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## The growing burden of cancer in the Gaza Strip

Globally, more than 18 million new cases of cancer were diagnosed in 2018, and almost 10 million deaths were registered.<sup>1</sup> In the occupied Palestinian territory (the West Bank and Gaza Strip), cancer is the second most common cause of death exceeded only by heart disease.<sup>2</sup> Most cases are diagnosed at a late stage, leading to difficulties in symptom control and treatment options, and compromising quality of life and survival.<sup>3</sup>

As of April, 2019, 5 163 667 people live in the occupied Palestinian territory, according to UN estimates. Two million people are living in the Gaza Strip, which is a narrow, overcrowded strip of land located southwest of the West Bank, measuring 362 km<sup>2</sup> and with a population density of 5525 people per km<sup>2</sup>. 75% of the population live below the poverty line and unemployment was 52% in 2018 (an increase of 8% from 2017) according to the Palestinian Central Bureau of Statistics.<sup>4</sup>

There are only two oncology departments in the Gaza Strip, one at Ranteesy Hospital and another at the European Gaza Hospital. Cancer therapy generally includes surgical treatment, chemotherapy, and radiotherapy or combination therapy, in addition to auxiliary services, such as radio-diagnostics, laboratory services, and nuclear medicine.<sup>5</sup> However, medical facilities in the Gaza Strip suffer chronic shortages of many essential medicines, due in part to the complex and ongoing sociopolitical and economic crises faced by the Ministry of Health, as well as political instability and lack of funding.<sup>6</sup> On average, 30–40% of essential chemotherapy drugs are out of stock at any one time in Gaza.<sup>7</sup> The unavailability of systemic treatment affects 7415 (60%) of 12 359 patients. Missing just one chemotherapy dose or cycle can dramatically decrease the effectiveness of the treatment and increase the risk of drug resistance in patients.<sup>8</sup>

Surgery is the main cancer intervention in Gaza. It is sometimes the first and often the last modality used

to treat cancer in Gaza, usually due to the absence of other options. More than 85% of surgical treatment of cancer is done without adjuvant or neoadjuvant chemotherapy, owing to the shortage of these drugs. Radiotherapy is still unavailable throughout the Gaza Strip. Radioisotopes and radioactive substances used for diagnosis and radiotherapy services, which are crucial, for example, for biopsying axillary lymph nodes and therefore assessing the spread of breast cancer, are banned from entering the Gaza Strip.

The high number of patients with cancer in oncology wards and the delay in receiving adequate cancer treatment force the medical staff to look for other options, such as referring patients for treatment outside Gaza in other countries.<sup>9</sup> This option has several drawbacks. More than 60% of patients are prohibited from entering these countries by governments. For the remaining 40% of patients, even if they do manage to travel, their treatment is a substantial financial burden on health authorities, as well as the patients themselves and their families. There is also a substantial social and psychological burden. Further, referrals are usually delayed during travelling, which leads to deterioration of the patient's condition, and sometimes death.

A lack of epidemiological studies and reliable data motivated us to do a retrospective assessment of the cancer burden in the low-income, isolated territory (the Gaza Strip) within the occupied Palestinian territory. We calculated the total number of new annual cancer cases during the past 8 years (2011–2018). Annual cancer incidence, strategic treatment intervention, and mortality were also calculated.

We found 12 359 new cancer cases in the Gaza Strip between 2011 and 2018. Of the five governorates of the Gaza Strip, Gaza City had the most cancer cases (5685 [46.0%] of 12 359), followed by Khanyounis (2101 [17.0%]), Deir al-Balah (1644 [13.3%]), north Gaza (1508 [12.2%]), and Rafah (1421 [11.5%]). The

number of patients with cancer in the Gaza Strip steadily increased over the study period. In 2011, there were 1037 cases of cancer, with an incidence of 65.2 per 100 000 people, compared with 1941 cases in 2018, with an incidence of 97.9 per 100 000 (figure). The incidence of cancer in the overpopulated Gaza Strip was 85.5 per 100 000 people in 2011–18, which means 128 newly diagnosed cases each month, and around 1545 newly diagnosed cases per year. 6797 (55%) of 12 359 cancer cases were in women and 5562 (45%) were in men. Among men, the most common cancer types were colorectal cancer (740 [13.3%] of 5562 cases), lung cancer (667 [12.0%]), and leukaemia (506 [9.1%]). Breast cancer (2365 [34.8%] of 6797 cases), colorectal cancer (624 [9.2%]), and thyroid cancer (571 [8.4%]) were the most common cancer types among women.

