

Ethnic disparities in the incidence of gynecologic malignancies among Israeli Women of Arab and Jewish Ethnicity: a 10-year study (2010–2019)

Roie Alter*, Adiel Cohen*, Paul-Adrien Guigue, Raanan Meyer and Gabriel Levin 

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Abstract

Background: Ethnic disparities in healthcare outcomes persist, even when populations share the same environmental factors and healthcare infrastructure. Gynecologic malignancies are a significant health concern, making it essential to explore how these disparities manifest in terms of their incidence among different ethnic groups.

Objective: To investigate ethnic disparities in the incidence of gynecologic malignancies incidence among Israeli women of Arab and Jewish ethnicity.

Design: Our research employs a longitudinal, population-based retrospective cohort design.

Method: Data on gynecologic cancer diagnoses among the Israeli population from 2010 to 2019 was obtained from a National Registry. Disease incidence rates and age standardization were calculated. A comparison between Arab and Jewish patients was performed, with Poisson regression models being used to analyze significant rate changes.

Results: Among Jewish women, the age-standardized ratio (ASR) for gynecologic malignancies decreased from 288 to 251 ($p < 0.001$) between 2014 and 2019. However, there was no significant change in the ASR among Arab women during the same period, with rates going from 192 to 186 ($p = 0.802$). During the study period, the incidence of ovarian cancer decreased significantly among Jewish women ($p = 0.042$), while the rate remained stable among Arab women ($p = 0.102$). A similar trend was observed for uterine cancer. The ASR of CIN III (Cervical Intraepithelial Neoplasia Grade 3) in Jewish women notably increased from 2017 to 2019, with an annual growth rate of 43.3% ($p < 0.001$). A similar substantial rise was observed among Arab women, with an annual growth rate of 40.5% ($p < 0.001$). In contrast, the incidence of invasive cervical cancer remained stable from 2010 to 2019 among women of both ethnic backgrounds.

Conclusion: Our findings indicate that Arab women in Israel have a lower incidence rate of gynecologic cancers, warranting further investigation into protective factors. Both ethnic groups demonstrate effective utilization of cervical screening.

Keywords: Arabs, gynecologic malignancy, health disparity, Jewish, rate

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Introduction

Ethnic disparities in healthcare represent a complex and challenging public health issue in numerous countries.¹ Despite being viewed as unjust and potentially infringing on the right to equal

healthcare opportunities, these disparities are frequently challenging to eradicate.² Notably, ethnic minority status has been linked to increased mortality rates and various adverse healthcare outcomes.^{3,4,5} This phenomenon is particularly

Correspondence to:

Roie Alter
Department of Obstetrics
and Gynecology,
Hadassah-Hebrew
University Medical Center,
POB 12000, Jerusalem
9574869, Israel
roie.alter@mail.huji.ac.il

Adiel Cohen
Hadassah Ein Kerem
Medical Center,
Department of Obstetrics
and Gynecology,
Jerusalem, Israel

Paul-Adrien Guigue
Claude Bernard University,
Lyon, France

Raanan Meyer
Department of Obstetrics
and Gynecology, Chaim
Sheba Medical Center,
Ramat-Gan, Israel

Gabriel Levin
Hadassah-Hebrew
University Medical Center,
Gynecologic Oncology,
Jerusalem, Israel

Lady Davis Institute/
Jewish General Hospital,
McGill University,
Montreal, Canada

*These authors
contributed equally

significant in the fields of oncology and gynecologic oncology.^{6–10}

In Israel, the demographic makeup of a Jewish majority (73.9%) and an Arab minority (21.1%) provides a unique context for investigating ethnic inequalities.¹¹ In contrast to numerous other countries where minorities primarily consist of recent immigrants, Arab Israelis are native-born, allowing the examination of disparities without the complicating factor of immigration status. Furthermore, while the Jewish population comprises a diverse range of ethnic backgrounds, Israeli Arab communities represent a genetically homogeneous minority.¹¹ This genetic homogeneity could potentially influence the incidence of genetically linked gynecologic malignancies, such as ovarian and endometrial cancer.

