The Current Cancer Situation in a Specialized Hospital in Metropolitan Dhaka

By

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A thesis submitted to the School of Pharmacy in partial fulfillment of the requirements for the degree of Bachelor of Pharmacy.

School of Pharmacy
BRAC University
May, 2023

Declaration

It is hereby declared that

1. The thesis submitted is my own original work while completing degree at BRAC University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

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Approval

The project titled "The Current Cancer Situation in Metropolitan Dhaka" submitted by Golam Morshid (19146089), of Summer 2022 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Pharmacy.

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Ethics Statement

This study does not involve any animal or human trial. An ethical permission in given by the ethical committee of Ahsania Mission Cancer and General Hospital to conduct the survey (attached in appendix 2).

Abstract

Dhaka, the country's most populous metropolis, is also one of the most polluted because of its heavy reliance on industry and the resulting release of harmful emissions and carcinogens into the air. The data collected from the questionnaire survey was used to investigate the correlations between the incidence of cancer with age, gender, genetic predisposition of cancer, and exposure to risk factors such as environment, habits, exposure to carcinogens, the patient's occupation, the proximity of a mobile tower within 30 to 50 meters and the use of tobacco product. From this study, significant correlation has been found between the incidence of cancer with the closeness of patients' residence to cell phone towers, with a confidence interval of 95% and p value of 0.04. In addition to this, correlation of cancer incidence has also been found with the exposure to various carcinogens (cl 95% and p value 0.05). The results of this study provide a glimpse of the state of cancer incidence in Dhaka today. However, extensive research on a larger population is necessary to verify the results of this study.

Keywords: Carcinogen, Cancer survey, Genetic predisposition, Cancer, Specialized hospital.

Dedication

Dedicated to my parents and my younger brother.

Acknowledgement

First and foremost, I would like to express my gratitude to the Almighty for his endless gifts, which have been given to me in an effort to provide me with the strength and determination tocomplete this project.

It is my genuine pleasure to offer my heartfelt appreciation to my academic supervisor, Dr. Nishat Zareen Khair (Assistant Professor at BRAC University's School of Pharmacy), for her invaluable guidance and encouragement during this research. Through the course of my education and project writing, she was a true source of advice and support for me. I am quite grateful to her for her valuable comments and ideas during my study, which helped me much in completing my project work in a timely manner.

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Finally, I'd like to convey my thanks to my parents, who never cease to inspire me to push myself beyond my comfort zone. I would not have made it this far without the daily prayers and unconditional love of my family and loved ones.

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List of Acronyms

1. LMICs: Low and Low Middle-Income Countries
2. IARC: International Agency for Research on Cancer
3. WHO: World Health Organization
4. SCC: Squamous cell carcinoma
5. BCC: Basal cell carcinoma
6. STSs: Soft tissue sarcomas
7. BSs: Bone sarcomas
8. AML: Acute myeloid leukemia
9. CML: Chronic myeloid leukemia
10. ALL: Acute lymphoblastic leukemia
11. CLL: Chronic lymphocytic leukemia
12. IgM: Immunoglobulin
13. CT: Computerized tomography
14. MRI: Magnetic resonance imaging
15. PTE: Positron emission tomography
16. AIDS: Acquired Immunodeficiency Syndrome
17. TB: Tuberculosis
18. GCO: Global Cancer Observatory
19. HPV: Human papillomavirus

20. CC: Community Clinics

21. UHC: Upazilla Health Complexes

22. RNAi: RNA interference

23. EVs: Extracellular vesicles

24. SPSS: Statistical Package for the Social Sciences

25. PHC: Primary health care

26. NGOs: Non-governmental organizations

27. SEER: Surveillance, Epidemiology, and End Results.

28. NGO: Non-governmental organizations.

Chapter One: Introduction.

1.1 Cancer - a global perspective.

Cancer is increasing at an alarming pace globally, making it the second largest cause of mortality after cardiovascular disease (de Martel et al., 2020; Wang et al., 2016). Statistics from the GLOBOCAN, IARC, a cancer registry, regulates, indicate that about 19,292,789 new cancer cases were diagnosed in a population of 7,794,798,844 in 2020, or 2.475% (World Health Organization, 2020) In 2020, there were approximately 10,065,305 male and 9,227,484 female cases of cancer worldwide. Furthermore, cancer encompasses more than 277 distinct cancer diseases for which scientists have identified varying stages, suggesting the involvement of multiple gene mutations in cancer pathogenesis (Hassanpour & Dehghani, 2017) Unfortunately, cancer is a disease that manifests itself in a wide range of ways depending on the affected tissue and leads to diversity. In light of that, cancer is still the leading cause of death and drawback worldwide and has detrimental consequences on a nations' human resources and economies(Hassanpour & Dehghani, 2017; Misiorek et al., 2021). Moreover, WHO found that cancer is one of the leading or second leading causes of death in 112 of 183 countries in 2020. In light of this, it is clear that a better understanding of the percentage impact of modifiable risk parameters on cancer incidence and their patterns over time is critical to notifying cancer control endeavors on a local and global scale (Deo et al., 2022; Ebrahimi et al., 2021).

In light of this, according to WHO, lung cancer is one of the most significant cancer-related causes of death, with an expected 1.8 million deaths, which is around 18%, next by colorectal cancer, which is about 9.4%, followed by liver cancer which is approximately 8.3%, stomach 7.70%, and female breast cancer 6.90%(Deo et al., 2022). It is anticipated that there will be 28.4 million new cancer cases worldwide by the year 2040, representing a 47% increase from the number of cancer cases diagnosed

in 2020 (Sung et al., 2021). As a result of demographic shifts, the cancer burden is predicted to rise more rapidly in transitioning countries (64–95%) than in transitioned countries (32–56%) (Mao et al., 2022; Sung et al., 2021). However, this may be further exacerbated by rising factors linked to global competition and a booming economy (Mao et al., 2022). The current research efforts in the realm of early cancer identification and prevention have been accelerated due to the global increase in incidence and death rates associated with this illness, as well as the dismal outlook related to the majority of malignancies (Y. B. Zhang et al., 2020). Moreover, cancers such as lung, breast, and colon, are currently on the upswing in financially transitional nations; this tendency will continue if safety precautions are not implemented on a widespread scale (Kerschbaum & Nüssler, 2019; Mao et al., 2022). Therefore, People who live far away from metropolitan centers, those who belong to a low socioeconomic category, and some ethnic communities that have lifestyles and belief systems that affect cancer control are more likely to have poorer cancer control within their own country and between nations (Ferlay et al., 2017; Olver, 2017). So, enhancing cancer control is a complicated endeavor; nonetheless, the establishment of worldwide objectives that are attainable for lowering the burden of non-communicable illnesses is a welcome first step toward a healthier world (Olver, 2017; Rumgay et al., 2021). To overcome this, an adequate and comprehensive cancer control program that focuses on cancer prevention education and screening tests must be created in order to combat this problem; the goal of such a program should be to lower the incidence rate of cancer and raise the longevity rate of people living with cancer (Kishore & Kiran, 2019; Klein et al., 2022).

1.2 What is cancer?

Cancer is a category of over 100 illnesses that may occur practically anywhere in the body. The smallest building blocks of the human body are cells (G. Cooper, 1970). When new cells are required, they are generated by cell division. In most cases, cells perish because they have aged too much or are damaged beyond repair. After then, new cells take their place and, mutations in a cell's DNA disrupt this usually occurring progression, which can lead to cancer, and unchecked cell growth begins to occur (J. Zhang et al., 2022). Eventually, a clump of these cells can develop into a tumor. Depending on the circumstances, a tumor may be malignant or noncancerous. A malignant tumor is cancerous and has the potential to metastasize (Lazebnik, 2010). Continually uncontrolled growth of cancer cells is the underlying defect that causes cancer formation. Instead of adequately reacting to the stimuli that regulate usual cell behavior, cancer cells proliferate and divide uncontrollably, infecting normal tissues and organs and ultimately affecting the entire body (G. M. Cooper & Hausman, 2007). The overall lack of growth control demonstrated by cancer cells is the cumulative outcome of aberrations in various cell regulations; it is expressed in several features of cell activity that differentiate cancer cells from their regular counterparts (G. M. Cooper & Hausman, 2007). Figure 1.1 depicts the progression of cancer from a healthy cell to the entire body (G. M. Cooper & Hausman, 2007). Besides, one of the most critical aspects in the progression of cancer is the suppression of cell division in the healthy cells that surround the tumor. It is possible for cancer cells to form and flourish in this setting while having little to no effect on the healthy cells nearby (G. M. Cooper & Hausman, 2007).

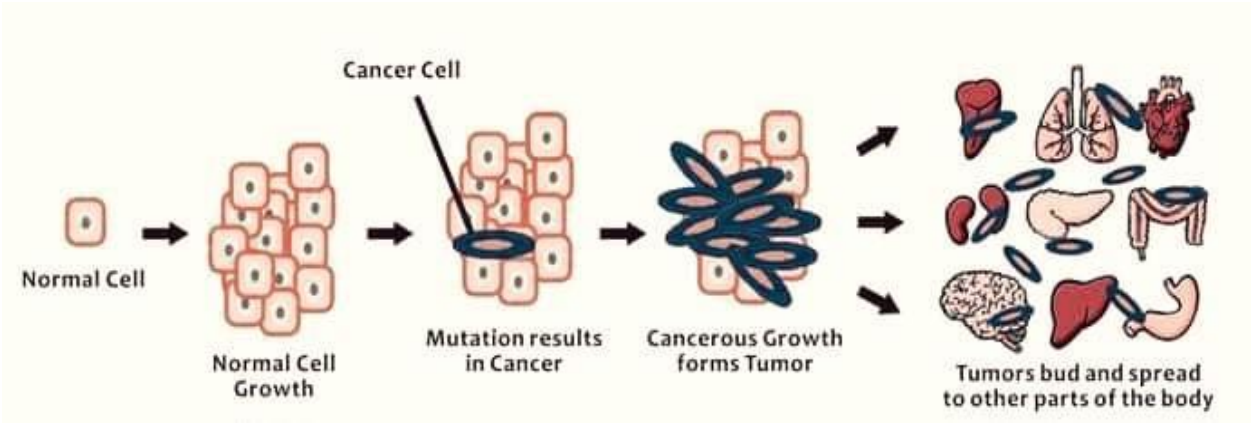

Figure1.1: The progression of cancer from a healthy cell to the entire body *(G. M. Cooper & Hausman, 2007).*

Furthermore, in Figure 1.2, the hallmarks of cancer consist of six biological capacities gained during the multistep evolution of human malignancies. The hallmarks serve as an organizing framework for understanding the intricacies of malignant tumors (Roizen, 2012). They consist of maintaining proliferative signals, avoiding growth suppressors, resisting cell death, allowing replicative immortality, generating angiogenesis, and stimulating invasion and metastasis (Roizen, 2012).

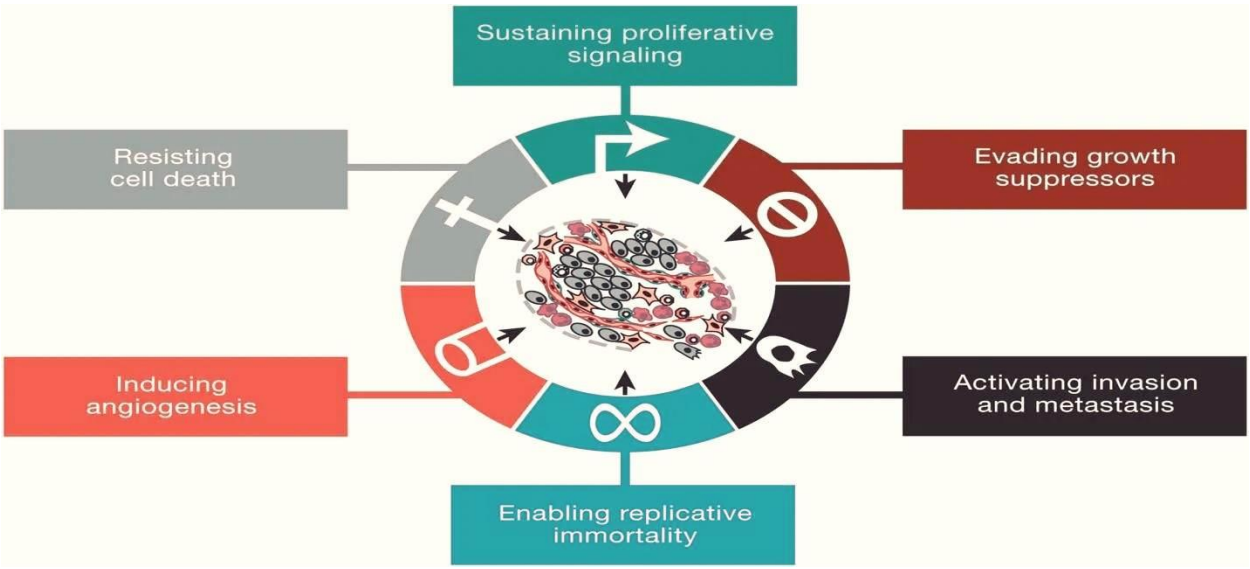

Figure 1.2: Characteristics that are typical of cancer *(Roizen, 2012).*

1.3 Types of cancer

The human body comprises tissues and organs, which are composed of groups of cells, and they are practically interchangeable. However, there are some distinctions between them since various bodily organs serve different purposes (National Institute for Health, 2021). Neurons and muscle cells, for instance, are specialized for various tasks and have distinct cellular architectures (National Institute for Health, 2021). There are about 200 recognized forms of cancer, each of which can be further subdivided by its site of origin (such as breast cancer or lung cancer) (Murugesan et al., 2021). Some cancers, such as epithelial and squamous cells, can also be classified by the specific kind of cell that gave rise to them (Murugesan et al., 2021).

1.3.1 Carcinoma

Cancer of the epithelial cells that surround organ surfaces and release fluids and mucus is called adenocarcinoma. Some tissues that include these epithelial cells are referred to as glandular tissues (Bhimji & Wallen, 2018). Adenocarcinomas account for the vast majority of cases among the three most common malignancies (Bhimji & Wallen, 2018).

Cancer of the basal cells that line the epidermis (the outer layer of skin) is called basal cell carcinoma. Most cases of basal cell carcinoma (BCC) develop on sun-damaged skin, while those on the mucous membranes and palms, and soles are pretty unusual (Jen, 2013; Tiosano et al., 2021). Metastases from basal cell carcinoma are uncommon since the tumor grows slowly. Despite its low mortality rate, basal cell carcinoma (BCC) can cause significant damage to surrounding tissues and can cause disfigurement if treatment is poor or delayed (Jen, 2013). BCC is diagnosed clinically when it presents as flesh or pink pearly papules with underlying ulceration or telangiectatic arteries. Most BCC occurs on the scalp or neck, although the disease can also spread to other parts of the body (Jen, 2013).

1.3.2 Sarcoma

Rare malignancies known as soft tissue sarcomas develop in the body's connective, supportive, and enclosing tissues (Vodanovich & Choong, 2018). Fat, muscle, blood arteries, deep skin tissues, tendons, and ligaments are all potential targets for soft tissue sarcomas. There is a wide range of possible sites for developing soft tissue sarcomas (abdomen) (Hatina et al., 2019). Sarcomas affect 2-4 individuals per 100,000, and its more than 50 types are primarily classified as soft tissue sarcomas (STSs) and bone sarcomas (BSs) (Vodanovich & Choong, 2018).

Brief Outline about Sarcoma:

- Malignant tumors that develop from mesenchymal cells are called sarcomas (Vodanovich & Choong, 2018).
- About one percent of all malignancies are sarcomas (Maki, 2019).
- Incidence rates of sarcomas are 2-4 per 100,000 persons (Vodanovich & Choong, 2018).
- Because of this shift, undifferentiated pleomorphic sarcoma is now the diagnostic of exclusion for MFH, which was previously considered a subtype of sarcoma (UPS) (M. E. Anderson et al., 2019).

1.3.3 Leukemia

Hematologic malignancies, such as leukemia, are a diverse category of diseases caused by the dysregulated growth of immature white blood cells. Myelocytic leukemia is classed as acute, while lymphocytic leukemia is chronic (Chennamadhavuni et al., 2022) They are classed as acute or chronic according to how quickly they multiply and as myeloid or lymphoid depending on the kind of cell from which they originate (Greaves, 1996). The most common forms of leukemia are those of the myeloid lineage, such as acute myeloid leukemia (AML) and chronic myeloid leukemia (CML), and the

lymphoid lineage, such as acute lymphoblastic leukemia (ALL) and chronic lymphocytic leukemia (CLL) (Puckett & Chan, 2019).

1.3.4 Lymphoma

Cancer of the lymphocytes is known as lymphoma (T cells or B cells) (Meng et al., 2020). In the immune response, these white blood cells work to combat illness; and lymphoma results from an accumulation of lymphocytes that are aberrant in the lymph nodes, lymph arteries, and sometimes other areas (Meng et al., 2020).