Cancer mortality is high in Gaza. 2942 patients died from cancer in 2011–15, with a mortality of 34.5 per 100 000 people. Bronchus and lung cancer are the leading causes of death in Gaza (both 441 cases [15.0%]), followed by breast cancer (409 [13.9%]).

Unfortunately, treatment of patients with cancer in the Gaza Strip remains problematic. The unavailability of treatment in Gaza and the difficulty of receiving treatment outside this territory is a challenge that is yet to be resolved. Notwithstanding the difficulties, our analysis provides novel information on the burden of cancer and tries to shed light on the problematic cancer treatment situation in the Gaza Strip. The isolation of this population, and the difficult social, political, and economic circumstances have affected the availability of adequate cancer treatment for many patients. The absence of a modern health-care system, including lack of screening and early detection facilities due to the absence of equipment, the serious shortage of oncologists, and the low level of cancer awareness and education,<sup>10</sup> all contribute to the problem. It is thought that a substantial number of cancer deaths could be prevented through early diagnosis and detection and appropriate treatment. Additionally, raising public awareness of cancer is warranted.

The facilitation of radiation oncology service in Gaza, the maintenance of regular drug supplies for patients with cancer, and the provision of training courses in various aspects of cancer care for the oncology teams would help alleviate the problems we have described.

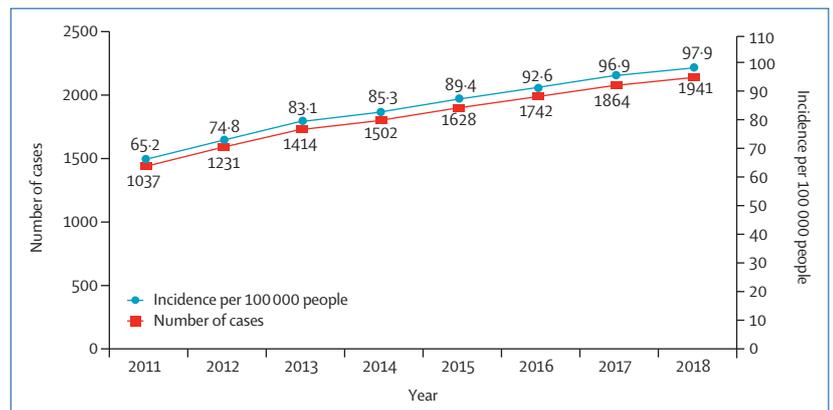


Figure: Incidence of all cancers types in the Gaza Strip, 2011–18

Without such interventions, the difficult conditions experienced by both patients and doctors—such as inability to travel for treatment, medical training, shortages of chemotherapy and lifesaving drugs, and the absence of modern health facilities supplied by the health system in Gaza—will lead to further impairment of adequate treatment and care for patients with cancer in the Gaza Strip. Increasing financial and technical support to the Palestinian Ministry of Health and other Palestinian service providers to enhance the provision of cancer diagnosis, treatment, and supportive care remains a necessity.

\*Bowirrat Abdalla, Mohammed Mansour, Mustafa Ghanim, Bowirrat Aia, Mustafa Yassin

Division of Anatomy, Biochemistry, and Genetics, Faculty of Medicine and Health Sciences, An-Najah National University, Nablus, PO Box 7, Palestine (BAb, MG); Basmet Amal for Cancer Patients Care, Gaza City, Palestine (MM); Faculty of Medicine, An-Najah National University, Nablus, Palestine (BAi); and Department of Orthopedics, Faculty of Medicine, An-Najah National University, Nablus, Palestine (MY)  
bowirrat@gmail.com

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