This study carries substantial significance in shaping effective public health policies within the nation. The enduring ethnic disparities in health-care outcomes and mortality rates underscore the urgent necessity for targeted interventions addressing the specific needs of diverse population groups. Through an examination of gynecologic cancer incidence patterns within Israel's distinct demographic landscape, we aim to illuminate the scope of these disparities and uncover insights into their underlying determinants.

Previous reports have indicated evident disparities in gynecological cancer rates between the two major ethnic groups in Israel.¹¹ However, that study analyzed cases from two decades ago and encountered data gaps in certain aspects. In light of the significant advancements achieved over the past decade in cervical cancer screening and the management of genetic susceptibility to ovarian and endometrial cancer, our primary objective is to investigate the incidence of gynecologic cancer among various ethnic groups in Israel during the recent decade.

This research endeavors to offer a contemporary and comprehensive understanding, thereby contributing to well-informed decision-making and the formulation of equitable public health policies.

Materials and methods

Data on diagnosed gynecological malignancies in Israeli during the years 2010–2019 were obtained

from the Israeli National Cancer Registry. This registry has been receiving obligatory information on all malignant tumors and certain benign pathologies for the past four decades. Each diagnosis is ascertained by the National Cancer Registry through the review of medical records.

Incidence rates by ethnicity were calculated using data for each year in the Israeli population published by the Central Bureau of statistics of Israel. The Age Standardized Rates (ASRs) per 100,000 women were calculated using the 'Segi World standard population' for standardization.

Statistical analysis

The crude incidence rates were calculated by using data on age and ethnicity for each year.

Poisson regression models were used to assess time trends of disease-specific incidence rates. A p -value of <0.05 was considered statistically significant. The data were analyzed using Software Package for Statistics and Simulation (IBM SPSS version 29, IBM Corp, Armonk, NY, USA).

Ethical approval

Ethical approval was deemed unnecessary for this of study, given its reliance on publicly available data (Israeli health ministry Director's General Circular 20/10, 11.10.2010).

Results

Gynecologic malignancies

Among Israeli women, the incidence of malignancies, excluding cancers *in situ*, was higher among Jewish compared to Arab women ($p < 0.001$), the ASR for invasive gynecologic malignancies remained consistently higher among Jewish women throughout the examined period from 2014 to 2019. In 2019, the ASR for all malignancies was 1.34 times higher in Jewish than in Arabs (244.86 versus 182.0; Figure 1). Within the Jewish population, the ASR for invasive gynecologic malignancies decreased from 288 to 251 during the period 2014–2019 ($p < 0.001$). Conversely, there was no significant change in the ASR among the Arab population during the same time period, with rates going from 192 to 186 ($p = 0.802$).