Lymphoma comes in two primary forms:

- Individuals with Hodgkin lymphoma have what are termed Reed-Sternberg cells, which are unexpected lymphocytes most of the time, these cells come from B cells (Shanbhag & Ambinder, 2018).
- Lymphocytes are the starting point for the development of the form of cancer known as non-Hodgkin lymphoma. Types of cancer can develop from either B cells or T cells, which can develop quickly or slowly (Binder & Brody, 2019).

1.3.5 Multiple Myeloma

Asymptomatic precursor constraints, such as monoclonal gammopathy of smoldering multiple myeloma, in which actively pursuing chromosomal abnormalities such as hyper diploidy and translocations involving the immunoglobulin (IgM) heavy chain are already present, constitute the most common routes whereby multiple myeloma develops in high-income states (Rajkumar, 2022; van de Donk et al., 2021). Although immunomodulatory medicines, proteasome inhibitors, and CD38-targeting antibodies have increased the number of years patients may expect to live, most will still succumb to their illness or treatment-related side effects (van de Donk et al., 2021).

1.3.6 Melanoma

Melanoma is a specific type of cancer that develops in melanocytes, the cells that generate the pigment melanin. Melanoma is more lethal than any other type of skin cancer; high survival rates are seen in the early stages of melanoma when just surgery is required for treatment, but this drastically decreases after the cancer has spread (Davis et al., 2019). Consequently, assuring individuals have the best prognosis requires early and accurate diagnosis. Because a misdiagnosis of melanomas in their early stages greatly diminishes a patient's chances of survival, more pathological and dermatological malpractice lawsuits are filed for melanomas compared to any other malignancy other than breast cancer (Leiter et al., 2014).

1.3.7 Brain and spinal cord tumor

Although spinal cord malignancies are uncommon, every radiologist should be familiar with the signs and symptoms of these lesions, which are most commonly detected in adolescents and younger adults (Balériaux, 1999). Brain and spinal cord cancers can take many forms, and the location and kind of cell from which these tumors originated in the brain are used to give them their respective names (American Cancer Society, 2020). For instance, astrocytes, the star-shaped brain cells that aid in maintaining the health of nerve cells are the cells of origin in cases of astrocytic tumors (Lukas et al., 2014). Tumors of the brain can be either benign (not cancerous) or malignant.

1.4 Cancer staging

Cancer staging is the practice of evaluating the physical manifestations of a disease. Before, diagnostic imaging for cTNM was restricted to radiographs and ultrasound scans; thus, doctors had to rely on patient histories and physical examinations to make diagnoses (Brierley et al., 2016). After surgery, histological results are gathered to define the pTNM, and these findings should be adequate to classify the tumor as T or N (Brierley et al., 2016; Telloni, 2017). The T, N, and M classifications are combined to form stage groups, and these stage groups must be documented and maintained for the patient's medical history (Jann et al., 2011).

The objectives of staging categorization are:

- Help in therapy planning.
- Give a prognostic indicator (Jann et al., 2011).
- Aid in the assessment of the outcomes allows the transmission of information across treatment centers and helps ongoing research into human cancers (Brierley et al., 2016).
- Support cancer control initiatives (Telloni, 2017).

1.5 Global cancer statistics

Since cancer contributes to one in every six deaths globally, more than AIDS, Tuberculosis (TB), and malaria put together, it ranks as one of the most lethal diseases in recent memory (Chhikara & Parang, n.d.; Sung et al., 2021). Moreover, the Global Cancer Observatory (GCO), which is part of the IARC, compiles information on the number of people who die from and are diagnosed with cancer all over the world; and statistics and interactive visualization of datasets regarding cancer occurrences and fatalities across 185 countries in regional and sex-based data are included in the GLOBOCAN 2020

project (Chhikara & Parang, n.d.). In addition, in figure 1.3, a projected survey carried out by WHO shows us the new cancer cases of 2020 in a pie chart, with Asia having the highest number at around 49.3%, Europe coming in second with approximately 22.8%, and then Northern America, Latin America and the Caribbean, Africa and Oceania have the numbers 13.3%, 7.60%, 5.70%, and 1.3% respectively (Sung et al., 2021).

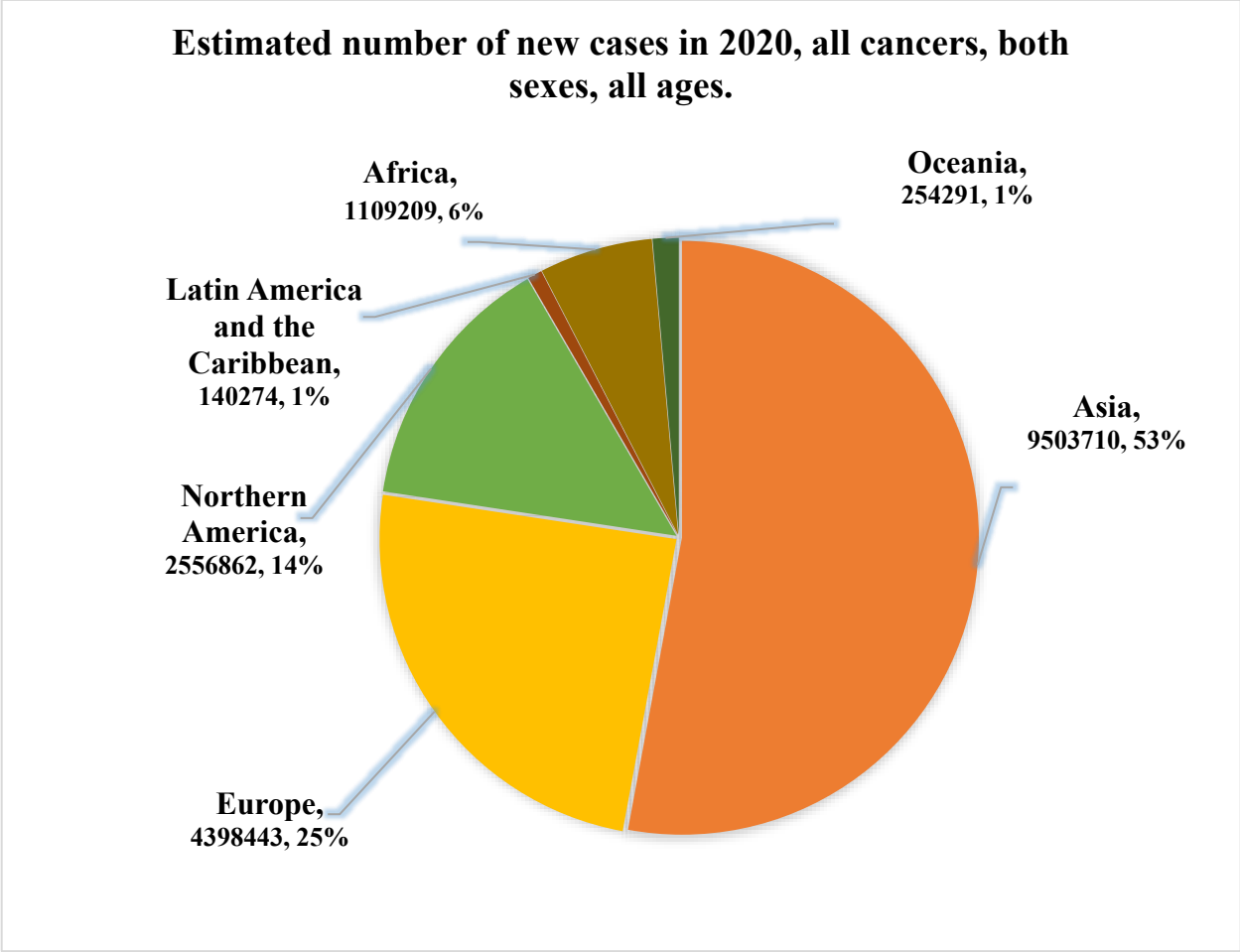

Figure 1.3: The projected number of new instances of cancer diagnosed in people of all ages, both sexes, in the year 2020 *(World Health Organization, 2020).*

Likewise, figure 1.4 displays the incidence versus the mortality around the globe, including both males and females as the approximate age standard of all cancers of all age ranges, and the number of male

and female cancer patients of all ages, the blue bar outlined the incidence; the red bar demonstrates the mortality in comparison to the incidence according to the WHO and IARC annual report, 2020 (World Health Organization, 2020). In contrast, the bar graph reveals that the regions of Asia and South Africa have the highest death rate compared to the incidence, while the areas of Australia and New Zealand have the lowest mortality rate, indicating that these nations have accelerated their healthcare systems (Prager et al., 2018; Pravettoni et al., 2022).

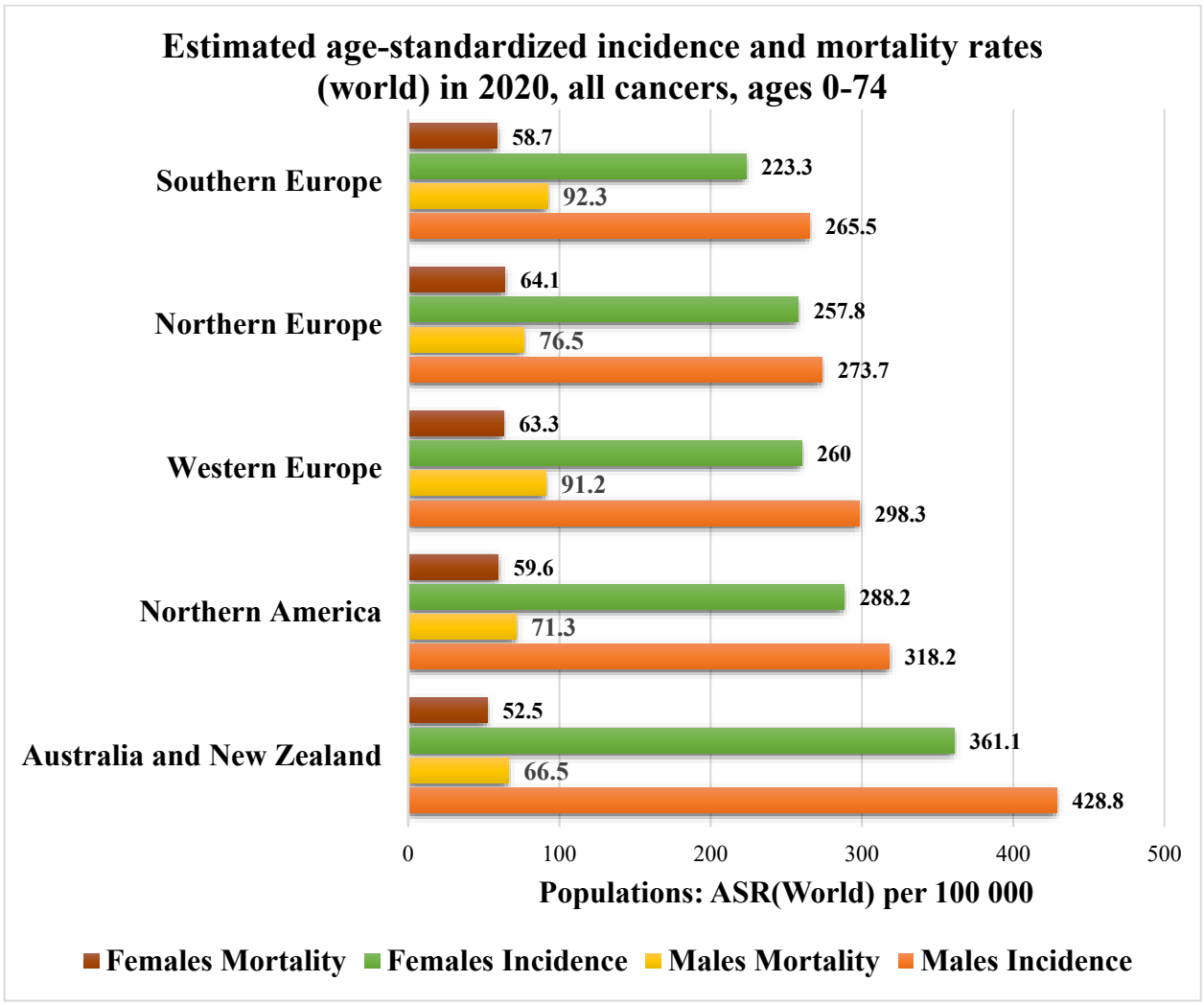

Figure 1.4: Standardized incidence and death rates based on age, estimated for all cancers and all ages, worldwide *(World Health Organization, 2020).*

In addition, GLOBOCAN 2020 projects that there were 19.3 million new cases of cancer and 10 million deaths attributable to cancer worldwide in the year 2020 (Hermans et al., 2022). In figure 1.5, approximately 2,261,419 or 11.70% cases of breast cancer, the most common cancer in females (World Health Organization, 2020). Next, the total number of lung cancer cases is 2,206,771, which is 11.40%. After that, the incidence of cancer in the colorectum, prostate, stomach, liver, and cervix uteri follow in the following order: 10%, 7.30%, 5.6%, and 4.70%. (World Health Organization, 2020).

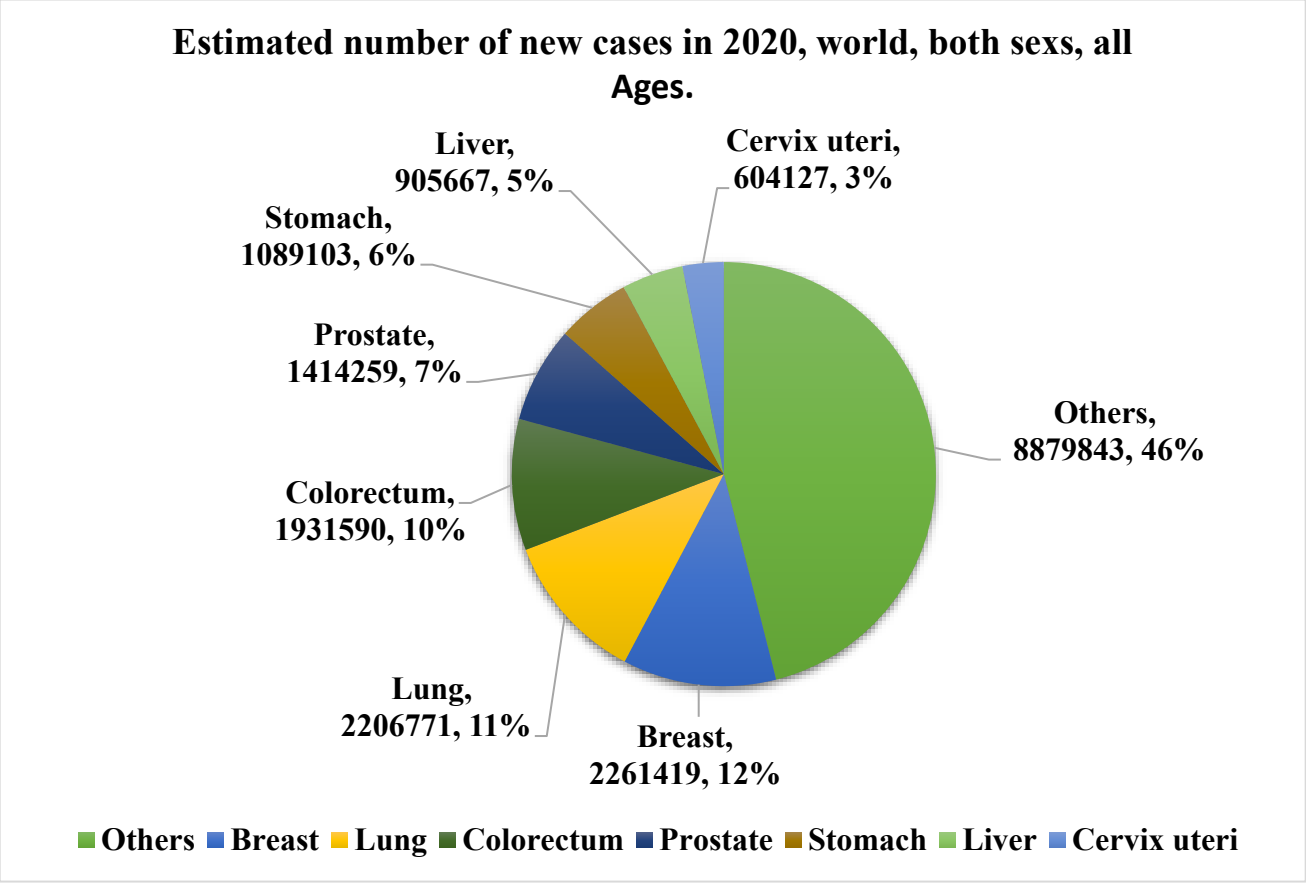

Figure 1.5: The estimated number of new cases occurred worldwide in 2020 across all age groups and genders *(de Martel et al., 2020).*

1.6 Perspectives on the future of cancer, its increased incidence, and newly arising obstacles, info-graphic.

Furthermore, according to the GLOBOCAN report 2020 published by the International Agency for Research on Cancer (IARC), the expected number of people diagnosed with cancer worldwide in 2040 will increase to around 28.9 million from the 19.3 million cases that were recorded in 2020, which is showing in figure 1.6 (World Health Organization, 2020).

