

The impact of COVID-19 on mammography screening: Trends in Türkiye between 2018 and 2023

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The study was approved by the Harran University
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Conflict of Interest

No conflict of interest was declared by the
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Abstract

Background/Aim: Breast cancer screening programs are essential for early detection, but they may be disrupted during major public health crises. This study evaluated trends in mammography screening, breast biopsy numbers, and malignancy detection rates in Türkiye between 2018 and 2023, with particular attention to the effects of the COVID-19 pandemic.

Methods: This descriptive study used nationwide mammography screening data obtained from the Health Statistics Yearbooks of the Republic of Türkiye Ministry of Health for 2018-2023. In addition, breast biopsy data and malignancy rates from the interventional radiology unit of the study center were reviewed for the same period. Annual changes were analyzed to assess the effect of the pandemic and the subsequent recovery period on breast cancer screening and diagnosis.

Results: Nationwide mammography screenings increased from 2,139,813 in 2018 to 2,252,815 in 2019 and then decreased markedly to 1,261,664 in 2020. A recovery trend was observed in 2021 (1,926,717) and continued through 2022 (2,453,042) and 2023 (2,704,397). Similarly, the number of breast biopsies decreased from 720 in 2019 to 450 in 2020, then increased to 920 in 2022 and slightly decreased to 900 in 2023. Malignancy rates increased from 24.0% in 2019 to 30.0% in 2022 and then slightly decreased to 29.0% in 2023.

Conclusion: The COVID-19 pandemic temporarily disrupted breast cancer screening and biopsy services in Türkiye. However, substantial recovery was observed in subsequent years in both screening participation and diagnostic follow-up. These findings underscore the importance of resilient health care systems and strategies that sustain cancer screening services during public health crises.

Keywords: mammography, breast cancer screening, COVID-19 pandemic

Introduction

Cancer remains a major global health problem and affects millions of people each year [1, 2]. Breast cancer is the most common cancer among women, and early detection is critical for improving treatment outcomes and reducing mortality [3]. In Türkiye, approximately one in eight women is at risk of developing breast cancer during her lifetime. Therefore, effective screening programs are essential for timely diagnosis and treatment.

Mammography is an imaging method that uses X-rays to evaluate breast tissue and is particularly valuable for detecting asymptomatic tumors at an early stage [4]. Current evidence supports the benefits of mammography screening, although its implementation and performance may vary across settings [5]. In Türkiye, mammography screening programs conducted by the Ministry of Health aim to facilitate early diagnosis in eligible women. However, participation in these programs remains below the desired level, and multiple barriers may influence screening uptake [6].

In this context, the present study evaluated nationwide mammography screening trends in Türkiye between 2018 and 2023 by using Ministry of Health data [7]. In addition, breast biopsy numbers and biopsy outcomes from our hospital's interventional radiology unit were examined to better understand the potential impact of the COVID-19 pandemic on diagnostic follow-up after screening. By evaluating national screening activity together with institutional biopsy trends, this study sought to provide a practical overview of disruption and recovery in breast cancer screening services during and after the pandemic.

Materials and methods

Study design and data sources

This descriptive study used data from the Health Statistics Yearbooks of the Republic of Türkiye Ministry of Health for the years 2018-2023 [7]. The analysis focused on annual trends in mammography screening in Türkiye. In addition, data from our hospital's interventional radiology unit regarding the number and results of breast biopsies performed during the same period were reviewed to assess changes in diagnostic follow-up during and after the COVID-19 pandemic.

Breast biopsy data

Breast biopsies were performed in patients with suspicious breast lesions detected on mammography or ultrasonography and classified as Breast Imaging Reporting and Data System (BI-RADS) category 4 or 5. All cases were evaluated by radiologists in the interventional radiology unit according to BI-RADS criteria, and lesion characteristics were recorded accordingly. Patients with BI-RADS category 3 or lower lesions were followed up and were not considered for biopsy. All biopsies were performed under ultrasound guidance with a 14-gauge core needle. Pathology results were categorized as malignant, benign, or atypical lesions. This standardized protocol supported consistency in patient selection, lesion assessment, and biopsy procedures.