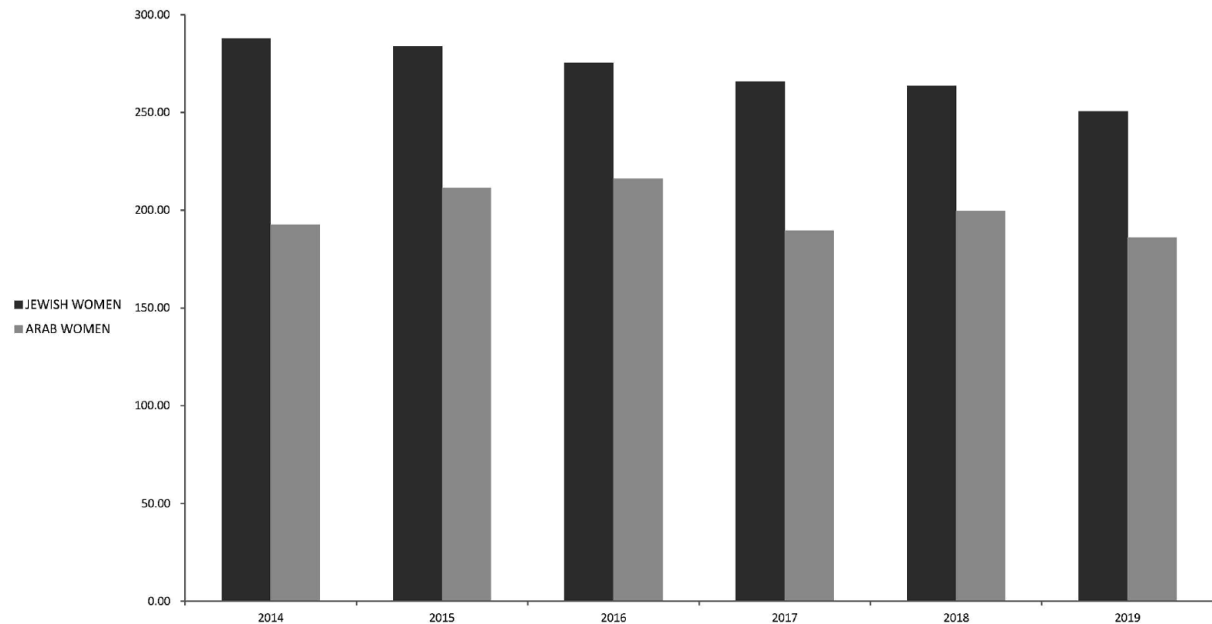


Figure 1. Incidence of invasive gynecologic malignancies among Jewish *versus* Arab women (2014–2019) – age standardized ratio.

In 2019, the highest ASR for gynecologic malignancy was observed among Arab women in the age group 70–74, whereas among the Jewish population, the peak incidence occurred in the younger age group 60–64. While the age distribution of gynecologic cancer among Jewish women follows a normal distribution pattern, in the Arab population, the distribution is similar between the ages of 45–59, and it begins to increase in the 60–64 age group, peaking later in the 70–74 age group (Figure 2).

Figure 3(a)–(d) illustrates the trends in gynecologic malignancies, including endometrial, ovarian, and cervical cancers, over the period 2010–2019. Among Jewish women, the incidence of total gynecologic malignancy remained stable from 2010 to 2015 ($p=0.664$). However, from 2015 onwards, a significant annual decrease of 2.1% [$p<0.001$; Figure 3(a)]. Conversely, among Arab women, the incidence of total gynecologic malignancy steadily increased from 2010 to 2015 ($p<0.001$), followed by a continuous decline with an annual rate of 7.02% from 2015 onwards ($p<0.001$). Notably, the degree of decrease was more pronounced among Arab women ($p<0.001$).

Regarding ovarian cancer, the rate among Jewish women showed a decreasing trend ($p=0.042$)

during the examined period, while the rate among Arab women remained relatively stable [$p=0.102$; Figure 3(b)].

For endometrial cancer, the ASR declined within the Jewish population going from 15.38 to 13.28 during the study period ($p<0.001$). In contrast, the ASR among Arab women remained relatively unchanged, with rates of 12.21 to 11.53 [$p=0.823$; Figure 3(c)].

CIN III and cervical carcinoma

The ASR of Cervical Intraepithelial Neoplasia Grade 3 (CIN III) (Figure 4) experienced a decline among Jewish women from 2010 to 2017, with an annual rate of decrease at 0.36% ($p<0.001$), while the ASR for Arab women remained statistically stable during this period ($p=0.403$). However, the ASR of CIN III for Jewish women increased significantly from 2017 to 2019, with an annual rate of 43.3% ($p<0.001$). A similar significant increase was observed among Arab women during the same period with an annual rate of 40.5% ($p<0.001$). Notably, the rate of invasive cervical cancer did not demonstrate significant changes during the period spanning 2010–2019 for women from both ethnic backgrounds.

