Ethnic Influence in Breast Reconstruction: A Comparative Study in the Bedouin Population

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ABSTRACT **Background:** Breast reconstruction following oncological resection offers psychosocial benefits. Various factors influence patient reconstruction decisions, including ethnicity, socioeconomic status, and education. We investigated disparities in breast reconstruction among Bedouin and non-Bedouin women in the Negev region.

Objectives: To investigate the influence of ethnicity in breast reconstruction decisions between Bedouin and non-Bedouin women in Israel and to identify factors influencing the choice of reconstruction following oncological breast surgery.

Methods: In this retrospective cohort study, we examined women undergoing breast cancer surgery, with or without reconstruction, between 2015 and 2021 in a breast cancer referral center. Demographics and detailed medical data were collected from electronic health records. We analyzed the factors that influenced decisions regarding breast reconstruction.

Results: The study included 1415 patients who underwent breast resection. Age was a significant factor in breast reconstruction choices, with younger patients being more likely to choose reconstruction. Marital status and education level influenced the decision, whereas socioeconomic status and number of children did not. Ethnicity analysis highlighted distinct demographic and socioeconomic differences between Bedouin and non-Bedouin women. Despite these disparities, surgical choices did not differ significantly between ethnicities.

Conclusions: Significant disparities exist between Bedouin and non-Bedouin women in terms of sociodemographic factors. However, these disparities did not affect their breast reconstruction decisions. Age, marital status, and education level influenced the decision to reconstruct the breast.

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Breast cancer is the second most common malignancy in women and the second cause of cancer-related death after lung cancer. Approximately 1 in 8 women will develop breast cancer in their lifetime [1]. In Israel, breast cancer is diagnosed in 4500 women annually, with approximately 900 succumbing to the disease [2].

Breast cancer management often necessitates surgical intervention, ranging from partial resection (lumpectomy or breast-conserving surgery [BCS]) to total mastectomy [3]. These procedures, while important to cancer management, can significantly impact a patient's physical and psychological well-being [4]. Breast reconstruction offers a way to mitigate these effects, potentially improving body image and quality of life [5,6]. However, the decision to undergo reconstructive surgery is personal and influenced by medical, social, and cultural factors [7].

Studies in North America have revealed higher reconstruction rates among Caucasian women compared to African American, Hispanic, and Asian populations. [8] This disparity may be attributed to various factors, including differences in insurance coverage, language barriers, distrust of medical professionals, and variations in socioeconomic and educational status [9].

Israel's public health system is designed to provide equal medical care to all citizens. However, specific populations, such as the Bedouin community, a semi-nomadic Arab ethnic group mainly living in southern Israel, have unique characteristics that may influence medical decision-making and access to healthcare facilities.

While healthcare disparities among ethnic minorities are well-documented globally [10], the extent of these disparities within the Bedouin population of Israel remains understudied.

In this study, we compared the rates of breast reconstruction in the Bedouin population with those in the non-Bedouin population in the Negev region.

PATIENTS AND METHODS

We conducted a retrospective study. Women who underwent surgical resection for breast malignancy between 2015 and 2021 at Soroka University Medical Center were included. This study was approved by the institutional ethical review board (0192-22-SOR). Women who had undergone breast surgery for non-oncologic reasons were excluded. Demographic data collected included age, ethnicity (non-Bedouin, Bedouin population), socioeconomic status (as reported in the patient's local clinic, scored by the National Central Bureau of Statistics), number of children, and academic education (defined as any education beyond high school). Comprehensive medical data, such as oncological diagnosis, surgical intervention, reconstructive operations, surgical reports, and subsequent follow-up were also recorded.

ETHICS APPROVAL

This study was performed under the principles of the Declaration of Helsinki. Approval was granted by our institution's ethics committee (0192-22-SOR).