Statistical analysis

The numbers of mammography screenings, breast biopsies, and malignancy rates were summarized by year using

descriptive statistics, including frequency and percentage. Trend graphics and annual comparisons were used to illustrate changes over time. Statistical analyses were performed with IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). Because the present report primarily aimed to describe annual trends in an ecological nationwide dataset together with institutional summary biopsy data, the findings are presented descriptively.

Ethics statement

The study was approved by the Harran University Noninterventional Clinical Research Ethics Committee (decision no. 25.06.56; March 24, 2025). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Results

All breast biopsy cases included in the study were female patients; no male patients were identified during the study period. The age of the patients who underwent biopsy ranged from 28 to 79 years, with a mean of 51.6 (9.3) years. All biopsied lesions were classified as BI-RADS category 4 or 5 on mammography or ultrasonography.

No nondiagnostic biopsy reports were recorded during the study period. All cases were histopathologically categorized as benign, malignant, or lesions with atypical cells. If a patient underwent more than one biopsy, only the first biopsy result was included in the analysis. Therefore, the reported numbers represent individual patients rather than the total number of biopsy procedures.

Mammography screening in Türkiye increased during the pre-pandemic period, from 2,139,813 screenings in 2018 to 2,252,815 in 2019, and then decreased markedly to 1,261,664 in 2020. Screening activity recovered to 1,926,717 in 2021 and exceeded pre-pandemic levels in 2022 (2,453,042) and 2023 (2,704,397) (Table 1, Figure 1).

A similar pattern was observed for breast biopsies performed in our hospital's interventional radiology unit. The number of biopsies increased from 650 in 2018 to 720 in 2019, decreased to 450 in 2020, increased again to 620 in 2021, peaked at 920 in 2022, and slightly decreased to 900 in 2023 (Table 1).

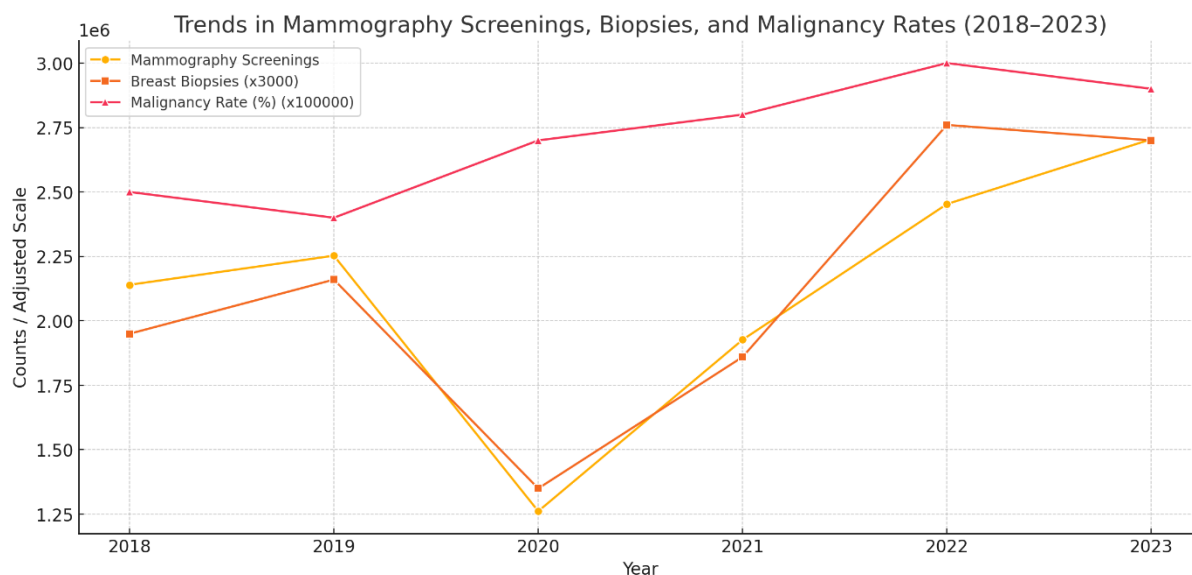
Malignancy rates showed annual variation across the study period. The malignancy rate was 25.0% in 2018 and 24.0% in 2019, increased to 27.0% in 2020 and 28.0% in 2021, peaked at 30.0% in 2022, and slightly decreased to 29.0% in 2023 (Table 1). Overall, these findings suggest that the decline in screening activity during the pandemic was accompanied by a reduction in biopsy volume, followed by recovery in both screening participation and diagnostic follow-up in the subsequent years.

