?	1.MOH		2.NGOs	3.Private	
6	How long time elapsed between clinical diagnosis and radiological diagnosis (days).					
7	How long time elapsed between clinical diagnosis and pathological diagnosis (days).					
8	How long time elapsed between diagnosis and surgical treatment (days)					
9	How long time elapsed between diagnosis and chemotherapy.(days)					
10	Are you able to cover the cost of cancer management? 1.Yes 2.No, If yes, how much (NIS)					

#	Patient relationship with service provider					
1	How you evaluate your condition	1.Satisfied		2.not satisfied	3.scared	4.feeling lost
2	How you were you told about your diagnosis?					
3	Who told you about your diagnosis?					
4	Did the doctor answer your questions?				1.Yes	2.No
5	Did the doctor tell you how treatment affect your daily life?				1.Yes	2.No
6	Did the doctor support you and your family?				1.Yes	2.No
7	Did the doctor explain your pathology report?				1.Yes	2.No
8	Did the doctor tell you your treatment options?				1.Yes	2.No
9	Did the doctor help you to find places that can give you more help				1.Yes	2.No
10	Did doctor discuss your concerns about how cancer will affect your future life				1.Yes	2.No
11	Did the doctor tell you about the possible side effects of each treatment?				1.Yes	2.No
12	Did the doctor communicate with you properly?				1.Yes	2.No

#	To cope with Diagnosis, I do the following	1.Yes	2.NO
1	Learn as much as possible about the disease		
2	Continue doing at least some of usual, daily activities		
3	Going through the mail		
4	Using a cell phone to communicate with the hospital		
5	Take care of family relationships		
6	Spend time with children and husband /wife		
7	Find out supportive services or friend available to help cope		
8	A psychologist help me to cope		
9	I am a religious, and easy to cope		
10	Others, specify		

From the first symptoms you have suffered through diagnosis, and treatment

<p>What are the gaps you observed in service provisions?</p>
<p>What are your unmet needs?</p>
<p>What are your recommendations for improvement?</p>

Annex 5: Caregiver Face-to-Face Interview Questionnaire (Children with Cancer)

SN

Date:

Personal Information						
P1	Patient Name		P2. ID		P3. Mobile	
P4	Gender	1. Male	2. Female		P5. Age (years)	
P6	Refugee Status	1. Refugee	2. Not Refugee			
P7	Marital Status of Parents	1. Single	2. Married	3. Divorced	4. Widowed	5. Separated
P8	Governorate	1. North	2. Gaza	3. Middle	4. Khan Y	5. Rafah
P9	Female headed family		1. Yes	2. No		
P10	Address					

Family Situation

Family socioeconomic Situation					
P10 Level of education			P11 Occupation		
	Father	Mother		Father	Mother
Illiterate	1	1	Non-working/housewife	1	1
Primary	2	2	Unskilled manual worker	2	2
Preparatory	3	3	Skilled manual worker/farmer	3	3
Secondary	4	4	Trades/business	4	4
University	5	5	Semi-professional/clerk	5	5
Postgraduate	6	6	Professional	6	6
P12 Family income/month = ILS;					
Number of family members =					
Number of rooms =					

#	P13 Residency Environment				
1	Geo-locality	1. Urban	2. Rural	3.Camp	
2	Type of house	1.Asbestos	2.Zinco	3.Cement	
3	Resident house	1.Owned	2.Rented		
4	House close to dumping places	1.Yes	2.NO		
5	House close to sewage plant	1.Yes	2.NO		
6	House close to power plant	1.Yes	2.NO		
7	House close to tiles factory	1.Yes	2.NO		
8	House close to marble factory	1.Yes	2.NO		
9	House close to paint factory	1.Yes	2.NO		
10	House close to battery factory	1.Yes	2.NO		
#	Patient Family History				
1	Family member bedridden	1.Yes	2.NO	if yes, who, why	
2	Family member with chronic diseases	1.Yes	2.NO	if yes, who, why	
3	Family member with cancer	1.Yes	2.NO	if yes, who, why	
4	Smoking of parents	0.No	1. Father	2.Mother	3.Both
5	Other, specify				