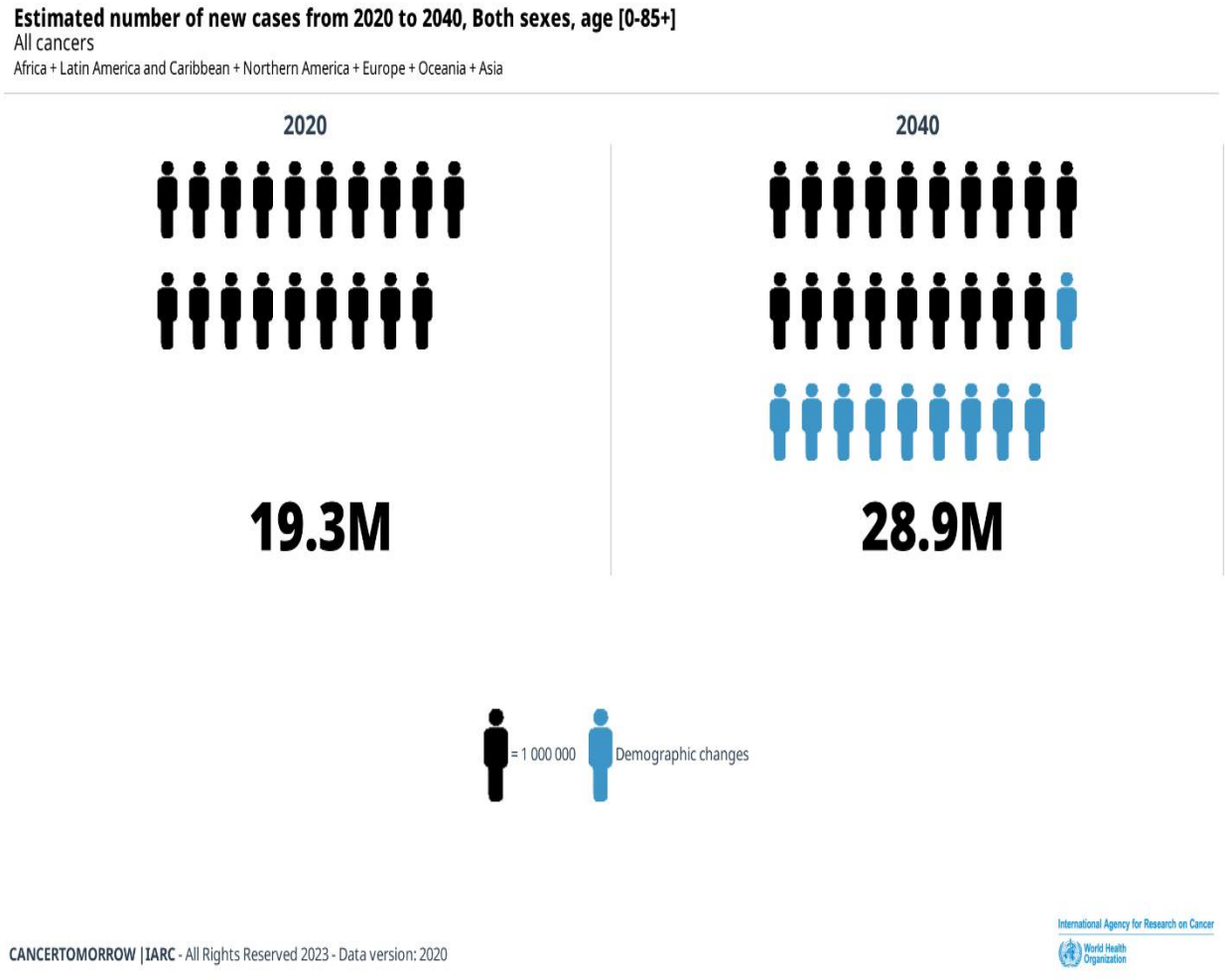

Figure 1.6: New cases predicted between 2020 and 2040, broken down by gender and age (0-85) *(Ferlay et al., 2021).*

In addition, figure 1.6 depicts an estimated total of new cancer cases between 2020 and 2040 in various regions; the blue bar in figure 1.6 indicates the cases caused in 2020, while the red bar depicts the number that will be diagnosed in 2040 for both genders and age ranges ranging from 0 to 85 (Siegel et al., 2021). In relation, the bar graph shows that Asia has the potential to have the highest number of new cancer cases, which is a lagging cause for the lower and middle-income countries in the Asia region (Siegel et al., 2021).

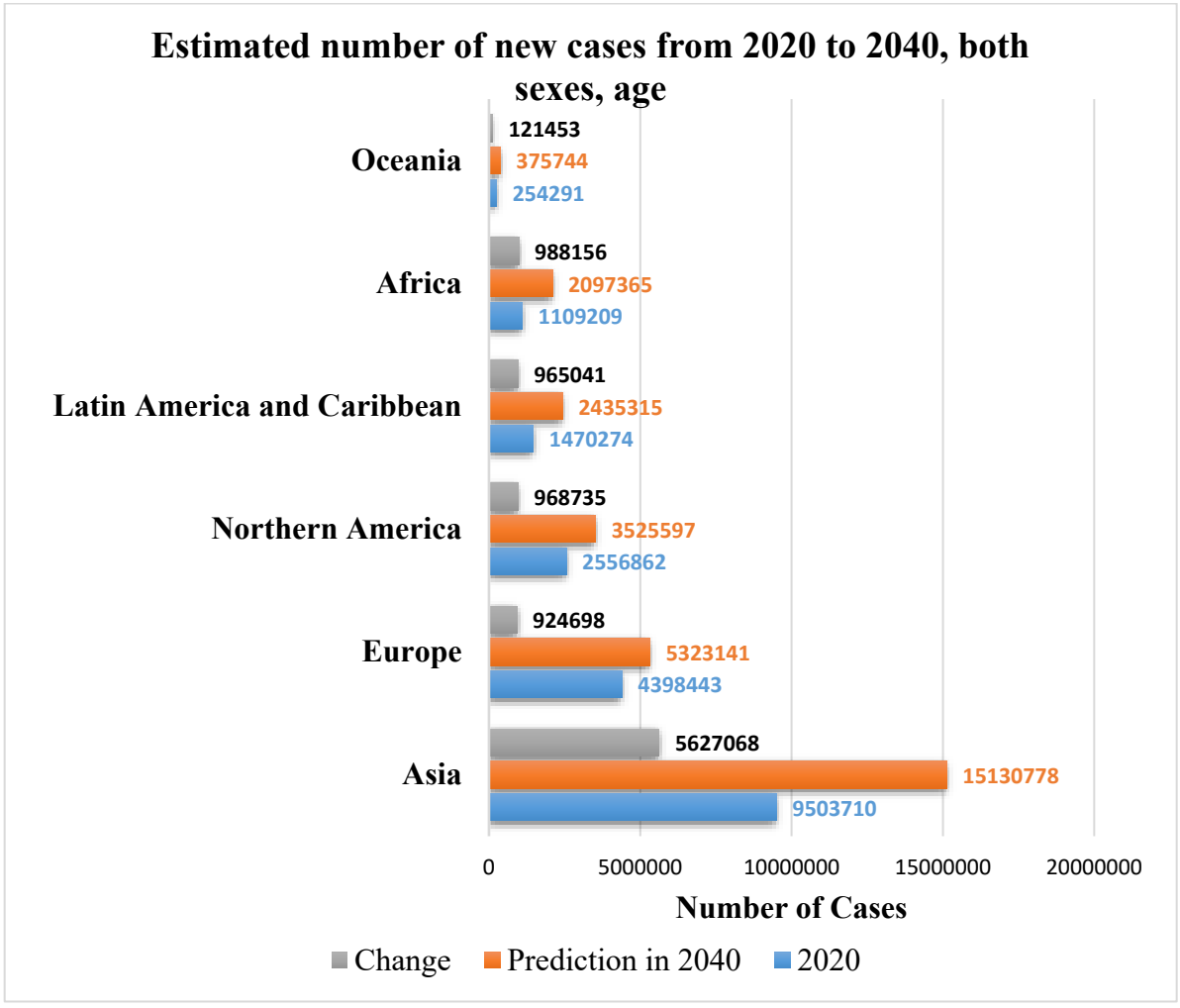

Figure 1.7: Approximate total number of new incidences by location, gender, and age (0-85) from 2020 to 2040 *(Ferlay et al., 2021).*

Furthermore, in figure 1.7, according to the GCO, the leading causes were Helicobacter pylori, which accounted for approximately 36.30% of cases; human papillomavirus, which accounted for approximately 31.10% of cases; hepatitis B virus, which accounted for approximately 16.30% of cases; hepatitis C virus, which accounted for approximately 7.1% of cases, and other incidences, which accounted for approximately 9.3% of cases (de Martel et al., 2020).

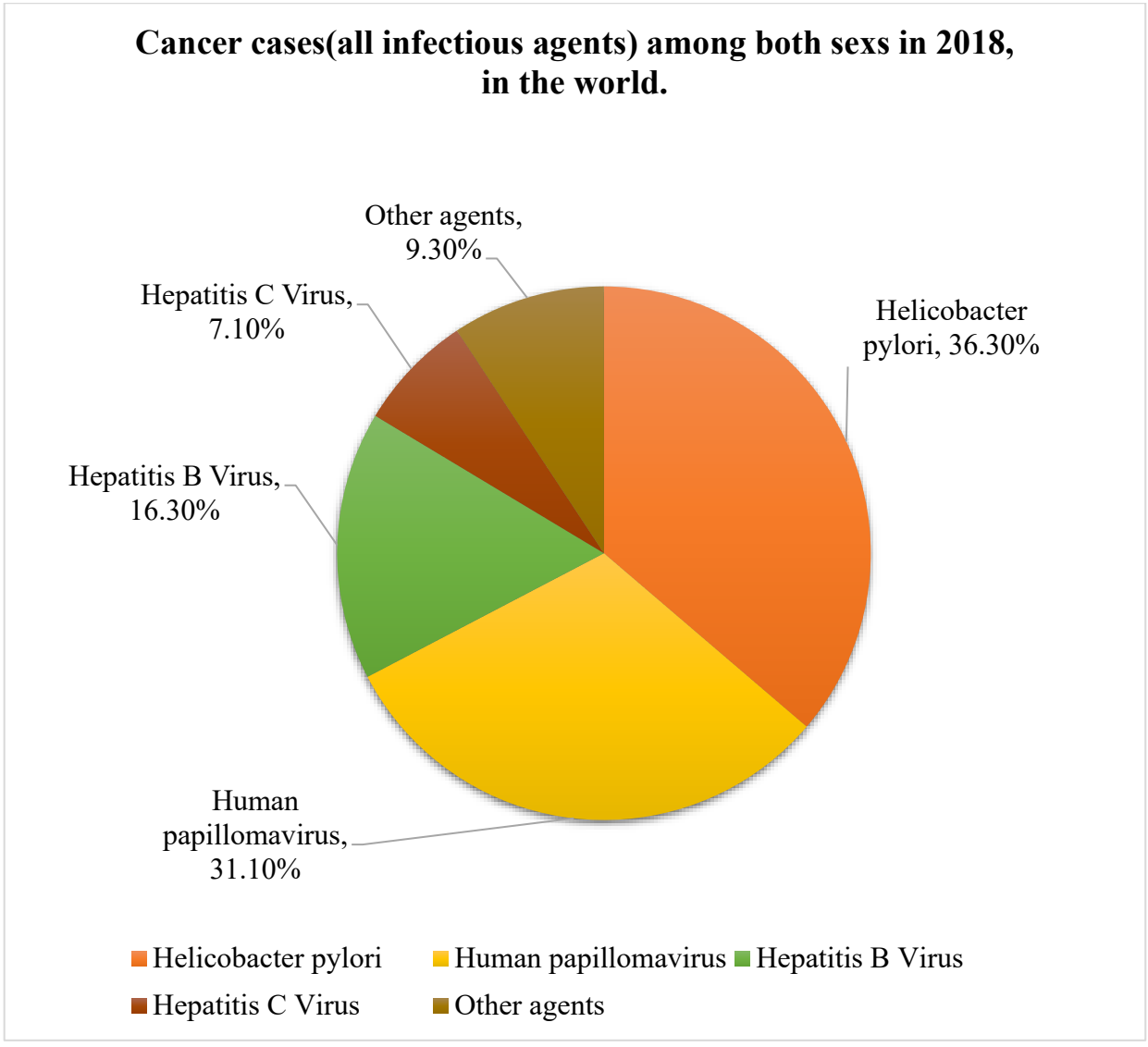

Figure 1.8: Infections caused by pathogens that affected people of both sexes in 2018 globally *(de Martel et al., 2020).*

On the other hand, cancer is a worldwide issue that primarily affects developing nations. In a recent survey, emerging nations account for 63% of cancer-related mortality (Abbas & Rehman, 2018). Nevertheless, new cancer therapy methods are being researched regularly, with over 60% of all experimental studies centered on tumor cures worldwide (Abbas & Rehman, 2018). The treatment's effectiveness depends on the type of cancer, the location of the tumor, and its stages of advancement. Besides, therapy for cancer takes a very long time and costs a lot of money (S. M. A. Hussain, 2013). The vast majority of persons who contract cancer do not have the financial resources to cover cancer treatment. Most patients in Bangladesh do not seek medical attention until they have progressed to a late stage because of a lack of education and awareness (S. M. A. Hussain, 2013).

Table1: Downsides of the most recent cancer therapy techniques *(Allende-Perez et al., 2022).*

Strategy to treat cancer	Challenges
Nanoparticles	• It is reliant on the specific nanoparticle (Pucci et al., 2019).
Extracellular vesicles (EVs)	• Inadequate methods for isolating, quantifying, storing, and loading drugs prior to preclinical trials (Pucci et al., 2019).
Natural antioxidants	• Probable toxicity (Sznarkowska et al., 2017). • Low bioavailability (Walter & Ahmed, 2021).
Targeted therapy	• There is a dearth of data on the potential for irreversible harm.
Gene therapy	• Genome integration (Sayed et al., 2022). • Limited effectiveness in certain patient groups (Mendell et al., 2021). • Need for ad hoc modes of delivery (RNAi) (Shirley et al., 2020).
Thermal ablation Magnetic hyperthermia	• High efficacy only for confined zones (Chang et al., 2018). • Low penetrating power (Chang et al., 2018). • Requirement of a trained operator to administer the therapy (Chang et al., 2018).
Radiomics/pathomics	• Definition of unambiguous data gathering requirements (Scapicchio et al., 2021). • Description of characteristics and simulation methods to establish robust protocols for the production of models for therapy (Z. Liu et al., 2019).

Furthermore, Typical cancer treatments and the difficulties they might cause are depicted in figure 1.7, and these treatments include surgery, radiation, chemotherapy, etc.

Their results are listed in the following examples:

- Low percentage of patients who have a positive response (Zhou et al., 2020).
- Multiple drug resistance (Ricci et al., 2017).
- Metastasis of cell (Zhou et al., 2020).
- Target Mutation (Zhou et al., 2020).

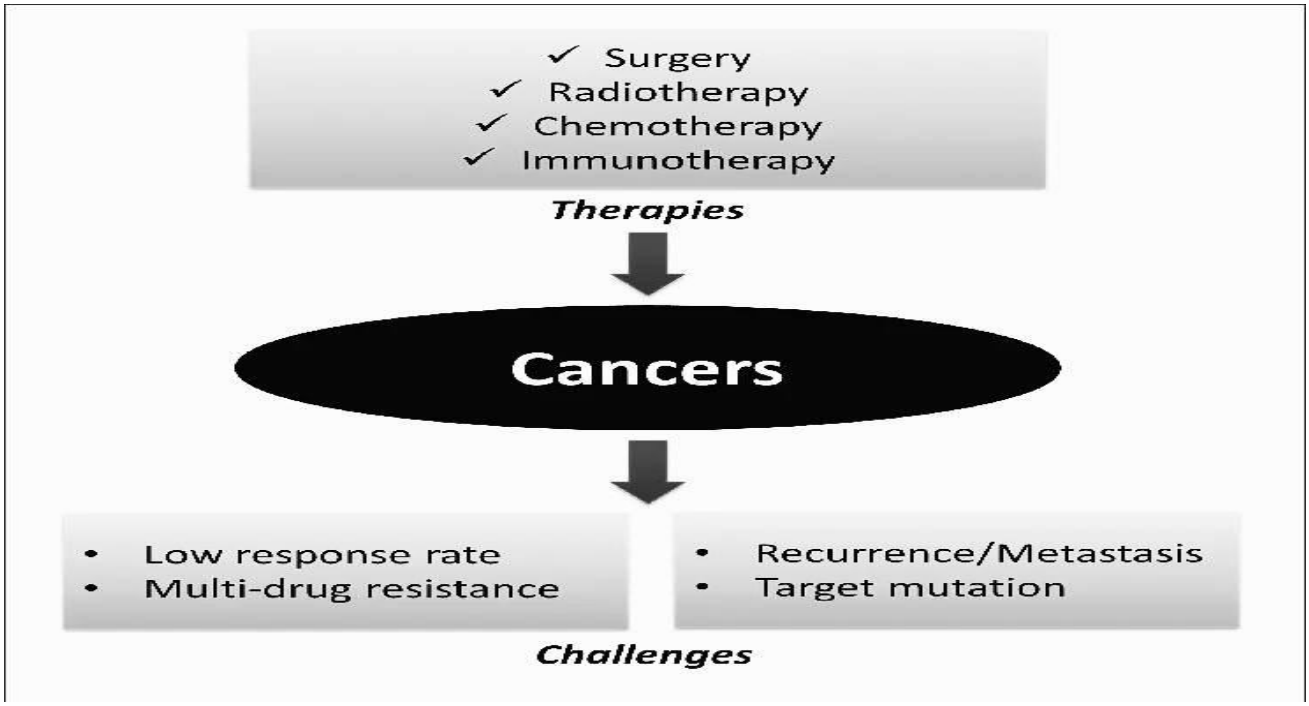

Figure 1.9: The conventional treatment faces a number of obstacles. *(Zhou et al., 2020).*

Moreover, as is shown in Figure 1.10, in direct and indirect expenditures, rural patients with cancer may encounter more cost-related obstacles to care (Walji et al., 2021). Cancer patients in rural areas may encounter additional challenges, including a lack of knowledge and exposure to diagnosis and treatment services, as well as travel obstacles and difficulties coordinating care across members of the

cancer care team (Afshar et al., 2019). In addition, they may have varying levels of faith in the medical system and different perspectives on the value of healthcare services. Getting medical attention may be more of a hassle for rural patients than for a city dweller with similar conflicting interests (Afshar et al., 2019). Even if the operational death rate were higher in a community hospital rather than a tertiary care facility, people in rural areas would still choose to have their surgeries performed there (Levit et al., 2020). A substantial fraction of the nation's rural population resides in regions without funding under the Affordable Care (Dobson et al., 2020). These hurdles to receiving cancer care can result in inferior cancer consequences for rural patients.