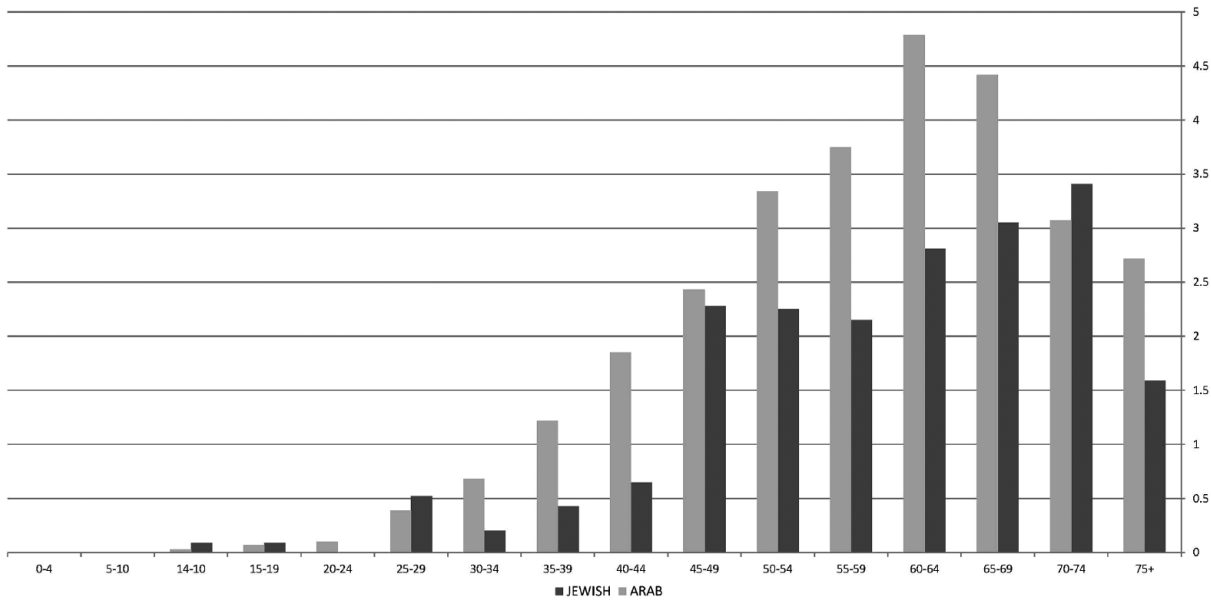


Figure 2. Age distribution of gynecologic malignancies, Jewish *versus* Arab women in 2019. Age standardized ratio.