#	Patient Medical History				
1	Was the mother get pregnant with In Vitro Fertilization	1.Yes	2.NO		
2	Was the child admitted in the NCU?	1.Yes	2.NO	if yes, why?	
3	Was the mother exposed to x-ray during pregnancy with the child?	1.Yes	2.NO		
4	Was the child LBW	1.Yes	2.NO	if yes, BW	
5	Was the child born preterm	1.Yes	2.NO	if yes, week	
6	Was the mother get infections during pregnancy with this child?	1.Yes	2.NO	if yes, what?	
7	Did the mother take drugs during pregnancy with the child?	1.Yes	2.NO	if yes, what?	
8	Blood group of the child	1.A	2.B	3.AB	4.O

#	Patient Present Cancer			
1	Did you delay health seeking for the child?	1.Yes	2. No	Reasons for delayed diagnosis
2	What is the diagnosis of your child?			
	How you discovered that you have cancer?	1.Screening	2.Clinical Diagnosis	
3	Where did you have your child diagnosis	1.MOH	2.NGOs	3.Private
4	What makes you seeking healthcare?	1.Self-exam	2.advice	3.radio
5	How long time elapsed between clinical diagnosis and radiological diagnosis (Days).			
6	How long time elapsed between clinical diagnosis and pathological diagnosis (Days).			
7	How long time elapsed between diagnosis and surgical treatment if any (Days).			
8	How long time elapsed between diagnosis and chemotherapy (Days).			
9	Are you able to cover the cost of cancer management? 1. Yes 2. No, If yes, how much			

#	Service provider patient relationship	1.Yes	2.NO
1	When your child was diagnosed, how they tell you?		
2	Who told you the diagnosis of your child?		
3	Did the doctor answer your questions?		
4	Did the doctor support you and your family?		
5	Did the doctor help you to find places that can give you more help?		
6	Did the doctor discuss your concerns about how cancer will affect child life?		
7	Did the doctor explain your pathology report?		
8	Did the doctor tell you your child treatment options?		
9	Did the doctor tell you about the possible side effects of each treatment?		
10	Did the doctor tell you how treatment affect your child daily life?		
11	Did the doctor communicate with you properly?		

#	To cope with Diagnosis, my child do the following and I help him/her to do	1.Yes	2.NO
1	Teach him/her as much as possible about the disease		
2	Continue doing at least some of usual, daily activities		
3	Going through the e-mail		
4	Using a cell phone to communicate with the hospital		
5	Take care of family relationships, maintain relation with schools and neighborhood friends		
6	Spend time with other children and husband		
7	Find out supportive services or friend available to help cope		
8	Recommend a psychologist to help my child to cope		
9	I am a religious, and my child and easy to cope		
10	Others, specify		

From the first symptoms you have suffered through diagnosis, and treatment

What are the gaps you observed in service provisions?

What are your unmet needs?

What are your recommendations for improvement?

Annex 6:

Interview with Director of CBOs and NGOs

1. Do the human resources in your organisation match the provided supportive services for cancer patients? If not, what do you suggest to respond to patients' load?
2. Do you know of other centers providing supportive services for cancer patients?
3. What are the provided supportive services for cancer patients?
4. Who are the targeted beneficiaries of your services? (adult cancer patients, children with cancer, patients' caregivers, all)
5. How do you rate the supportive services for cancer patients at your organisation?
6. Do you conduct rehabilitation services?
7. Do you conduct PSS?
8. How do you scale (1- 10, one unsatisfied, and ten perfect) the coordination among cancer service providers?
9. Do you have a developmental plan in the future regarding cancer patients?
10. What about your needs, gaps of services?
11. What are recommendations you have suggested?
12. Do you have an electronic database for your patients?
13. Are there any issues that I have not brought up that you would like to address?