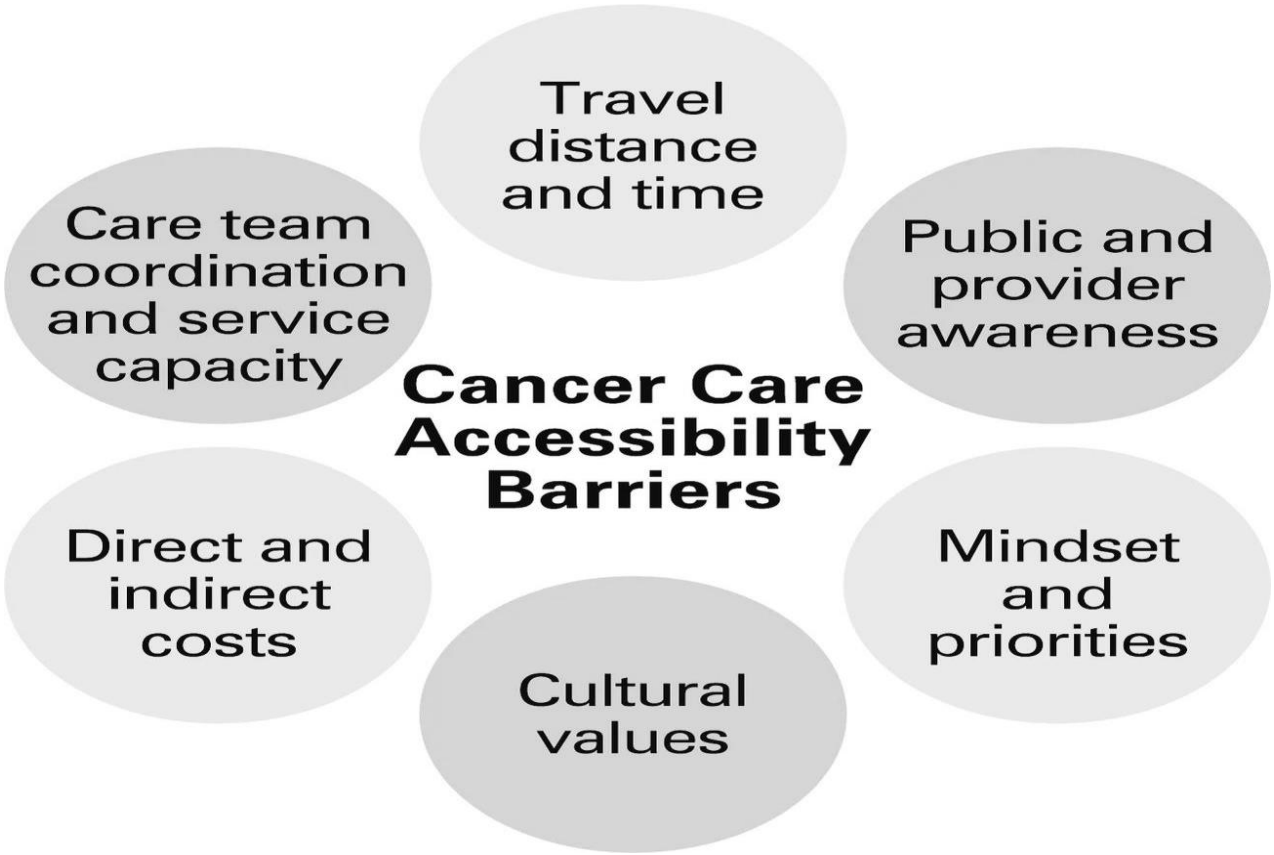

Figure 1.10: Accessibility Obstacles Facing Cancer Treatment in Rural Areas *(Walji et al., 2021).*

1.7 Comprehensive picture of cancer in Bangladesh

Consequently, the death rate from cancer has been considerably increasing daily in less developed nations like Bangladesh, making it a big problem in the realm of public health; where Lung, throat, colon, stomach, ovarian, breast, and melanoma are the most common forms of malignancies seen in the population densities of less developed nations (M. M. Rahman et al., 2022). Furthermore, men's and women's death rates are rising; carcinoma is particularly prevalent in this region's adolescent and adult population due to a combination of smoking, using tobacco leaves, bacterial illnesses, genetic problems, dietary adulterations, and lifestyle exposures (Rodríguez-Gómez et al., 2020). Besides, according to WHO, GLOBOCAN, a global statistical observation in 2020, states that among 164,689,383 people, the new number of cases was 156,775, and the death was around 108,990, which is very alarming for this era (the global cancer observatory, 2021). Furthermore, Bangladesh is estimated to be approximately 148,460 square kilometers in size, and in 2020, our nation had around 165 million people, for a population density of 1,265.19 persons per square kilometer of land, which is one of the most densely populated countries (Hanifi et al., 2020). Bangladesh is divided into several smaller administrative entities, including divisions, districts, up next to Upazilas, union parishads, and villages, where the Community Clinics (CC) typically serve the villagers. In contrast, the Upazilla Health Complexes (UHC) serves the whole of Upazila (Mubin et al., 2021; Rawal et al., 2021). Moreover, each CC is governed by its respective UHC (Mubin et al., 2021). With this vast population and lack of personnel and equipment, the Urban Primary Medical Service Delivery Initiative has subcontracted PHC services in urban areas to local NGOs for the past two decades but still it hard to maintain proper management for cancer treatment in urban areas, and city hospital has a limited capacity of bed to provide services to them (Hasan et al., 2020) As seen in table 2, esophageal and oral cancers are the top causes of death in men, whereas breast and cervical cancers are women's leading

causes of death (the global cancer observatory, 2021). In addition, the probability of having cancer just before the age of 75 for males is 12.9 % and for females is 9.8 %, which is quite frightening for a growing nation; and the estimated number of fatalities in 2020 is roughly 108,990. (S. A. Hussain & Sullivan, 2013; the global cancer observatory, 2021) Moreover, Bangladesh has various cancers related to smoking and tobacco product use, Human papillomavirus (HPV) infection, Hepatitis B and C infectious disease, Helicobacter Pylori infection, arsenic-poisoned groundwater, accessibility of chemical carcinogens primarily formalin-handled fruits, fish, and vegetables at the marketplace, and tannery disposal polluted with chromium (Used for poultry feed and fish feed preparation); and this are the common factors that are affecting to prevent cancer in this country (S. A. Hussain & Sullivan, 2013; Ocran Mattila et al., 2021).

1.8 The ten most common malignancies in Bangladesh in 2020

According to WHO, GCO 2020, table 3 lists the top ten cancer cases and their mortality rate and prevalence during the past five years (International Agency for Research on Cancer, 2021). According to data from Table 3, Esophagus is the most lethal of these ten conditions, with an estimated 20,319 deaths in the previous five years (International Agency for Research on Cancer, 2021). In addition, oral cavity, breast, and lung cancers are reported correspondingly, with breast cancer having the most remarkable fatality rate during the past five years (International Agency for Research on Cancer, 2021).

Table 2: Cancer in Bangladesh: A Brief overview for 2020 *(Deo et al., 2022).*

	Males	**Females**	**Both sexes**
Population	83259108	81430275	164689383
Number of new cancers	88 075	68700	156775
Age-standardized incidence rate	119.3	92.4	106.2
Premature cancer development risk in those under 75 (%)	12.9	9.8	11.5
Number of cancers Deaths	63541	45449	108990
Age-standardized mortality rate (World)	87.1	62.9	75.3
Cancer mortality rate in people under 75 (%)	9.7	7	8.4
5-year prevalent cases	139147	131719	270866
Five most common malignancies, not counting non-melanoma skin cancer (Ranked by cases)	Esophagus Lung Lip, oral cavity Hypopharynx Stomach	Breast Cervix uteri Esophagus Gallbladder Lip, oral cavity	Esophagus Lip, oral cavity Breast Lung Cervix uteri

Table 3: The ten most Common Malignancies in Bangladesh in 2020 *(Ferlay et al., 2021).*

	New Cases				Deaths				5-year Prevalence (All ages)	
Cancer	Number	Rank	(%)	Cum. Risk	Number	Rank	(%)	Cum. Risk	Number	Prop. (Per 100 000)
Oesophagus	21745	1	13.9	1.69	20319	1	18.6	1.58	23372	14.19
Lip, oral cavity	13985	2	8.9	1.12	8197	3	7.5	0.68	29536	17.93
breast	13028	3	8.3	1.83	6783	4	6.2	1.03	31232	38.35
Lung	12999	4	8.3	1.18	12003	2	11.0	1.08	13915	8.45
Cervix uteri	8268	5	5.3	1.16	4971	7	4.6	0.76	18132	22.27
Stomach	7599	6	4.8	0.61	6642	5	6.1	0.55	10235	.6.21
Hypopharynx	7476	7	4.8	0.63	3151	9	2.9	0.29	9542	5.79
Gallbladder	7252	8	4.6	0.55	5742	6	5.3	0.43	9399	5.71
Larynx	5270	9	3.4	0.46	3219	8	3.0	0.31	11457	6.96
Oropharynx	3852	10	2.5	0.31	2377	11	2.2	0.20	7711	4.68

1.9 Bangladeshi Cancer Incidence by Gender in 2020

1.9.1 Cancer incidences: Female

The following 1.9, a pie chart from WHO and the International Agency for Research on Cancer (IARC) in 2020 reveals that breast cancer accounts for roughly 19% of all cancer cases in Bangladesh (Ferlay et al., 2021). Additionally, there were 68,700 cases involving the cervix uteri (8,268) and the esophagus (7604), rated second and third, respectively (Ferlay et al., 2021).

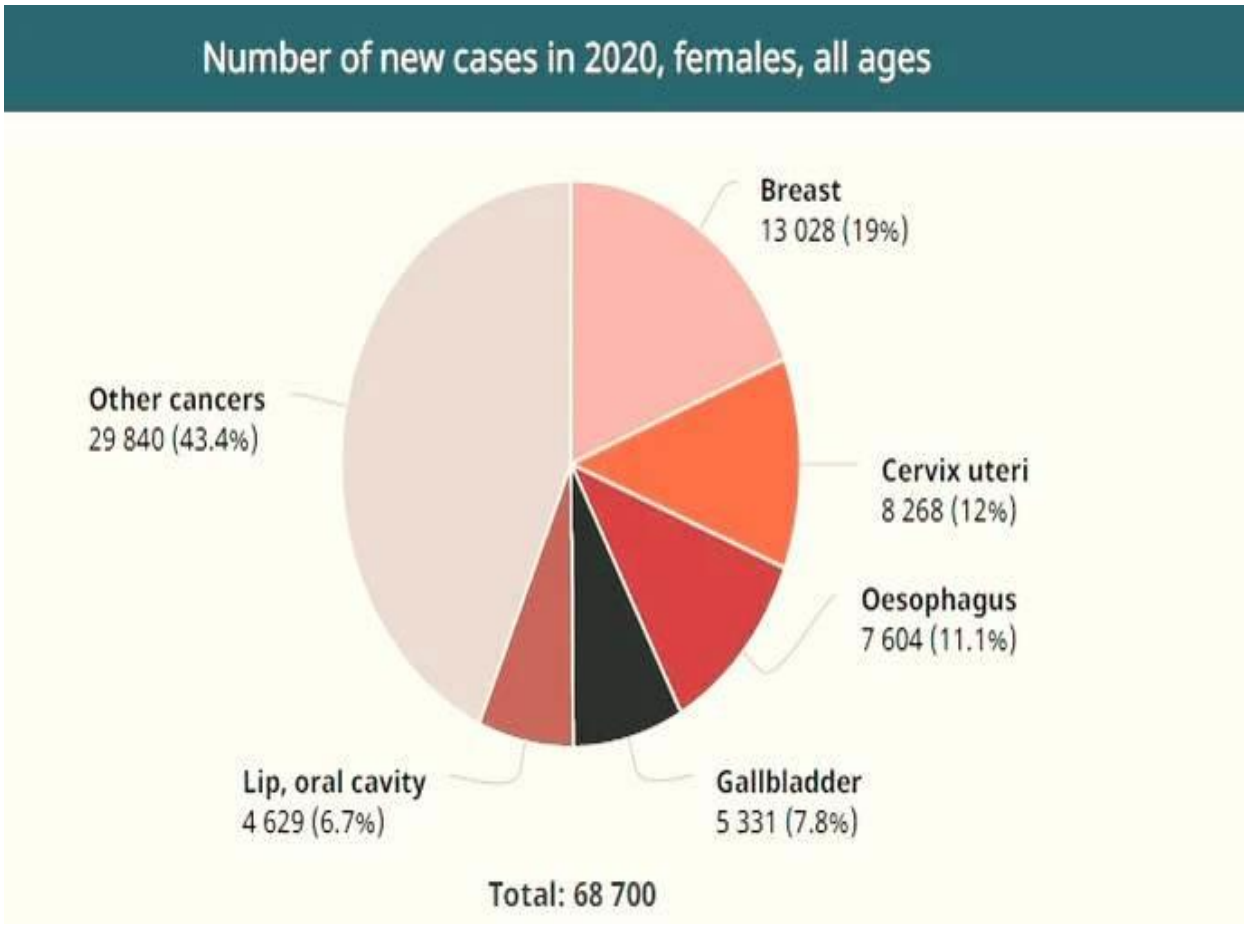

Figure 1.11: The total number of new female cases across all ages in 2020 in Bangladesh *(Ferlay et al., 2021).*

1.9.2 Cancer incidences: Male

The following 1.10, a pie chart from WHO and the International Agency for Research on Cancer (IARC) in 2020 reveals that Oesophagus cancer accounts for roughly 16.1% or 14,141 of all cancer cases in Bangladesh for male (Ferlay et al., 2021). Additionally, there were 88,075 cases involving the Lung (9797, or11.1%) and the Lip and oral cavity (9356, or 10.6%), rated second and third, respectively (Ferlay et al., 2021)