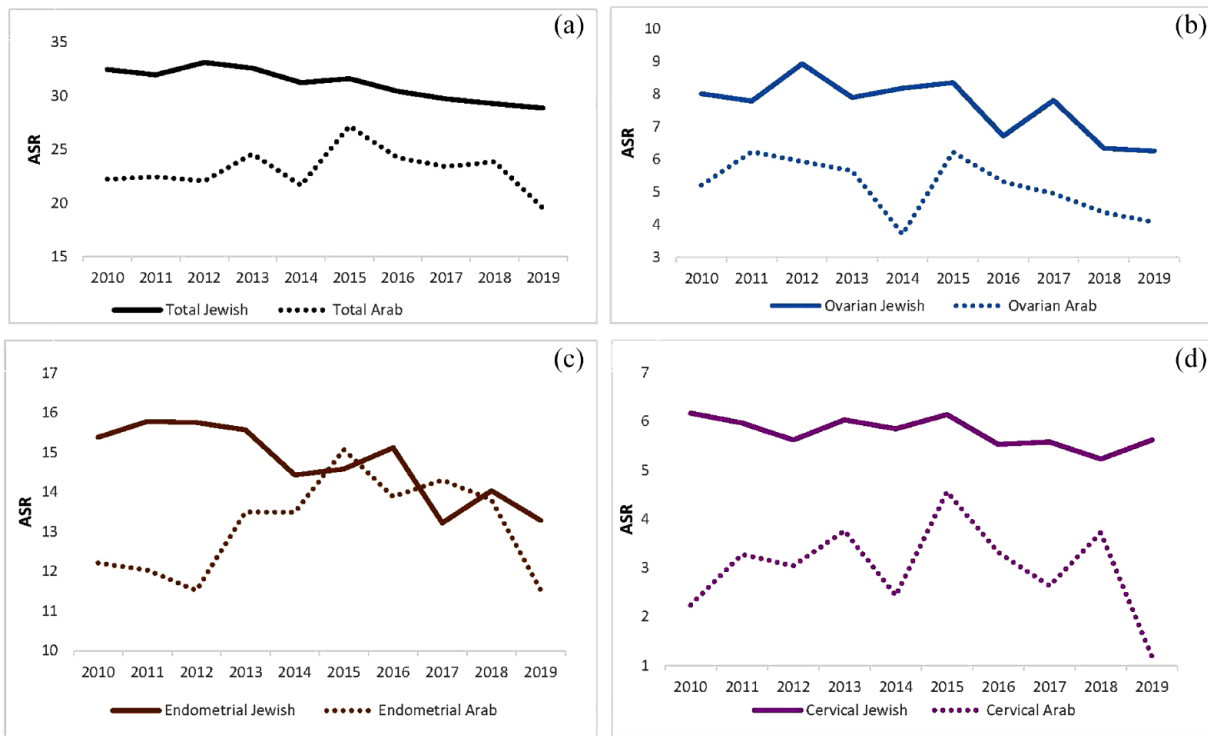


Figure 3. Gynecologic malignancies, Jewish *versus* Arab women in 2010–2019. (a) Total gynecologic malignancies rate, (b) Ovarian cancer, (c) Endometrial Cancer rate, and (d) Cervical Cancer rate.

All malignancies context

Breast cancer ranks as the most prevalent type of invasive cancer among Israeli women. Both Arab and Jewish women follow a similar trend, where breast cancer account for one out of every three cancer cases, and colorectal cancer representing 1 out of every 10 cases. Uterine cancer and non-Hodgkin lymphoma collectively constitute 5% of all malignancies and stand as the fourth and fifth most common types, respectively. Notably, the prevalence of thyroid and lung cancer is higher among Arab women, ranking as the third and sixth most common malignancies, respectively. In contrast, Jewish women exhibit the opposite pattern (Figure 5).

Discussion

Summary of main results

Our study underscores a reduction in invasive gynecological malignancies over the last 5 years, particularly among Jewish women. However, this decline was not observed among Arab women. Specifically, the rate of ovarian cancer has decreased among Jewish women but remained stable among Israeli Arab women. The same pattern is observed for endometrial cancer. Additionally, we have seen an increase in the diagnosis of CIN III among both ethnic groups, while the rates of cervical carcinomas have not significantly changed.

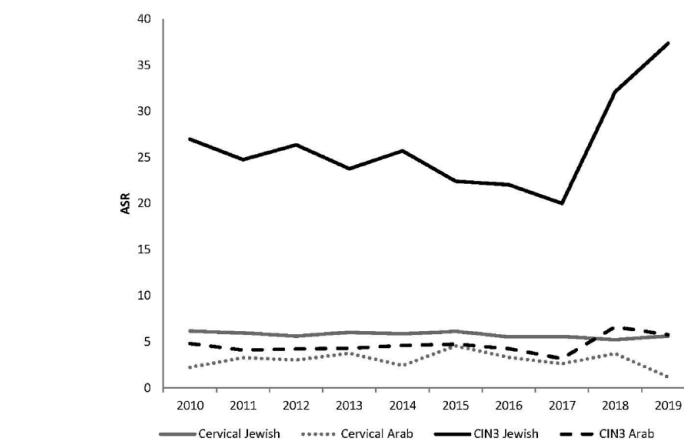


Figure 4. CIN III and invasive cervical cancer by ethnicity 2010–2019. CIN III, Cervical Intraepithelial Neoplasia Grade 3.

Results in the context of published literature

In Israel, Jewish and Arabs constitute two distinct ethnic populations, residing closely within the same geographical territory and having equal access to healthcare resources. Moreover, healthcare resources are free in Israel and may be equally accessed. Nonetheless, these populations are culturally and genetically diverse and may exhibit socioeconomic differences. Our study reveals significant difference in the incidence of gynecologic cancers between Arab and Jewish women in Israel.