Interview with General Director (Deputy) of Hospitals

1. In general, please tell me about the cancer patients' situation in Gaza
2. What about cancer in the MoH strategic plan 2021-2025?
3. What about cancer strategic plan?
4. What about the cancer service process (continuity of services)?
5. What are the challenges, obstacles facing MoH regarding early detection, diagnosis, and management of cancer patients?
6. Does MoH developmental plan respond to these challenges?
7. Do you have a developmental plan in the future regarding cancer patients?
8. What is the hospitals' capacity for preventive and screening program?
9. What is the hospitals' capacity for cancer diagnosis and treatment (outpatients, inpatients, beds, furniture, human resources, specialties and subspecialties, cost of treatment)?
10. What about the Infection Prevention and Control (IPC)?
11. What about your needs, gaps of services?
12. What about cancer patients' referral system, difficulties, cost, etc?
13. What about the referral system and treatment abroad?
14. What opportunities do MoH have to better serve cancer patients?
15. Do you have a cancer registry? If yes, can I have it?
16. In your opinion, do you encourage development of cancer multidisciplinary teams or establish a big center for cancer management
17. What recommendations do you suggest?
18. Are there any issues that I have not brought up that you would like to address?

Interview with Director of Screening Program

1. Can you tell me what you thought about the cancer screening intervention?
2. What type of cancer are you screening?
3. Do you know other organisations run cancer-screening program? Who they are?
4. Are all equipment available for screening? If yes, what you have?
5. Was there anything that specifically worked well to increase screening?
6. Was there anything specifically that did not work (barriers) to increase screening?
7. How did the organisation practice handle questions from patients?
8. How did the staff respond to patients' questions about cancer screening in general?
9. If you have seen an increase in cancer screening and follow up, describe to me whether you think this increase is sustainable. Why or why not?
10. What do you think could have been done to improve the intervention?
11. What about your needs, gaps of services?
12. What about the cancer service process (continuity of services)?
13. How many mammogram machines you need to cover the screening
14. Are the radiologist sufficient to meet the needs. How many you need?
15. Do you have a developmental plan in the future regarding cancer screening and other prevention programs?
16. What recommendations you have suggested?
17. Are there any issues that I have not brought up that you would like to address?

Interview with Director of Radiological Department

1. Are the human resources in your department match the number of cancer patients? If not, what do you suggest to respond to patients' load?
2. Do you know other centers providing radiological services for cancer patients a part of MoH? If yes, where and what services they provide?
3. What about the equipment for diagnosis and radio-intervention of cancer patients?
4. What about the screening, radiological diagnosis, radiotherapy, nuclear diagnosis and intervention, radio-intervention? Are you satisfied with the facilities and equipment? Are all diagnostic facilities you request available?
5. What about the IPC?
6. What about the cancer service process (continuity of services)?
7. What about the appointment system? Reporting system, Are there any delays? How long the patient have to wait the result report?
8. Do you have a developmental plan in the future regarding cancer patients?
9. How do you scale (1- 10, one unsatisfied, and ten perfect) the coordination among cancer management multidisciplinary team (oncologist, pathologist, radiologist, nurse, psychologist, etc)?
10. How many radiology machines you need to cover the needs?
11. Are the radiologist sufficient to meet the population needs, how many you need?
12. What about your needs, gaps of services?
13. What specific barriers do you think might get in the way?
14. What are recommendations you have suggested?
15. Are there any issues that I have not brought up that you would like to address?

Interview with Director of Pathology Department

1. Are the human resources in your department match the number of cancer patients' requests? If not, what do you suggest to respond to patients' load?
2. How long does the pathological report is given to cancer patients from specimen delivery Do you know other centers providing histopathological diagnosis a part of MoH? If yes, where and who they are?
3. Are all the equipment, supplies, and disposables for the lab available?
4. Is a frozen section available in your lab?
5. What about the IPC?
6. What about the appointment system? Are there any delays? How long the patient have to wait the result report?
7. What are the difficulties you faced during your work?
8. What are your working needs for cancer patients?
 - 1.always
 - 2.usually
 - 3.frequently
 - 4.often
 - 5.sometimes
 - 6.occasionally
 7. rarely
 - 8.never
9. How often do you tell the patient about the diagnosis?
10. What about the cancer service process (continuity of services)?
11. What about your needs, gaps of services?
12. What about the equipment you need to cover the needs?
13. Are the pathologists sufficient to meet the population needs, how many you need?
14. Do you have a plan to develop your department? If yes, tell me about it.
15. What are your recommendations?
16. Are there any issues that I have not brought up that you would like to address?