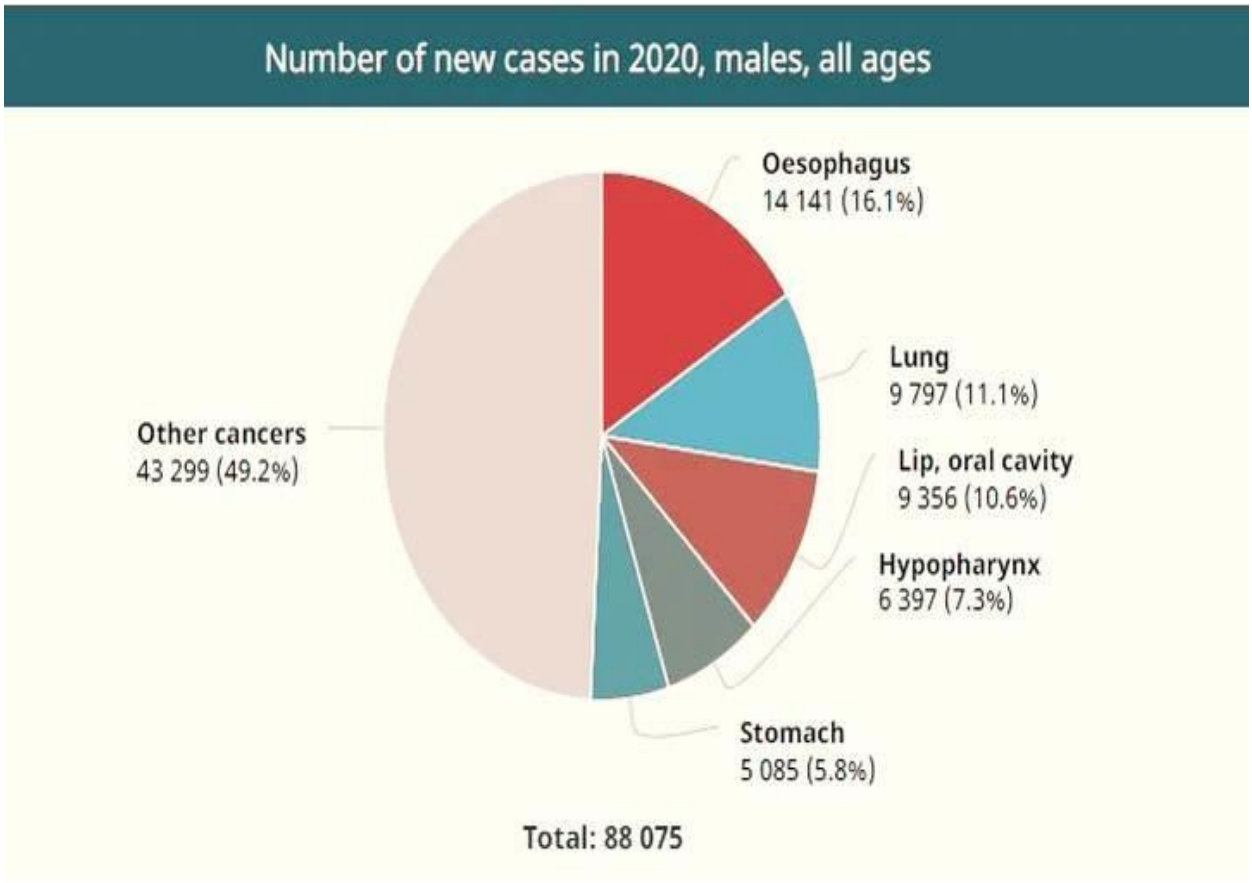

Figure 1.12: The total number of new male cases across all ages in 2020 in Bangladesh *(Ferlay et al., 2021).*

1.10 Cancer-causing agents and risk factors

Factors such as increased cancer-causing activities and increased exposure to cancer-causing chemicals have been connected to the dramatic rise in cancer burden worldwide (S. A. Rahman et al., 2021). According to the WHO, 30–50% of cancers are preventable by limiting exposure to carcinogens, leading a healthy lifestyle, and using other proven preventative measures (S. M. A. Hussain, 2013). Besides, cancer may be caused by several different things, both external and internal, to the body (Cai & Liu, 2021). The environment, which is always present, may be a risk factor, and specific aspects of the environment seem to be carcinogens or mediators in the development of cancer, and numerous cases of cancer may be traced back to exposure to a mixture of environmental chemicals and pollutants (Cai & Liu, 2021).

1.10.1 Tobacco consumption is one of the leading causes of cancer.

About 4,000 compounds have been identified in tobacco smoke, with at least 438 known to cause cancer (Nargis et al., 2020). When it comes to preventable causes of cancer, tobacco use stands head and shoulders above the others. Unfortunately, since 1980, cigarette and bidi output in Bangladesh has skyrocketed (Ahmed et al., 2020; Nargis et al., 2020). WHO found that 20 million people in Bangladesh consume tobacco in certain forms, which include 5 million women, and that 57,000 people per year die from tobacco-related illnesses. In Bangladesh, 41% of adult males who are smokers are located in that age group. Women aged 15 and up accounted for 1.8% of the total (Nargis et al., 2020).

1.10.2 Variables related to sexuality and reproduction.

Cancers of the cervix and breast are both linked to sexual and reproductive variables (Vara et al., 2020). Cancer of the uterine cervix has been linked to sexual behavior variables such as early sexual initiation, having several sexual partners, and practicing poor sexual hygiene. Cervical cancer has been traced back to HPV (Chuang et al., 2018; Vara et al., 2020). High-risk sexual conduct and inadequate hygienic practices contribute to the spread of HPV. Breast cancer risk factors include delaying marriage, never having children, and having menopause later in life (Chuang et al., 2018).

1.10.3 Diet

Tissue-specific environmental variables, such as growth factor and cytokine presence, and cell-cell interactions, also play a role in cancer development (Bose et al., 2020). Although these characteristics play a part in determining cancer cell metabolism, the accessibility of nutrients, which is entirely determined by the environment, has a far more significant effect (Bose et al., 2020). Moreover, some of the foods that are linked to malignancies of the oral cavity, pharynx, larynx, esophagus, liver, and breast are red meat (cow and goat), sugar, artificial sweetener, tea, dried fish, preserved foods, agricultural adulteration, and soft drinks (S. M. A. Hussain, 2013; Islam Royel et al., 2021). Alterations in dietary factors will result in a rise in the contribution of diet to the cancer-causing mechanisms in Bangladesh.

1.10.4 Age

Age, which is taken into account as completed units of time, constitutes one of the risk factors for cancer that has been studied the most. Besides, Age is applied in nearly all cancer epidemiological studies. According to the SEER Cancer Trends review, cancer primarily affects older people, with the majority of cases being over 50 (Rawla et al., 2019). Moreover, age is the primary cause of cancer in

general and for many specific cancer types (Rozhok & DeGregori, 2016). Cancer incidence rates rise gradually with age, from less than 25 deaths per 1000 persons under the age of 20, to over 350 occurrences per 100,000 people between the ages 45-49, and more than 1,000 incidents per 100,000 individuals who are 60 and beyond (National Cancer Institute, 2021).

1.10.5 Genetics

The involvement of genetic factors in the formation of cancer has recently gained widespread recognition. Cancer susceptibility is affected by genetic factors (Durrett, 2021). Mutations that increase susceptibility often have an effect on pathways involved in DNA repair, regulation of cell cycles, and cell death. Individuals vary in their inherited proclivity to get cancer. Moreover, mutations can lead a cell to produce proteins that influence how the cell develops and splits into new cells. Furthermore, certain mutations can lead cells to proliferate uncontrollably, leading to cancer (Milanese & Wang, 2021). For many years, major single-gene flaws that induce early cancer initiation were recognized from their patterns of inheritance, and inherited faults with smaller impacts on propensity were also assumed to exist (K McHugh et al., 2022).

1.10.6 Environment and occupations

Every year, outdoor air pollution leads to 6 to 8 million deaths worldwide from lung cancer and some other ailments; and the environment and particle debris in outdoor air pollution are designated as known possibly carcinogenic to humans by IARC (Yari et al., 2018). Moreover, outdoor air pollution is especially bad in fast-growing cities in low-middle income states. People who consume high quantities of arsenic in their drinking water are more likely to develop skin, lung, and thyroid cancer (Mozzoni et al., 2021; Yari et al., 2018). Arsenic levels in water supply have been shown to be high in regions of Bangladesh, and various Central and South American nations. Some occupational

exposures, such as radon and asbestos-containing fibers, toluene, and polychlorinated biphenyls, may occur in the general populace, albeit at lower levels (Checkoway, 2018; Mozzoni et al., 2021). Pollutants in the air, water, food, and workplace can all have a role, as can the use of certain medications, hormones, and radiation. Furthermore, cancer hazards linked with several environmental contaminants have been established via studies of forms of employment that are exposed to these chemicals at a higher rate than the overall population (Terzic et al., 2021). Some industrial activities linked to cancer include manufacturing aluminum, iron, and steel, as well as underground mining where uranium or radon exposure may cause cancer (Checkoway, 2018; Mozzoni et al., 2021). Furthermore, shift work, that can disturb the daily rhythm, has been linked to an increased risk for several forms of cancer, including breast cancer (National Cancer Institute, 2021).

1.11 Environment at Dhaka city

The capital and largest town of Bangladesh is Dhaka, and it can be found in South Asia. It has surpassed all other major cities in recent years in population growth (Swapan et al., 2017). Dhaka City is located between coordinates 23.69 and 23.89 north latitudes and 90.33 and 90.44 east longitudes, and about 127 square kilometers of land make up the central city (Akash et al., 2018; Swapan et al., 2017). Besides, growth spillover into six neighboring municipalities, expanding the megacity's total area to 1528 square kilometers (Swapan et al., 2017). At a rate of 4.4% per year, the current population of the Dhaka mega city of 18.2 million is projected to increase to 22 million by the year 2025 (Swapan et al., 2017). In-migration accounts for roughly 63% of cumulative population expansion, with natural increase accounting for the remaining growth (Nahrin, 2020). Moreover, 67% of the bread samples gathered from the Dhaka metropolitan area had KBrO3 concentrations that were too high, according to the current study, and a majority of the bread samples tested had dangerously high levels of KBrO3 (Mahmud et al., 2021). Furthermore, everyday foods, like fresh vegetables and fruits, represent several

health hazards, including cancer development, kidney problems, immune system disparity, and even death, due to bioaccumulation and persistence in the environment of heavy metals like arsenic, chromium, which are non-biodegradable toxic wastes derived from naturally occurring mineral sources or waste dumping (Sarker et al., 2022).

Thus, several potentially cancer-causing substances are released into Dhaka's air and food supply. It may significantly contribute to the rising cancer rates in recent decades.

1.12 Objective of the study

The World Health Organization predicts that by 2040, the number of people diagnosed with cancer worldwide will reach 28.9 million, a 49.7 % rise from 2020; and it is a dire warning that we need to take preventative measures to avert this scenario. There is a growing cancer epidemic in Bangladesh, as in many other countries today. There is a deficiency in the presentation of national cancer statistics due to the lack of a national cancer registry.

The object of this project work is to showcase:

1. Underlining the current situation of cancer cases in a specialized hospital located inside Dhaka city.
2. To find the prevalence of various cancers types among genetic predisposition of cancer, and exposure to risk factors such as environment, the proximity of a mobile tower and the use of tobacco product.
3. To identify links between the incident of cancer and exposure to various risk factors.

Chapter 2: Methodology

2.1 Methodology and data collection

In this project, work three-month-long questionnaire-based survey was conducted on cancer patients admitted to Ahsania Mission Cancer and General Hospital (AMCGH) of Dhaka city. The survey was conducted from November 2022 to January 2023, and information related to 103 patients was collected. A standard questionnaire was also designed to investigate the current scenario of cancer in Dhaka city. It included basic questions regarding the age, gender, and history of the patient, followed by a series of linked questions that aligned with the project's goals. A copy of the questionnaire is provided in Appendix 1.

Before conducting this survey, ethical permission was taken from the respective hospital, and consent was taken from the patients after explaining the purpose of this project. Patients who gave verbal consent were approached with the prepared questionnaire. As the native language of all patients was not English, the questions were translated into Bengali by the researcher. Outmost care was taken to convert the respondents' Bengali responses into English. Moreover, physicians and nurses in the hospital oncology ward were approached to collect the necessary information for the research.

The questionnaire used in this project was developed after studying the relevant literature. The data collected from the questionnaire survey was used to investigate the correlations between the incidence of cancer with age, gender, genetic predisposition of cancer (a genetic factor), and exposure to risk factors such as environment, habits, exposure to carcinogens, the patient's occupation, the proximity of a mobile tower within 30 to 50 meters, and the use of tobacco product. Information was also gathered and evaluated on the patient's diagnoses, medications, and treatment outcomes; however, this information was not analyzed in this project due to lack of time.

The methodology to conduct this research work is designed to collect information regarding the current state of cancer and the relationships between hereditary predisposition, environmental carcinogen exposure, and gender distribution. SPSS and Microsoft Excel were just two of the many statistical programs used to analyze the collected data. Besides, the ethical committee at Ahsania Mission Cancer and General Hospital found that all of the questionnaire's questions were relevant and were statistically sound before approval (AMCGH).

Chapter 3: Result

Dhaka, the country's most populous metropolis, is also one of the most polluted because of its heavy reliance on industry and the resulting release of harmful emissions and carcinogens into the air (M. S. Rahman et al., 2022). This survey gathered data from 103 patients to accomplish the study's goals and contribute to the project's completion.

3.1 Incidence of cancer based on gender

Gender affects the incidence of cancers such as bladder and breast cancer, with different genders being more likely to be affected by specific cancer (Dobruch et al., 2016). In this study of 103 patients, in figure 2.1, the number of male patients is 49, or approximately 48% of the overall population, while the number of female cases is 54, or approximately 52%, indicating that more women than men are affected by various types of cancer. However, due to the small sample size, we cannot draw any firm conclusions about whether or not men and women actually face equal risks of developing cancer.

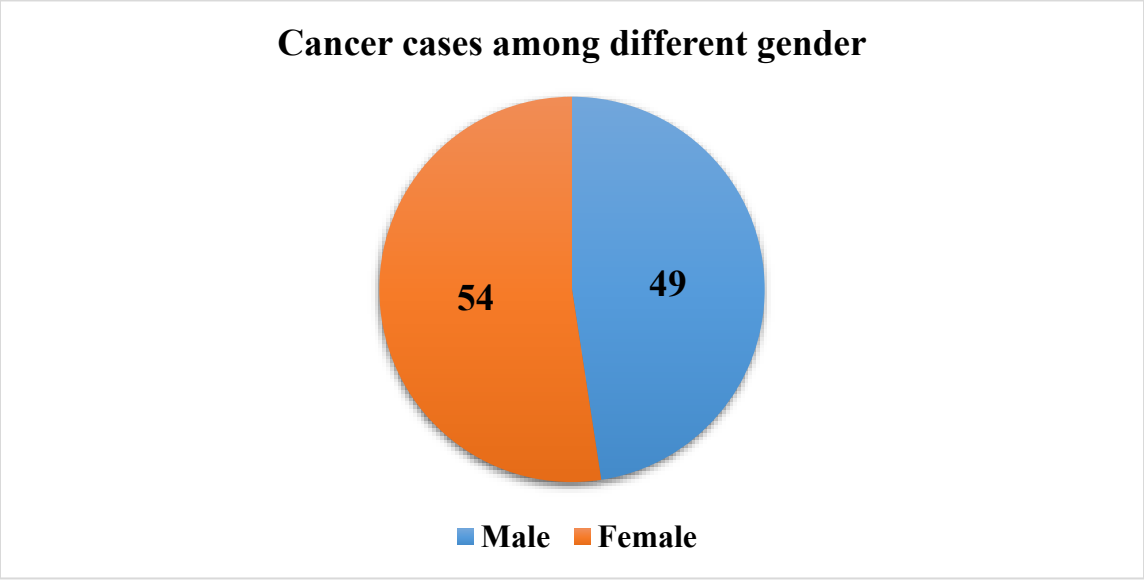

Figure 3.1: Incidence of Cancer Based on Gender.

3.2 Incidence of cancer cases within Bangladesh's different divisions

In figure 3.2, shows the variation in patient numbers across the country of Bangladesh. The capital city of Dhaka has the highest total, with 60 individuals, followed by Chattogram, which has 13, and then Khulna and Rajshahi, each of which has 10, followed by Mymensingh, with 6, Rangpur, with 2, and finally Barishal and Sylhet, each of which has 1. This result suggests Dhaka has a higher cancer risk than any other part of Bangladesh, whereas Barishal and Sylhet have the lowest. Consequently, data shows that residents of the Dhaka division have an elevated chance of contracting cancer due to environmental factors. However, due to the small sample size, we cannot draw any firm conclusions.