Several hypotheses could explain these differences. One of them relates to inherent genetic, or

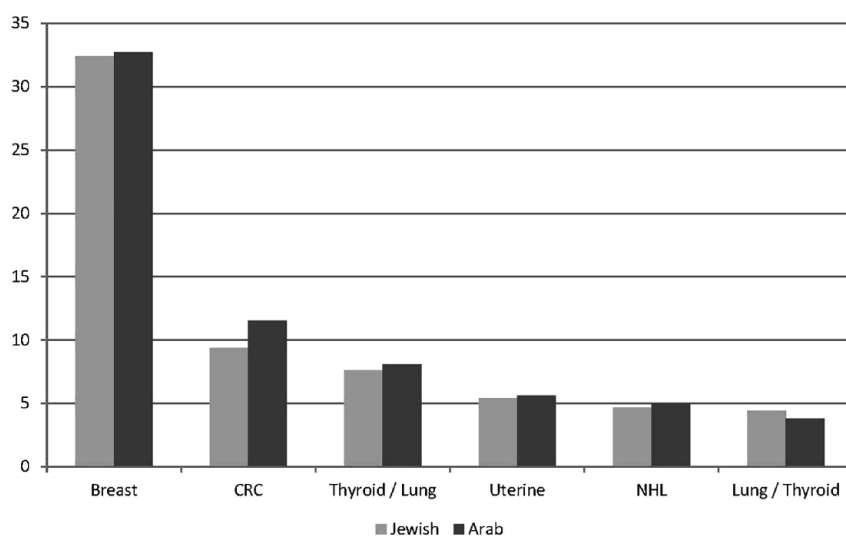


Figure 5. Most common malignancies among Jewish versus Arab women. 2019.

epigenetic features of the population, with Arab population being more homogeneous, characterized by a higher prevalence of consanguineous marriages.¹² This genetic homogeneity might influence the clinical presentation of diseases. Conversely, the Jewish genotype is more diverse, characterized by a lower frequency of consanguineous marriages and significant genetic diversity based on origin, such as Ashkenazi and non-Ashkenazi Jewish people.

However, it is possible that ethnicity serves as a confounding factor.¹³ Israeli Bureau of Statistics data indicates that the top decile of income is predominantly composed of the Jewish population. The well-established association between socioeconomic status and cancer health outcomes¹⁴ suggests that Arabs, who are more widely represented in lower socioeconomic strata, may utilize fewer healthcare services and screening programs.

Therefore, the lower incidence of gynecological cancer among Arabs could be due to underdiagnosis, though it is challenging to believe that symptomatic malignancies such as gynecologic cancers, which manifest with symptoms like vaginal bleeding and abdominal pain, are not being presented in emergency department visits or clinic visits.

Another explanation for the differences in incidence between these populations could be attributed to geographic factors and the availability of healthcare services. Despite healthcare services in Israel being free and allegedly equally accessible, areas with a majority of non-Jewish population, such as the Negev region, have fewer primary care clinics and tertiary hospitals, possibly contributing to underdiagnosis.¹⁵ Nonetheless, global data suggests that Arab populations have lower cancer incidence rates.¹⁶ This could be related to lifestyle factors such as prolonged fasting, dietary habits, and reduced alcohol consumption.¹⁶ Additionally, differences in well-established risk factors for gynecological malignancies, such as parity and age at first gestation and delivery, may play a role. The Arab population traditionally exhibits higher parity and an earlier age of reproduction.

Our study also identifies a substantial decrease (more than 10%) in the ASR of all malignancies among Jewish women whereas among Arab

women, no such decrease is observed. This may strengthen the hypothesis that higher socioeconomic status and a higher level of education are associated with better health-related outcomes due to increased preventive healthcare utilization, adoption of healthy lifestyles, and early screening and diagnosis, ultimately leading to a decrease in malignancies among Jewish women. Conversely, in lower socioeconomic strata, malignancy ASR remain unchanged, reflecting lower utilization of healthcare services and diagnoses throughout the study period.