Interview with Director of Oncology Department

1. Are the human resources in your department match the number of cancer patients? If not, what do you suggest to respond to patients' load?
2. Do you know other centers providing management for cancer patients a part of MoH?
3. What about the radiological diagnosis, pathological diagnosis, lab findings? Are you satisfied with the results? Are all diagnostic facilities you request available?
4. What about the appointment system? Are there any delays?
5. What about chemotherapy and hormonal therapy? Is it always available? What about the patient health status in case of discontinuation of chemotherapy.
6. What type of cancer patients you usually see?
7. Do your management regimen of cancer depend on updated international protocols or depend on national guidelines? If not, why? If yes, what?
8. Do you implement a targeted chemotherapy for patients in need?
9. How do you deal with the side effects of chemotherapy? Do you have the needed drugs?
10. Does your team include a psychologist?
11. How do you scale (1- 10, one unsatisfied, and ten perfect) the coordination among cancer management multidisciplinary team (oncologist, surgeon, pathologist, radiologist, nurse, psychologist, etc)?
12. What about the equipment for management of cancer patients?
13. Do you provide palliative management?
14. Do you care for imminently dying?
15. What specific barriers do you think might get in the way?
16. What about the cancer service process (continuity of services)?

17. What about the treatment abroad?
18. Do you have a developmental plan in the future regarding cancer patients?
19. What about your needs, gaps of services?
20. Are the oncologist sufficient to meet the population needs, how many you need?
21. What are recommendations you have suggested?
22. Are there any issues that I have not brought up that you would like to address?
23. What is the rate of patient recovery in your facility?
24. Do you know other organizations in your area provide the same services? Are these services overlap or complement with your services?
- 25.

Interview with Director of Surgical Department

1. Are the human resources in your department match the number of cancer patients? If not, what do you suggest to respond to patients' load?
2. Do you know other centers providing management for cancer patients a part from MoH?
3. How do you rate the clinical diagnosis of cancer at your department?
4. What about the radiological diagnosis, pathological diagnosis, lab findings? Are you satisfied with the results? Are all diagnostic facilities you request available?
5. What about the appointment system? Are there any delays? How long the patient have to wait for surgery?
6. What type of cancer you usually treat?
7. What about the surgical modalities for cancer management? Is it always available? What about the patient health status in case of side effects.
8. Do your management regimen of cancer depend on updated international protocols or depend on national guidelines? If not, why?
9. Do you do reconstructive plastic surgery for cancer patients?
10. Do you conduct a palliative surgery?
11. Does your team include a psychologist?
12. What about the cancer service process (continuity of services)?
13. How do you scale (1- 10, one unsatisfied, and ten perfect) the coordination among cancer management multidisciplinary team (surgeon, oncologist, pathologist, radiologist, nurse, psychologist, etc.)?
14. What about the surgical equipment, supplies for management of cancer patients?
15. What about IPC in your department?
16. What specific barriers do you think might get in the way?
17. What about the treatment abroad?
18. Do you have a developmental plan in the future regarding cancer patients?