STATISTICAL ANALYSIS

Statistical analyses were performed using IBM Statistical Package for the Social Sciences statistics software, version 20 (SPSS, IBM Corp, Armonk, NY, USA). The correlation of evaluated factors to ethnicity was analyzed. A *P*-value < 0.05 was considered statistically significant (two-tailed).

RESULTS

The study comprised 1415 patients (1260 non-Bedouin, 155 Bedouin) who underwent surgical breast resection between 2015 and 2021. Of these, 23.2% (n=328) underwent breast reconstruction, whereas 76.8% (n=1087) did not.

The age of patients was 60 ± 13.35 years [Table 1]. Age differed significantly between those who underwent breast reconstruction (49.19 years ± 11.12 years) and those who did not (63.56 ± 12.03 years, $P < 0.0001$). Marital status and academic education significantly influenced the likelihood of undergoing breast reconstruction. In the breast reconstruction group, 72.9% (n=239) were married vs. 63.6% (n=691) in the non-reconstruction group (n=1087, $P = 0.002$). Regarding academic education, in total only 29% (n=432) had education beyond high school. In the breast reconstruction group, 43.3% had higher education, whereas 26.7% in the non-reconstruction group ($P < 0.001$) had higher education. However, the number of children and socioeconomic status did not differ significantly between the reconstruction and non-reconstruction groups.

In the BCS group (n=1047), 8.7% (n=91) chose to reconstruct the breast, whereas 91.3% (n=956) did not [Table 2]. Only 14% (n=194) had a preoperative plastic surgery consultation. Of this group, 6.1% (n=59) decided not to undergo reconstruction.

The age of women who chose breast reconstruction was significantly lower (50.72 ± 11.96 years) than those who did not (62.95 ± 11.99 years) ($P < 0.0001$). There

Table 1. Demographics in all breast resection

	Total cohort (%)	With breast reconstruction (%)	Without breast reconstruction (%)	*P*-value*
Number	1415	328 (23.3%)	1087 (76.8%)	
Age in years, mean ± SD	60.132 ± 13.346	49.19 ± 11.12	63.56 ± 12.03	**< 0.0001**
Ethnicity				
Non-Bedouin	1260 (87.4%)	292 (89%)	968 (89.1%)	0.189
Bedouin	155 (11%)	36 (11%)	119 (10.9%)	
Married	930 (64.5%)	239 (72.9%)	691 (63.6%)	**0.002**
Number of children, mean ± SD	3.03 ± 2.09	2.92 ± 1.73	3.086 ± 2.19	0.21
Socioeconomic status score, median [IQR]	5.00 [3.00–6.00]	5.00 [3.00–6.00]	4.00 [3.00–6.00]	0.765
Academic education	432 (29.9%)	142 (43.3%)	290 (26.7%)	**< 0.001**

IQR = interquartile range, SD = standard deviation
*Bold signifies statistically significant.

Table 2. Demographics in the different types of breast resection

Breast-conserving surgery	Total cohort (%)	With breast reconstruction (%)	Without breast reconstruction (%)	*P*-value*
Number	1047	91 (8.7%)	956 (91.3%)	
Age in years, mean ± SD	61.71 ± 12.59	50.72 ± 11.96	62.949 ± 11.99	**< 0.0001**
Ethnicity				
Non-Bedouin	928 (88.6%)	78 (85.7%)	850 (88.9%)	0.223
Bedouin	119 (11.3%)	13 (14.2%)	106 (11%)	
Married	685 (65.4%)	68 (74.7%)	617 (65.5%)	**0.041**
Number of children, mean ± SD	3.11 ± 2.16	3.13 ± 1.88	3.12 ± 2.199	0.975
Academic education	589 (56.3%)	45 (49.5%)	544 (56.9%)	0.128
Plastic consultation	149 (14%)	91(100%)	59 (6.1%)	**< 0.0001**
Mastectomy				
Number	368	237 (64.4%)	131 (35.6%)	
Age in years, mean ± SD	55.5 ± 14.37	48.6 ± 10.74	68.05 ± 11.43	**< 0.0001**
Ethnicity				
Non-Bedouin	332 (90.2%)	214 (90.2%)	118 (90%)	0.754
Bedouin	36 (9.8%)	23 (9.8%)	13 (10%)	
Bilateral	45 (12.2%)	36 (15.2%)	9 (6.9%)	**0.013**
Married	245 (66.5%)	171 (72.1%)	74 (56.4%)	**0.002**
Number of children, mean ± SD	2.81 ± 1.84	2.83 ± 1.66	2.8 ± 2.14	0.88
Academic education	198 (53.8%)	122 (51.5%)	76 (58%)	0.125
Plastic consultation	254 (69%)	237 (100%)	16 (12.2%)	**< 0.0001**