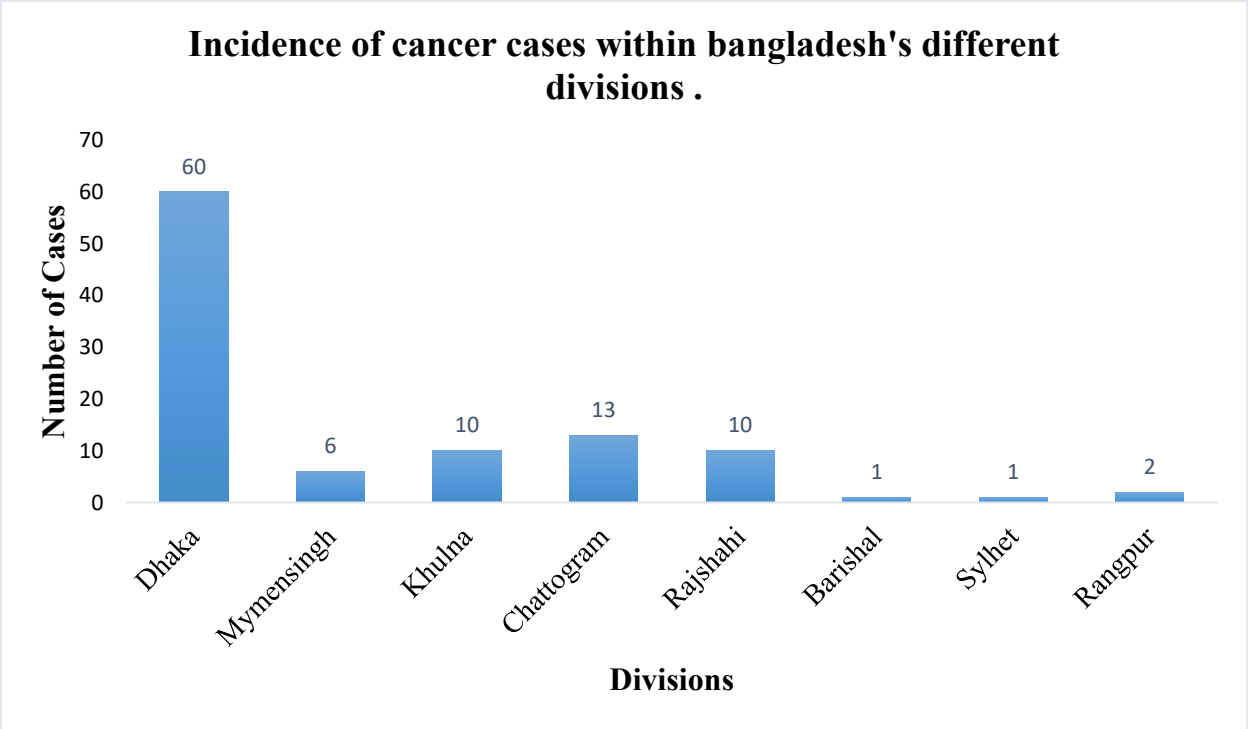

Figure 3.2: Incidence of Cancer Cases Within Bangladesh's Different Divisions.

3.3 Cancer incidence by age group

Cancer is often regarded as an age-related condition because the frequency of most malignancies climbs with age, with the rate of increase accelerating beyond midlife (White et al., 2014). In addition, age can be viewed as a proxy for the many physiological processes linked with aging (Hendricks et al., 2021; White et al., 2014). Figure 3.3 depicts the various age distributions of cancer patients in both ganders, where each group was divided by a ten-year age gap, and ten groups were constructed to evaluate the data; and with the age group between 51 and 60 years containing the highest number of cases among all the groups which is 35. Following that, those who fall within the age range of 61 to 70 years have a total of 22 people, which places them in second position in figure 3.3. In addition, we can observe in figure 3.3 that around 77.67% of adults over 40 are impacted by cancer in this study.

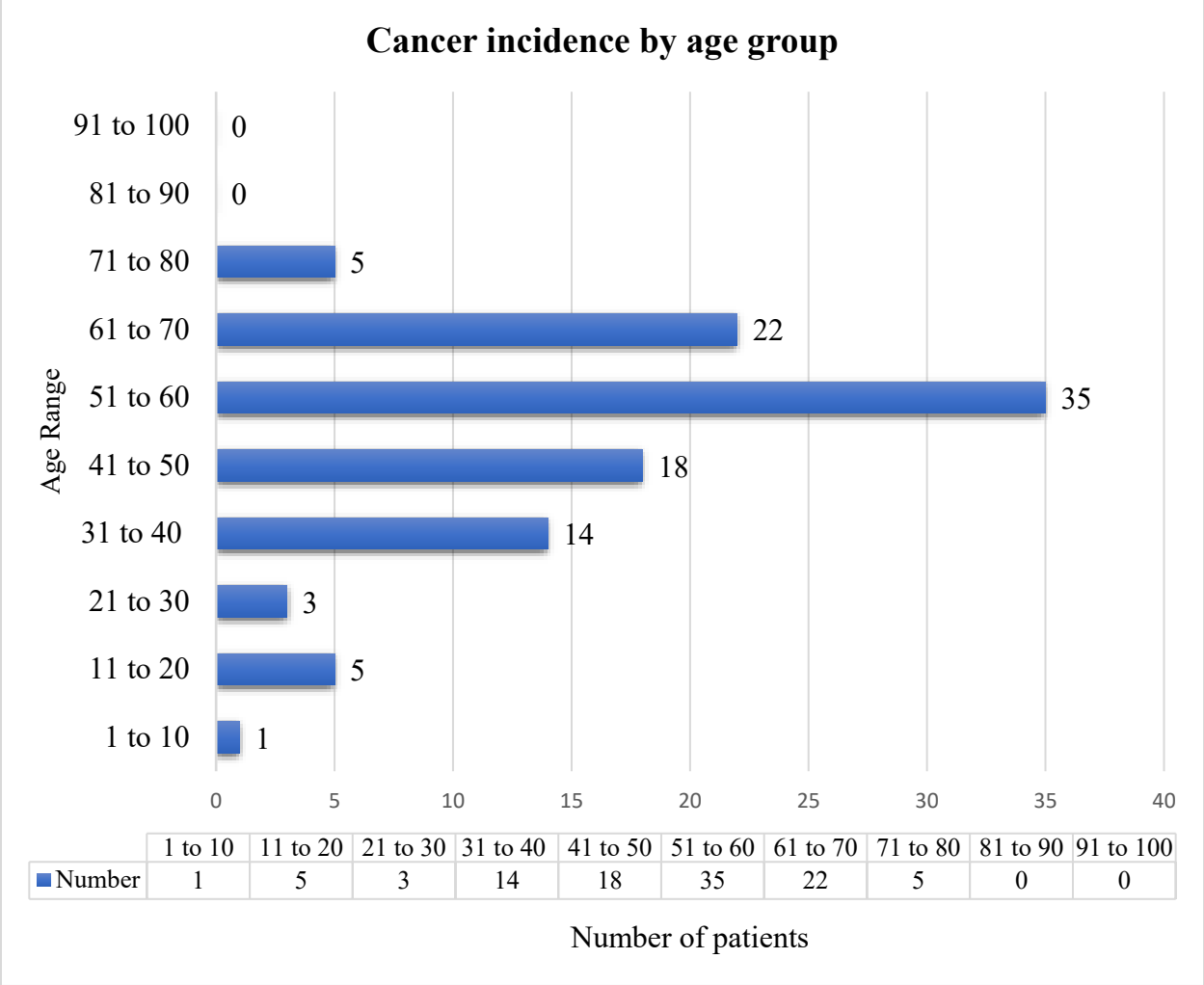

Figure 3.3: Cancer Incidence by Age Group

3.4 Dispersion of cancer among various organs

Figure 3.4, demonstrates the main source of distribution of cancer for 103 patients, with 31 different types of cancer observed and the highest incidence rate seen in female breast cancer (16 patients). The incidence of lung cancer ranks second with 11 occurrences, followed by stomach, leukemia, rectal, Hodgkin Lymphoma, liver, and bladder cancer in that case number: 7,7,6,6,3,3.

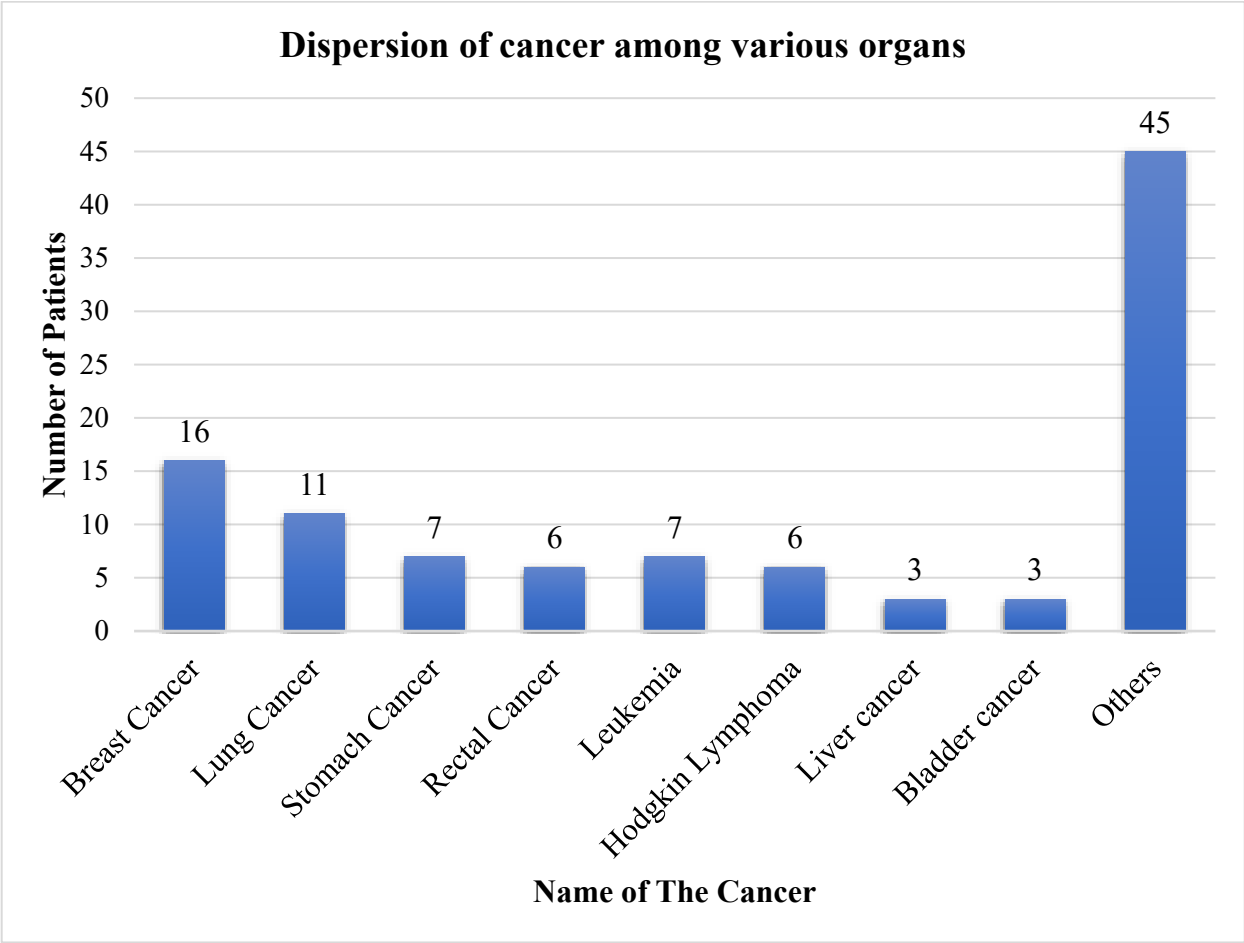

Figure 3.4: Dispersion of Cancer Among Various Organs

3.5 Patients activity before admitting to hospital.

Figure 3.5 depicts the patient's state prior to hospitalization. The patients who are ambulatory and competent in all self-care but unable to perform any work for more than 50 per cent of waking hours are the most numerous, with 36. Following that, there are a total of 20 patients who are only capable of minimal self-care and who spend more than fifty per cent of their waking hours confined to a bed or chair. In addition, the remaining cases are broken down as follows: fully disabled (5), restricted to doing instance physical exercise (26) and able to undertake the typical activity (16).

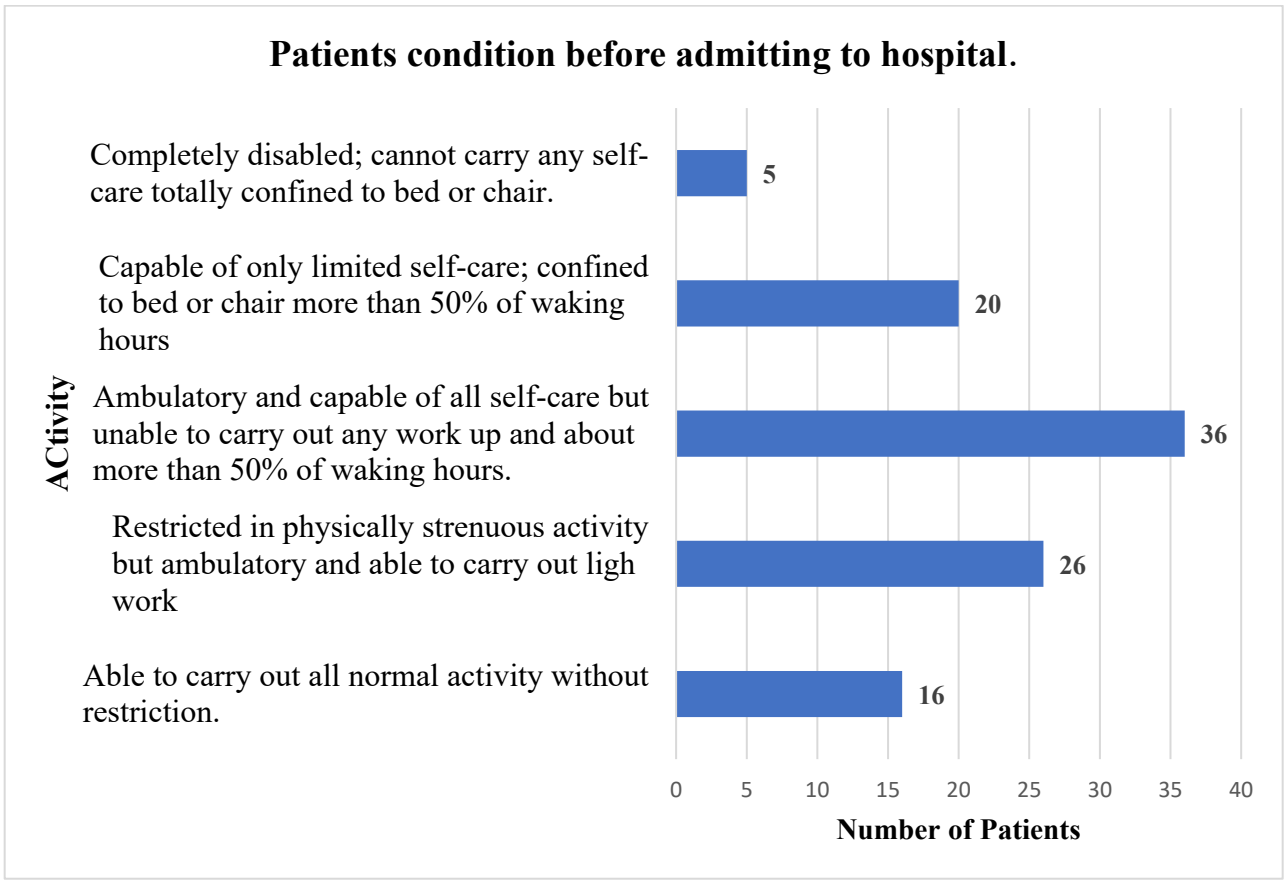

Figure 3.5: Patients Activity Before Admitting to hospital.

3.6 Basic understanding about palliative care

Palliative care seeks to enhance living standards for those with life-threatening conditions and their families (Schneiter et al., 2019). One key obstacle to palliative care utilization is inaccurate understanding and unfavorable views among the general public, which may impede early interest, engagement, and incorporation of palliative care upon future illness assessment (Rome et al., 2011; Schneiter et al., 2019). The purpose of end-of-life palliative care is to alleviate the pain of patients and their caregivers through the entire diagnosis and management of physical, psychological, and spiritual manifestations (Rome et al., 2011).

Figure 3.6 depicts the patient's knowledge and source regarding palliative care treatment for the patient's treatment. The majority of patients are unaware of the treatment, even when prescribed by physicians. In addition, 81 out of 103 patients in the graph do not know anything about the treatment, whereas 22 patients have basic knowledge of palliative care, and their source of learning is self-learning (9) and physicians (13).