19. What about your needs, gaps of services?
20. What are recommendations you have suggested?
21. Are there any issues that I have not brought up that you would like to address?
22. Do you order pathology tests electronically, or by paper request?
23. When do you get the result?
24. Do you think there is a difference between the quality of pathology services provided within the hospital compared to the private sector?
25. On a scale 1-10, with 1 being totally skeptical and 10 being totally confident. How confident are you in the accuracy of pathology results

Palliative Care if any

1. Does your organization have a palliative care program or provide access to a palliative care program?
2. (If the organization does not have a program). Are you developing a palliative care program or plan to develop one in the future? a. If not, why not? b. If yes, why are you developing a program?
3. How do you define palliative care in your organization?
4. What a palliative care team consist of?
5. Is there confusion among providers, patients, or families about what palliative care is?
6. How do you explain it to patients and their families?
7. In your opinion, do the palliative care services in your program meet the needs of your community? How could those services be improved?
8. In your opinion, what are the major reasons for referrals to palliative care in your program?
9. What is your opinion regarding the palliative care referral process? a. How can the palliative care referral system be improved?
10. What about your needs, gaps of services?
11. Do you think patients are being referred to palliative care at the appropriate time? a. What is the appropriate time?
12. Thinking about the patient side, what are the major patient-related barriers to providing high quality palliative care?
13. On the provider side, what are the major provider-related barriers to providing high quality palliative care?

Annex 7:

Palliative medications based on director of CDS

	Palliative medications based on director of CDS		
1	Antidepressant drugs	Tablet	Tablet
2	Morphine	Tablet	Tablet
3	Morphine	Ampoule	Ampoule
4	Methyl acetyl morphine	Ampoule	Ampoule
5	Pethidine	Ampoule	Ampoule
6	Fentanyl	Ampoule	Ampoule
7	Fentanyl	Patch	Patch
8	Oxycodone	Tablet	Tablet
9	Pregabalin	Tablet	Tablet
10	Clexan	Ampoule	Ampoule

Annex 8:

Shortage of Chemotherapy and palliative drugs at Rantisi hospital

Based on an Interview with the director of Al Rantisi pharmacy			
No.	Item	Form	Unit
1	Actinomycin D 0.5mg	Vial	Single
2	Asparaginase 10000 I.U.	Vial	Single
3	B.C.G Freeze Dried 5X10*8 CFU with Administration filter	Vial	Single
4	Bevacizumab (Avastin) 400mg 16ml vial	Vial	Single
5	Bevacizumab (Avastin) 100mg 16ml vial	Vial	Single
6	Cyclophosphamide 1000mg	Vial	Single
7	Dacarbazine 500mg	Vial	Single
8	Docetaxel 20mg vial	Vial	Single
9	Epirubicin 10mg vial	Vial	Single
10	Mesna 400mg	Vial	Single
11	Mercaptopurine 50mg	Vial	Single
12	Methotrexate 500mg	Vial	Single
13	Methotrexate 2.5mg	Vial	Single
14	Nilotinib 200mg	Vial	Single
15	Paclitaxel 100mg	Vial	Single
16	Rituximab 500mg vial	Vial	Single
17	Rituximab 100mg vial	Vial	Single
18	Trastuzumab 440mg vial	Vial	Single
19	Vinorelbine 50mg	Vial	Single
20	Vincristine Sulphate 1mg	Vial	Single
Palliative medications based on director of Rantisi pharmacy			
21	Tramadol HCL 150 mg	Tablet	Tablet
22	Tramadol 50 mg	Tablet	Tablet
23	Tramadol 37.5 mg plus paracetamol 325	Tablet	Tablet
24	Pregabalin 75 mg	Tablet	Tablet
25	Gabanentin 300 mg, 400 mg	Tablet	Tablet

Annex 9:

Drug shortage at pediatric oncology department

Based on interview with the pediatric oncologist			
1	Amphotericin liposomal 50 mg	Vial	Single
2	Caspofungin 50 mg	Vial	Single
3	Piperacillin	Vial	Single
4	Tozabactam	Vial	Single

Annex 10:

The underlying table shows the medical supplies for cancer patients that out of stock

Based on Interview with director of Al Rantisi pharmacy			
1	Subclavian catheter	4	Lower locked syringes
2	Gown nylon shield	5	Gauge needle 19
3	Long sleeved gloves	6	Port cat needle



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