SD = standard deviation
*Bold signifies statistically significant.

were more married women in the breast reconstruction group (74.7%) than in the non-reconstruction group (65.5%, n=617; $P = 0.041$). There were no differences in the number of children or academic education.

In the mastectomy group (n=368), 64.4% (n=237) chose breast reconstruction, whereas 35.6% (n=131) did not. Younger patients were more likely to undergo a breast reconstruction (48.6 ± 10.74 vs. 68.05 ± 11.43 years, $P < 0.0001$). The patients undergoing bilateral mastectomy (12.2%, n=45) were more likely to opt for reconstruction (80%, $P < 0.013$). Married women were more likely to reconstruct (70% [n=171] vs. 30% [n= 74], $P < 0.002$). In total, 254 (69%) had plastic consultation before surgery, only 16 (6.3%) decided to forgo reconstruction.

The distribution of Bedouin and non-Bedouin women choosing breast reconstruction was similar for both breast-conserving surgery and mastectomy, with no statistically significant differences (BCS: $P = 0.223$; mastectomy: $P = 0.754$).

ETHNICITY

As a sub-analysis, the study population was divided into two groups: non-Bedouin (n=1260) and Bedouin (n=155) [Table 3]. The Bedouin women in the study were younger (50.06 ± 12.3 vs. 61.36 ± 12.9 years, $P < 0.0001$), had a higher number of children (5.33 ± 3.34 vs. 2.75 ± 1.68 children, $P < 0.0001$), and had lower socioeconomic status score (2 [0.00–2.00] vs. 5 [3.00–7.00], median [IQR], $P < 0.0001$). Academic education was less common among the Bedouin women (3.6%) than among the non-Bedouin (96.4%), $P < 0.0001$.

BCS group (N=1047)

Examining BCS patients only, Bedouin patients were younger (51 ± 12.72 vs. 63.05 ± 11.9 years, $P < 0.0001$), had more children (5.55 ± 3.47 vs. 2.8 ± 1.7, $P < 0.0001$), had lower socioeconomic status (2, IQR 0.00–2.00 vs. 5, IQR 3.00–7.00, $P < 0.0001$), and were less academically educated (30.4% vs. 8.3%, $P < 0.0001$) [Table 4].

Table 3. Patient characteristics by ethnicity

	Total cohort (%)	With breast reconstruction (%)	Without breast reconstruction (%)	*P*-value
Number	1415	1260 (89%)	155 (11%)	
Age in years, mean ± SD	60.132 ± 13.346	61.36 ± 12.9	50.06 ± 12.3	**< 0.0001**
Marriage	946 (66.9%)	837 (66.4%)	109 (70.3%)	0.194
Number of children, mean ± SD	3.03 ± 2.09	2.75 ± 1.68	5.33 ± 3.34	**< 0.0001**
Socioeconomic status score, median [IQR]	5.00 [3.00–6.00]	5 [3.00–7.00]	2 [0.00–2.00]	**< 0.0001**
Academic education	441 (31.2%)	425 (33.7%)	16 (10.3%)	**< 0.0001**
Type of surgery				
Lumpectomy	1047 (74%)	928 (73.7)	119 (76.8%)	0.171
Mastectomy	368 (26%)	332 (26.3%)	36 (23.2)	
Consultation and breast reconstruction				
Plastic consultation	402 (28.4)	358 (28.4)	43 (27.7%)	0.281
Breast reconstruction	328 (23.2)	292 (23.2%)	36 (23.2%)	0.189

IQR = interquartile range, SD = standard deviation
*Bold signifies statistically significant.