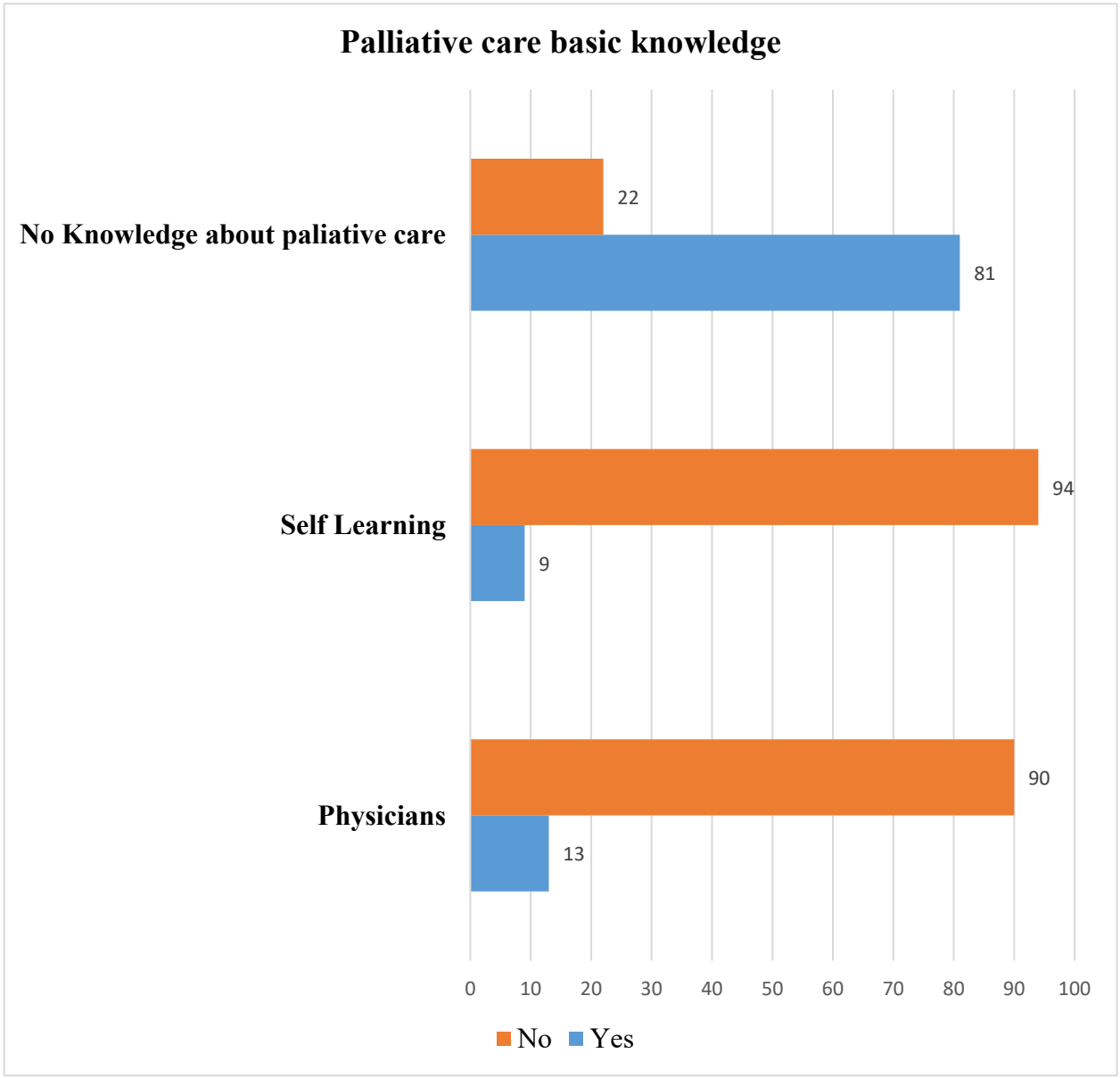

Figure 3.6: Basic understanding about Palliative Care

3.7 Initial findings on related to patients' conditions and external parameters

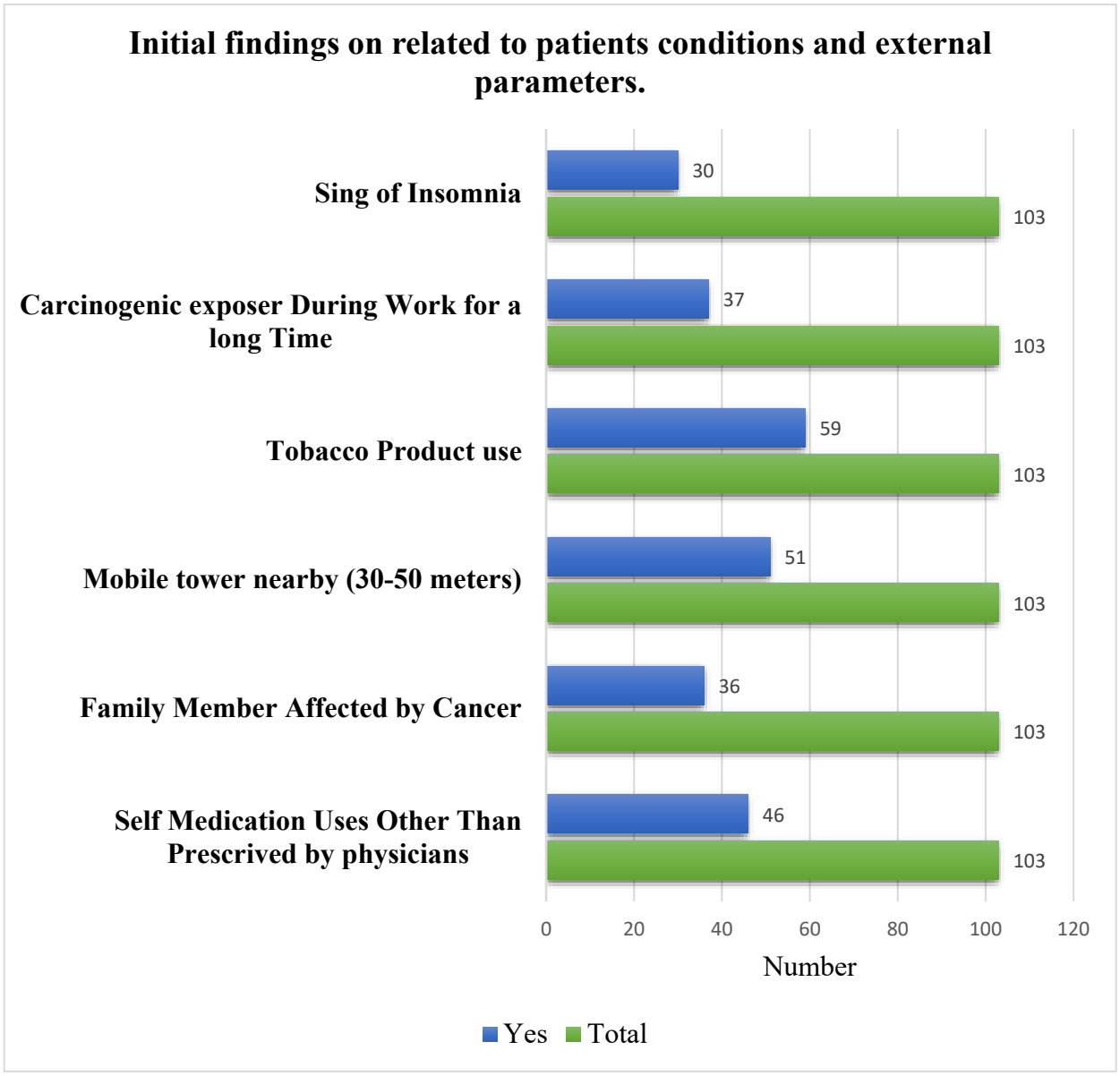

Figure 3.7: Initial Findings on related to patients' conditions and external parameters.

3.8 Correlation between cancer affected site and carcinogenic exposed during work for long time

Figure 3.8 also shows a statistically significant relationship between the number of cancers incidence and the duration of exposure to various carcinogens; the P value for this association is 0.049, which is less than 0.05 in the 95% confidence interval.

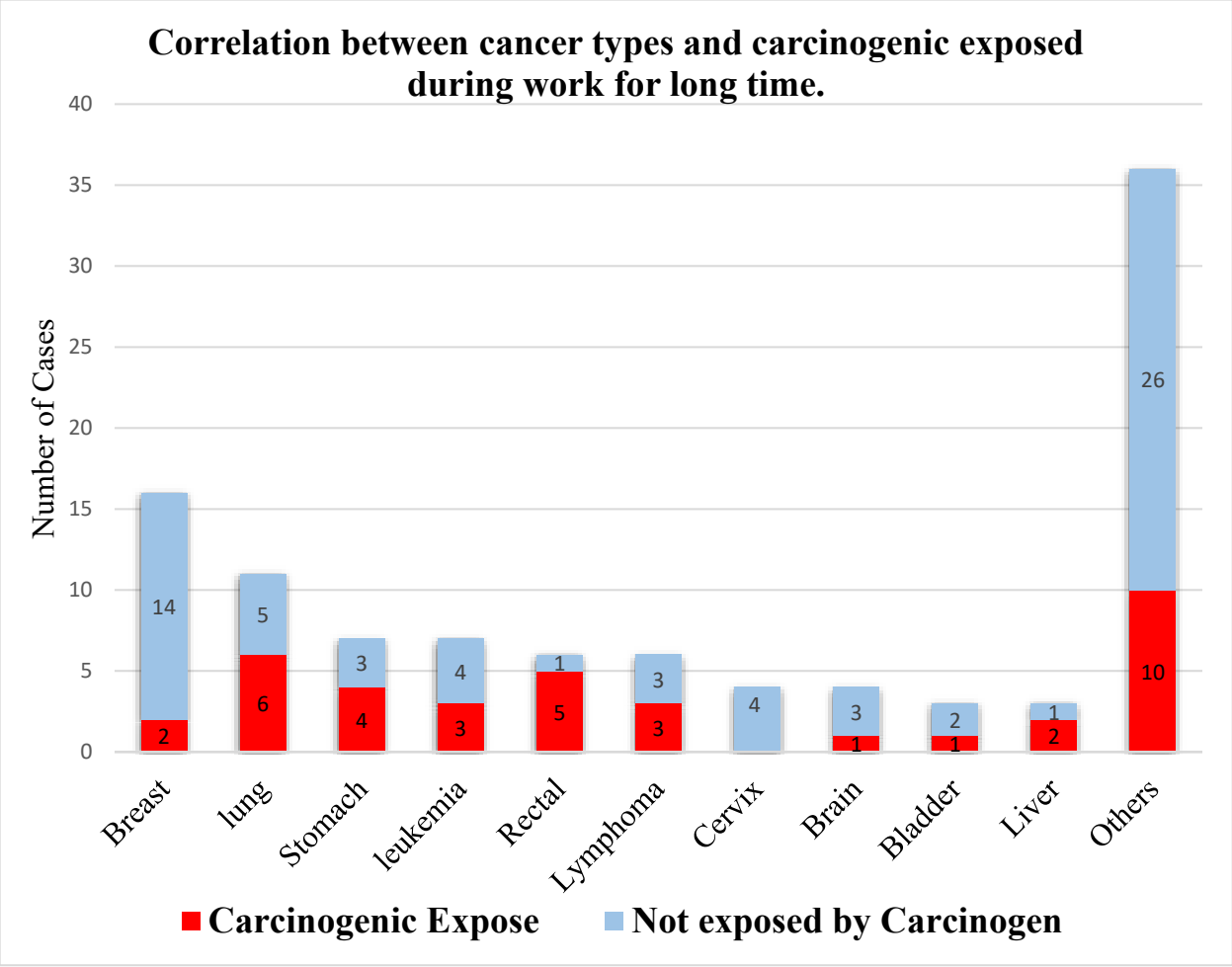

Figure 3.8: Correlation between Cancer types and Carcinogenic Exposed During Work for Long Time.

3.9 Correlations between address (division) and mobile tower near 30-to-50-meters.

The human body absorbs energy through radio frequency radioactive fallout emitting equipment. The only reliably observed biological consequence of radio wave radiation absorption in mammals is the heating of the part of the body in which a mobile phone is kept (Karipidis et al., 2018). A study of data from all 13 nations revealed a statistically significant correlation between intracranial localization of brain tumors and identity phone location (Grell et al., 2016). A study of data from all 13 nations revealed a strong correlation between intracranial localization of brain tumors and identity phone proximity (Schoemaker et al., 2005). Several factors have been linked to cancer development, one of which is the proximity of a patient's home to a cell phone tower, and we can conclude that the result is statistically significant, with a 95% confidence interval and a P value of 0.035.

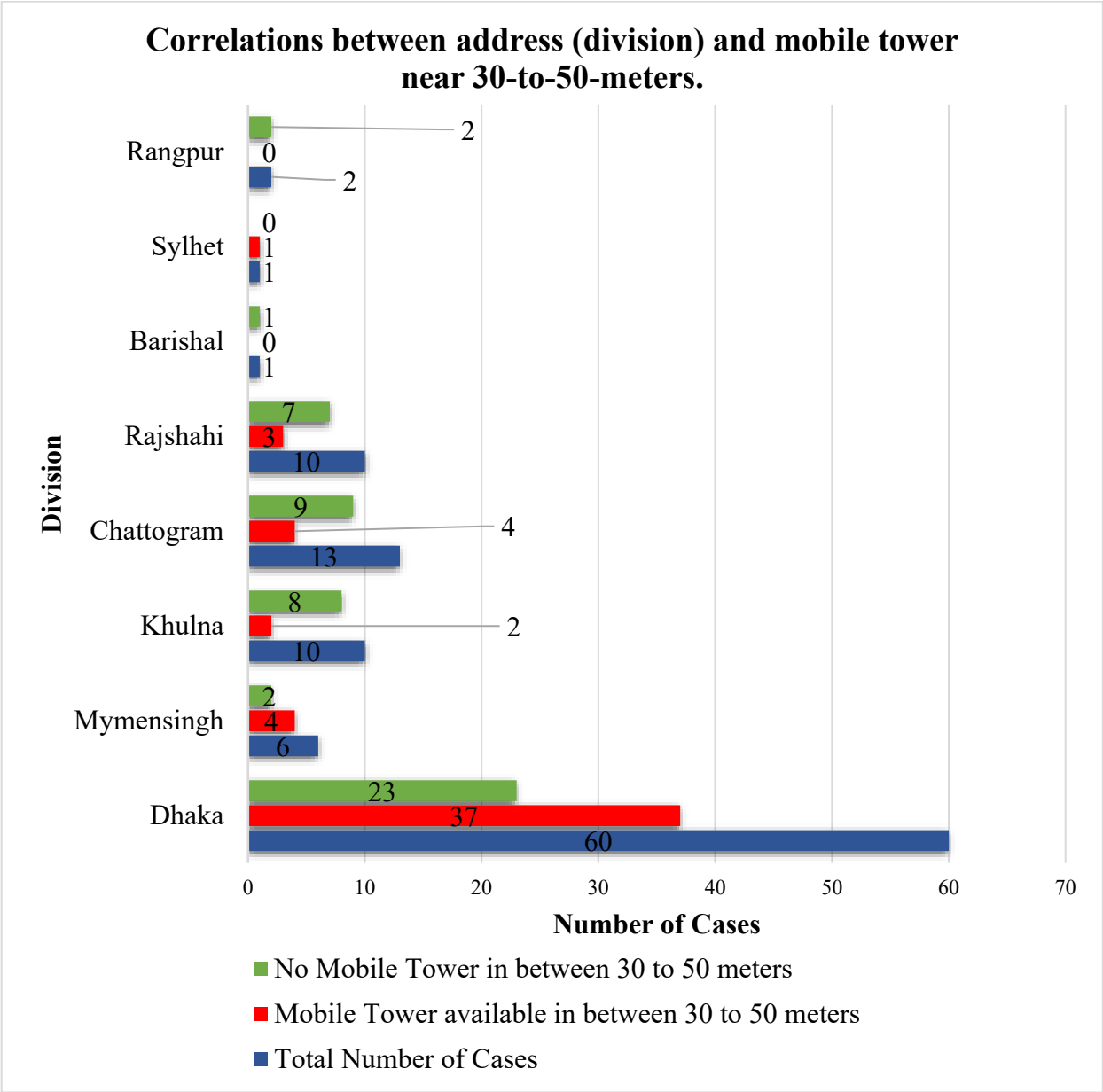

Figure 3.9: Correlations Between Address (Division) and Mobile Tower Near 30-to-50-Meters.

3.10 The Nature of The Care Provided to Patients.

Figure 3.10 displays the prevalence of common preventative therapies such as chemotherapy, radiotherapy, surgery, medicine, diet, and palliative care among survey participants. In addition, the largest group of patients (33 total) receiving chemotherapy for their malignancy is depicted in the diagram. The next highest number of cases (twenty) were treated with radiotherapy and chemotherapy,

followed by curative measures in ten cases (surgery), four cases (radiotherapy), seven cases (surgery plus radiotherapy plus chemotherapy), six cases (surgery plus chemotherapy), and 23 cases (other preventive measures).

People who have been diagnosed with cancer, most of the time, undergo chemotherapy. On the other hand, patients may also receive a mix of chemotherapy and radiation therapy if necessary. Common anticancer medicines are often used in combination with chemotherapy. About 32.038 per cent of the patients examined in this study were given chemotherapy. Some of the most commonly administered anticancer treatments in this analysis are Carboplatin, 5-FU, Rituximab, Cisplatin, Doxorubicin, Zoledronic acid.