We have also identified a significant rise in the diagnosis of pre-invasive cervical disease, specifically CIN III. This increase can be attributed to a fundamental modification in the cervical dysplasia screening program, which integrated human papillomavirus (HPV)-based screening. This change enhanced screening sensitivity, resulting in a higher frequency of colposcopy-guided biopsies.^{17,18} Notably, both Jewish and Arab populations exhibit a similar substantial surge in CIN III diagnoses. This similarity suggests that the increase is primarily linked to the shift in screening methodology from conventional cytology to the more sensitive HPV-based approach. Another potential explanation for this upward trend could be the national HPV vaccination program initiated in 2013. Although the influence of the vaccination program on test results may not have been immediate in the subsequent years, it could have played a role in raising awareness about cervical cancer and available screening options among the population.

These findings underline that both ethnicities have access to and utilize screening programs in a comparable manner, thereby challenging previous hypotheses of inequality in access to screening programs. Moreover, the women participating in cervical screening are generally within a specific age group with a high level of medical literacy regarding women's health issues. Importantly, the rate of cervical invasive cancer does not change significantly in both ethnicities, indicating efficient screening and treatment of pre-invasive disease in both groups.

The decrease in ovarian cancer cases among women can be attributed to genetic screening and preventive measures, such as risk-reducing surgeries guided by these screening programs.

Ashkenazi Jewish women have an estimated 1 in 40 chances of carrying one of the three common BRCA1 or BRCA2 mutations. Since 2020, any woman in Israel of Jewish Ashkenazi origin has been eligible for genetic screening for hereditary breast and ovarian cancer. However, in the Arab population, a similar decrease is not observed. This could be due to the less pronounced genetic component in this population and a lower frequency of risk-reducing surgeries for this indication.

Strengths and weaknesses

Our study has several limitations. It lacks description of demographic data such as body mass index, comorbidity, and socioeconomic status. Additionally, although our study focused on recent trends in Israeli populations, it did not analyze previous periods. As this is a longitudinal population-based retrospective study, association can only be inferred. Nevertheless, the objective of this study was to analyze ethnic differences in incidence of gynecological malignancies. Finally, although we have studied incidence, we did not analyze mortality rates in these populations.

Implications for practice and future research

Numerous factors depend on public medical screening policies and clinic accessibility, both of which can be influenced by these policies. This study highlights the successful implementation of a screening policy for both ethnic groups, indicating the need for continued support and promotion. Furthermore, it is crucial to recognize independent factors such as environmental influences, cultural aspects, and lifestyle choices, as they can act as either protective or risk factors. Given the unique genetic distinctions between these two populations, there is an opportunity to identify specific factors contributing to disease development or prevention. Future research should prioritize investigating life expectancy, quality of life, and mortality rates in the context of ethnic differences following a malignant diagnosis.

Conclusions

Our analysis of gynecological cancers in Israel underlines significant disparities between Jewish and Arab women. The lower incidence of gynecologic cancer among Israeli Arab women warrants further investigation. It is noteworthy that both ethnic groups exhibit efficient utilization of

cervical screening programs, emphasizing the importance of equitable access to preventive healthcare services.

Declarations

Ethics approval and consent to participate

No ethical approval was needed by the institutional review board as this study analyzed only published available public data. None needed as no patient data was used.

Consent for publication

Not applicable.

Author contributions

Roie Alter: Conceptualization; Data curation; Formal analysis; Investigation; Validation; Visualization; Writing – original draft; Writing – review & editing.

Adiel Cohen: Conceptualization; Data curation; Investigation; Validation; Visualization; Writing – original draft; Writing – review & editing.

Paul-Adrien Guigue: Data curation; Investigation; Writing – review & editing.

Raanan Meyer: Data curation; Investigation; Writing – review & editing.

Gabriel Levin: Conceptualization; Formal analysis; Writing – original draft; Writing – review & editing.

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Competing interests

The authors declare that there is no conflict of interest.

Availability of data and materials

All data available publicly and upon request.

Synopsis

In Israel women of Jewish and Arab ethnicity have significant differences in gynecologic malignancies rates and trends between 2010 and 2019.

ORCID iD

Gabriel Levin  <https://orcid.org/0000-0003-1282-5379>

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