Table 1. Annual mammography screenings, breast biopsies, and malignancy rates in Türkiye (2018-2023).

Year	Mammography screenings (nationwide)	Breast biopsies (n)	Malignancy rate (%)
2018	2,139,813	650	25.0
2019	2,252,815	720	24.0
2020	1,261,664	450	27.0
2021	1,926,717	620	28.0
2022	2,453,042	920	30.0
2023	2,704,397	900	29.0

n: number. Nationwide mammography screening data represent the total number of screenings performed across Türkiye between 2018 and 2023. Breast biopsy data and malignancy rates were obtained from the XXX University Interventional Radiology Unit.

Figure 1. Annual trends in mammography screenings, breast biopsies, and malignancy rates in Türkiye between 2018 and 2023. The blue line represents nationwide mammography screenings. The orange line represents the number of breast biopsies performed in the Harran University Interventional Radiology Unit, scaled by a factor of 3,000 for visual comparability. The green line represents the malignancy detection rate (%), scaled by a factor of 100,000.



Discussion

This study showed that mammography screening activity in Türkiye increased before the COVID-19 pandemic, decreased substantially in 2020, and then recovered progressively through 2023. Similar disruptions in breast cancer screening were reported internationally during the pandemic, including marked reductions in the United States and the United Kingdom, as well as in several other countries [8-11]. The subsequent recovery observed in our study is also consistent with reports showing the restoration of screening services after the most restrictive phase of the pandemic [12].

The biopsy data from our interventional radiology unit complemented the nationwide screening findings. The reduction in biopsy numbers during the pandemic period was followed by a rebound in the post-pandemic years, suggesting that reduced screening activity was accompanied by reduced diagnostic follow-up. In parallel, malignancy rates increased modestly after the pandemic onset, which may reflect changes in biopsy referral patterns, delayed presentation, or the detection of previously missed clinically significant lesions after services resumed [10, 12, 15].

The observed post-pandemic increase in malignancy rates should be interpreted cautiously. Higher malignancy proportions do not necessarily indicate a true rise in disease incidence; rather, they may reflect selective referral of higher-risk cases when access to screening and diagnostic services was limited. Nevertheless, the findings reinforce the importance of maintaining continuity in screening pathways and implementing adaptive strategies, such as mobile screening, risk-based prioritization, and stronger public outreach, particularly during periods of health system disruption [13, 14, 16].

This study has several limitations. First, it combined nationwide mammography screening data with breast biopsy results from a single institution, which may limit generalizability. Second, detailed clinical staging data and long-term patient outcomes were not available, which restricted the ability to evaluate the direct effect of delayed screening on disease progression. Third, the lack of individual-level sociodemographic

data limited further analysis of factors associated with screening participation and malignancy detection. Finally, multiple pandemic-related confounders, including changes in referral practices, resource allocation, and health-seeking behavior, could not be fully assessed.

Despite these limitations, the study provides a practical overview of screening disruption and recovery in Türkiye during an unprecedented public health crisis. From a health policy perspective, the findings support the need for resilient and flexible breast cancer screening systems that can preserve access during future emergencies.

Conclusion

The COVID-19 pandemic temporarily disrupted mammography screening and breast biopsy activity in Türkiye. However, both screening participation and diagnostic follow-up recovered in the post-pandemic period. Sustained accessibility, public awareness, and health system preparedness are essential to protect breast cancer screening services during future public health crises.

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