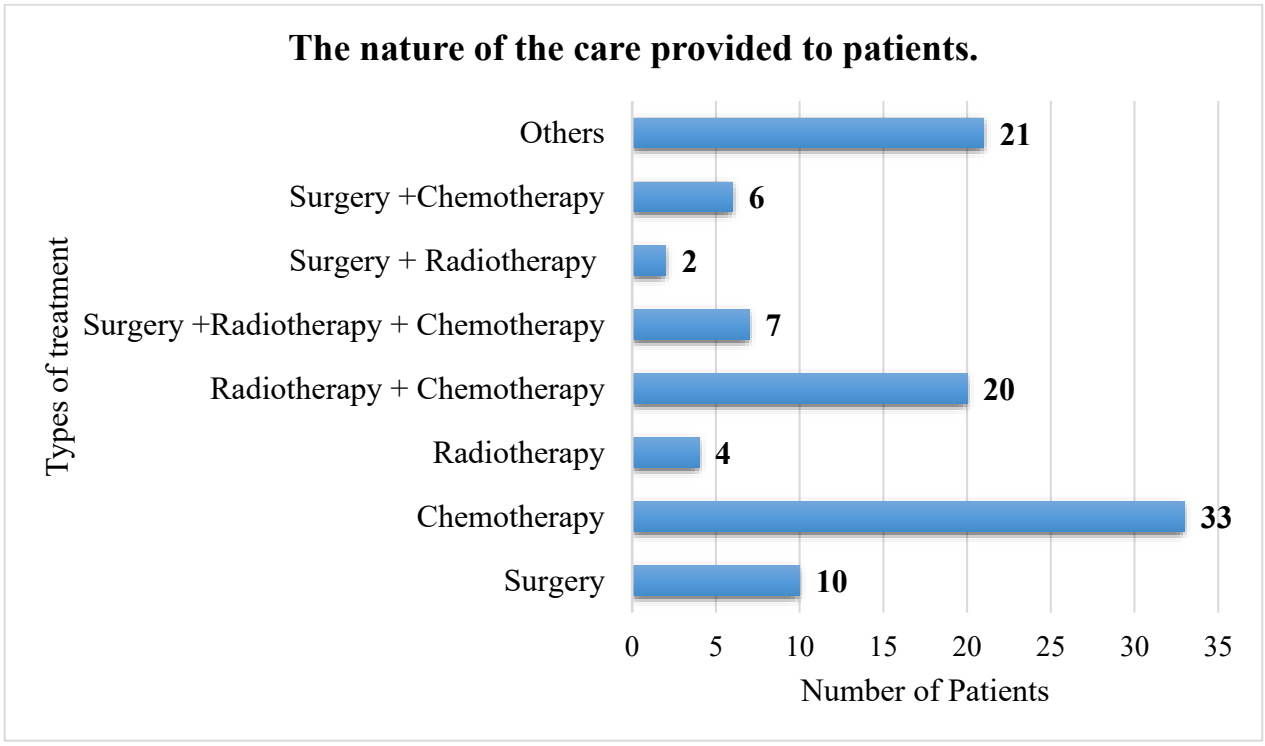

Figure 3.10: The nature of the care provided to patients.

Chapter 4 Discussion

There was a total of 103 patients polled for the study; 49 men and 54 women. The results of this survey indicate that roughly the same percentage of women and men have been diagnosed with cancer (52.038 per cent of women and 47.037 per cent of men, respectively); however, due to the small sample size, we cannot draw any firm conclusions about whether or not men and women actually face equal risks of developing cancer. Since cancer is often not diagnosed until it has spread, many patients, especially those from lower socioeconomic backgrounds, die before they receive any therapy. Cancer is caused by a variety of reasons, including increased use of tobacco products, exposure to cell tower radiation, genetic predisposition, and advanced age (Meena et al., 2016). More research on a larger population is needed to confirm the male and female percentages.

Dhaka, the country's most populous metropolis, is also one of the most polluted because of its heavy reliance on industry and the resulting release of harmful emissions and carcinogens into the air (Naik & Mohanta, 2020). Additionally, the study result shows us that the majority of instances occur in Dhaka city, which implies contamination of the environment and unhealthiness of the lifestyles of the people living there (Hossain & Easa, 2012). The hospital's convenient location in the heart of Dhaka makes it a top choice for residents of the city and surrounding areas in need of medical care. As a result, it is not possible to draw firm conclusions from this study regarding the prevalence of cancer-causing factors in Dhaka city. Moreover, the number of deaths in Bangladesh attributed to air pollution rise from 123,000 in 2017 to 173,500 in 2019, and the country's ageing population, which has grown as its people have lived longer, is a significant contributor to this rise (Khuda, 2020; Kudrat-E-Khuda, 2020).

Cancer risk factors have been studied extensively, and one of the most studied is age, which is quantified in years (Pretzsch et al., 2022; White et al., 2014). As the rate of development of most

cancers increases with age and speeds up beyond middle age, it is tempting to classify cancer as a disease of old age; indeed, our survey data shows that the over-40 crowd accounts for 77.69% of all cancer cases. This suggests that there is a correlation between advancing age and an increased risk of cancer but that the sample size of 103 is too low to draw firm conclusions.

It is impossible to restrict cancer's point of origin. Cancer cells can spread to any part of the body; therefore, early screening and regular checkups are essential for detecting the disease early and fighting it effectively (Fitzgerald et al., 2022; Loud & Murphy, 2017). In our study we found that female breast cancer has the highest number in both male and female, and it is also highest number in female individual where male breast cancer is very rare in number (H. Liu et al., 2021; Loud & Murphy, 2017). Our research shows that while breast cancer is more common in women overall, it is far more prevalent in females and is much less common in males. This survey's results are unreliable since there wasn't enough time or participants to collect enough reliable data. Moreover, environmental and hereditary factors, as well as patients' lackadaisical attitude toward regular checkups, determine where cancer will first manifest in the body (Loud & Murphy, 2017).

Cancer can be treated if it is detected early before it spread to different part of body and it is hard to detect cancer in our country due to lack of knowledge and due to high cost of the treatment and screaming cost in our country (Hubbell et al., 2021; Miller et al., 2019) . In our survey it shows us that the patients who are ambulatory and competent in all self-care but unable to perform any work for more than 50 per cent of waking hours are the most numerous, with 36. Following that, there are a total of 20 patients who are only capable of minimal self-care and who spend more than fifty per cent of their waking hours confined to a bed or chair. In addition, the remaining cases are broken down as follows: fully disabled (5), restricted to doing instance physical exercise (26) and able to undertake the typical activity (16). So, it shows the negligence of the cancer screening and treatment of the patients

due to less awareness and economic purpose (R. A. Anderson et al., 2021; Hubbell et al., 2021) Several factors have been linked to cancer development, one of which is the proximity of a patient's home to a cell phone tower. So, we can conclude that the result is statistically significant, with a 95% confidence interval and a P value of 0.035. Non-specific and highly selective cell elimination therapy contributes to standard cancer treatment's high expense and extreme discomfort (Aghaei et al., 2020). Patients have less access to and less desire for better preventative care. So that patients can have a higher quality of life while undergoing treatment, palliative care must be completed and promoted as part of day-to-day care (Brant & Silbermann, 2021).

Getting good care for cancer can be expensive, a significant issue for low- and middle-income people. As a result of financial constraints, many cancer patients cannot afford the most advanced treatment options. Successful cancer treatment relies heavily on timely and accurate cancer screening. As a significant cause of cancer-related mortality, metastasis typically develops when patients are not diagnosed and treated promptly. Using toxic materials such as fish and chicken feed and damaging carcinogenic chemical compounds in food preservation pose a significant risk for cancer formation. Another critical issue is the accumulation of pesticides in tissue and organs from cultivating and storing crops, vegetables, and fruits. The release of toxic waste from industries and hospitals into the water body also influences the carcinogen level, as the local population consumes this water for various purposes. To help with early disease diagnosis, the government should develop a thorough, government financed cancer screening program. Moreover, prices might be raised three-to-four times as much to discourage cigarette use. The prohibition against harmful food preservatives and food impurities should be consistently enforced to reduce the amount of carcinogen exposure. Manufacturing should be allowed with proper waste disposal management and water treatment plant, and all enterprises should be located far away from residential areas.

Chapter 5: Conclusion

This study provides an overview of the cancer incidence, current situation in a specialized hospital in metropolitan Dhaka. Bangladesh is burdened by both contagious and non-communicable conditions and diseases. Therefore, a rapid change in the cancer situation is not feasible for a nation like Bangladesh. Understanding the morbidity and mortality associated with cancer in Bangladesh has become crucial. Cancer is a condition for which therapy is too lengthy and is too expensive. This research provides an overview of the cancer incidence, current situation in Dhaka and meets all survey aims. So, to help with early disease diagnosis, the government should develop a thorough, government financed cancer screening program. On top of that, the government should implement cutting-edge technologies for cancer diagnosis and treatment backed by a team of highly trained medical professionals and competent technicians. Non-governmental organizations (NGOs) can help run a cancer diagnosis and carcinogen campaign to raise awareness on a large scale.

5.1 Future work

For this study to produce statistically relevant results, a sizable population from various areas of the city of Dhaka must participate. Furthermore, in order to obtain reliable statistical data, attempts will be made to identify the factors, such as genetics, environmental carcinogen visibility, and primary source cancer distribution, that show a correlation between cancer and a wide range of populations.

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Appendix 1: Questionnaire of The Survey

The Current Cancer Situation in a Specialized Hospital in Metropolitan Dhaka

Name of the Hospital: **Date:**

1. **Name:**
2. **Date of Birth:**
3. **Age:**
4. **Gender: ☐Male ☐Female**
5. **Mobile Number:**
6. **Current Weight with Indoor Clothing:**
7. **Origin of Color: ☐Black ☐White ☐Brown ☐Other**
8. **Marital Status: ☐Single ☐Married ☐Divorced ☐Separated ☐Widowed**
9. **Religious Status: ☐Islam ☐Hinduism ☐Buddhism ☐Christianity ☐Other**
10. **Occupations:**

11. In Your Work or Daily life, are (were) You Regularly Exposed to Any of the Following?

Exposure to:	Check One		Number of Years
	Yes	No	
Asbestos			
Chemicals/Acids/Solvents			
Coal or Stone Dusts			
Coal Tar/PUch/Asphalt			
Diesel Engine Exhaust			
Dyes			
Formaldehyde			
Gasoline Exhaust			
Pesticides/Herbicides			
Textile Fibers/Dusts			
Wood Dust			
X-rays/Radioactive Materials			

12. Place Where They Used to Live: ☐City ☐Rural

13. Address:

14. Any Mobile Tower Nearby:

15. Does Anyone in Your Family Ever Had Cancer: ☐Yes ☐No

16. History of Diseases:

a. Type of Cancer:

b. Diagnostic Status: ☐Histopathologically confirmed ☐Cytopathologically confirmed ☐Suspected ☐ Clinical diagnosis ☐Others

c. Clinical Stage of The Disease:

d. Date of Diagnosis:

e. Date of First Treatment (year):

f. Performance Status Before Coming to Hospital for Treatment:

☐ Able to carry out all normal activities without restriction.

☐ Restricted in physically strenuous activity but ambulatory and able to carry out light work.

☐ Ambulatory and capable of all self-care but unable to carry out any work up and about morethan 50% of waking hours.

☐ Capable of only limited self-care; confined to bed or chair more than 50% of waking hours

☐ Completely disabled; cannot carry any self-care totally confined to bed or chair.

d. Any Other Disease Condition than Cancer Recently?

e. Have You Ever Had an Operation Other Than Cancer? ☐Yes ☐ No

17.Current Treatment of Cancer: ☐Surgery ☐Radiation Therapy ☐Chemo Therapy ☐Medication /Diet ☐Combination ☐Other

18.Number of Chemotherapy:

19.Number of Radiotherapy:

20.List of Medication of Cancer Using at The Moment with Brand and Generic Name (Fromprescription):

21.Current Physical Conditions:(compared with last 6 months):

☐Not Changed ☐Improved ☐Worsen ☐Other

22.Sleeping Time:

23.Sign of Insomnia: ☐Yes ☐No

24.Any Pain Related to Treatment (Describe):

25.Use of Tobacco Products (Smoking, Chewing or Passive Smoking): ☐Yes ☐ No

26.Alcohol Consumptions: ☐Yes ☐No

27. Did You Ever Receive Any Diet Chart from Your Physicians?

28. Do You Follow a Vegetarian diet? ☐Yes ☐No

29.Has There Been a Major Change in Your Diet in last 6 months? ☐Yes ☐No

30.Daily Food Habit:

- □ **Processed food**
- □ **Fast Food**
- □ **Fries**
- □ **Other**

31.Medications, Vitamins and Minerals (Other than use for cancer):

a. Where Do You Get Your Drinking Water From? ☐City supply ☐Private well ☐Other (specify):

b. Do You Add Any Substances to Soften Your Drinking Water? ☐Yes ☐No

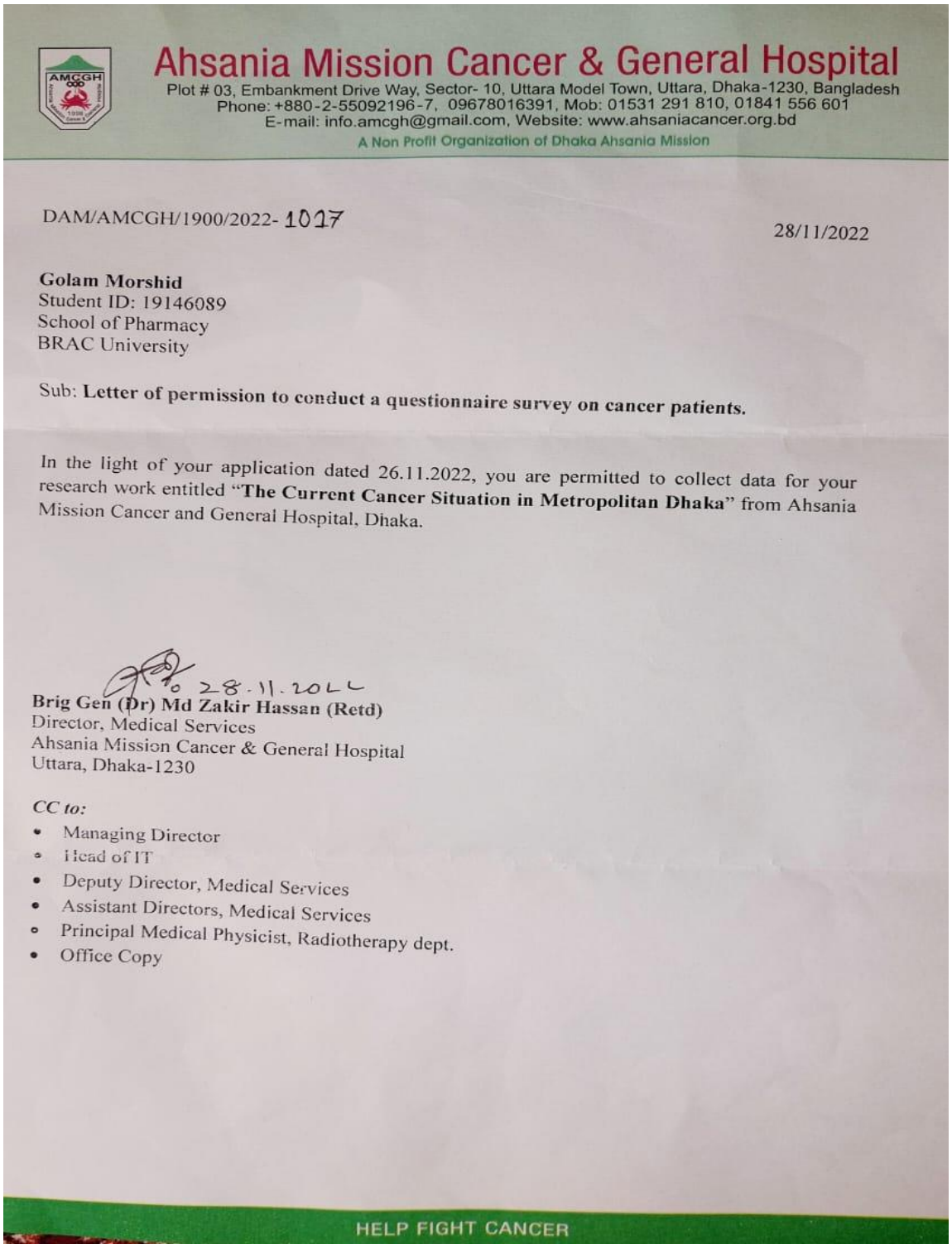
c. If "Yes" what is Added?

32.Do you Hear Anything About Palliative Care Treatment? ☐Yes ☐ No

33. If "Yes"

What is the Source? ☐Physicians ☐Self-Learning ☐Other

Appendix 2: Permission by ethical committee of AMCGH to conduct the survey.



Ahsania Mission Cancer & General Hospital
Plot # 03, Embankment Drive Way, Sector- 10, Uttara Model Town, Uttara, Dhaka-1230, Bangladesh
Phone: +880-2-55092196-7, 09678016391, Mob: 01531 291 810, 01841 556 601
E-mail: info.amcgh@gmail.com, Website: www.ahsaniacancer.org.bd
A Non Profit Organization of Dhaka Ahsania Mission

DAM/AMCGH/1900/2022- 1017

28/11/2022

Golam Morshid
Student ID: 19146089
School of Pharmacy
BRAC University

Sub: **Letter of permission to conduct a questionnaire survey on cancer patients.**

In the light of your application dated 26.11.2022, you are permitted to collect data for your research work entitled "**The Current Cancer Situation in Metropolitan Dhaka**" from Ahsania Mission Cancer and General Hospital, Dhaka.

28.11.2022

Brig Gen (Dr) Md Zakir Hassan (Retd)
Director, Medical Services
Ahsania Mission Cancer & General Hospital
Uttara, Dhaka-1230

CC to:

- Managing Director
- Head of IT
- Deputy Director, Medical Services
- Assistant Directors, Medical Services
- Principal Medical Physicist, Radiotherapy dept.
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HELP FIGHT CANCER

The Current Cancer Situation in Metropolitan Dhaka

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