Table 4. Different types of breast resection by ethnicity

Breast-conserving surgery	**Total cohort (%)**	**Non-Bedouin (%)**	**Bedouin (%)**	***P*-value**
Number	1047	928 (88.6%)	119 (11.4%)	
Age in years, mean ± SD	61.76 ± 12.59	63.05 ± 11.9	51 ± 12.72	**< 0.0001**
Marriage	698 (66.7%)	619 (66.7%)	79 (66.4%)	0.498
Number of children, mean ± SD	3.11 ± 2.16	2.8 ± 1.7	5.55 ± 3.47	**< 0.0001**
Socioeconomic status score, median [IQR]	4 [3.00–4.0]	5 [3.00–7.0]	2 [0.00–2.0]	**< 0.0001**
Academic education	299 (28.6%)	289 (31.1%)	10 (8.4%)	**< 0.0001**
Consultation and breast reconstruction				
Plastic consultation	150 (14.3%)	130 (14%)	20 (16.8%)	0.244
Breast reconstruction	91 (8.7%)	78 (8.4%)	13 (10.9%)	0.223
Mastectomy				
Number	368	332 (90.2%)	36 (9.8%)	
Age in years, mean ± SD	55.58 ± 14.37	56.58 ± 14.44	46.51 ± 9.96	**< 0.0001**
Bilateral	45 (12.2%)	43 (13%)	2 (5.6%)	0.447
Marriage	248 (77.2%)	218 (65.7%)	30 (83.3%)	**0.036**
Number of children, mean ± SD	2.81 ± 1.84	2.62 ± 1.59	4.56 ± 2.82	**< 0.0001**
Socioeconomic status score, median [IQR]	5.00 [3.00–5.00]	5.00 [3.00–6.00]	2.00 [0.00–2.50]	**< 0.0001**
Academic education	142 (38.6%)	136 (41%)	6 (16.7%)	**0.002**
Previous Lumpectomy	30 (8.2%)	28 (8.4)	2 (5.6%)	0.416
Consultation and breast reconstruction				
Number	254 (69%)	230 (69.3%)	24 (66.7%)	0.736
Age in years, mean ± SD	237 (64.4%)	214 (64.5%)	23 (63.9%)	0.745

IQR = interquartile range, SD = standard deviation
*Bold signifies statistically significant.

Mastectomy group (N=368)

Examining mastectomy patients only, Bedouin patients were younger ($P < 0.0001$), had more children ($P < 0.0001$), had lower socioeconomic status ($P < 0.0001$), and had less academic education ($P < 0.002$). In contrast to the BCS group, a higher proportion of Bedouin patients was married (81% vs. 65%, $P = 0.036$).

DISCUSSION

In this retrospective study, we examined the breast reconstruction rates among women in Israel, emphasizing the potential disparities due to ethnic differences. We specifically focused on the Bedouin population. The analysis included 1415 patients who underwent surgical breast resection between 2015 and 2021 at Soroka University Medical Center. Ethnic disparities were unrelated to the decision to undergo breast reconstruction, contrary to previous reports [9]. Despite having a lower socioeconomic status and academic education and higher number of children, Bedouin women were equally likely to choose reconstruction compared to non-Bedouin women. In addition, the Bedouin women were younger and had more children, indicating a demographic difference that could play a role in healthcare planning. The lack of significant differences may be due to the uniform access to the public health system in Israel. Overall, the breast reconstruction rate after mastectomy was high (64.4%) compared to the lower previously reported statistics of about 41% [11]. Reconstruction after lumpectomy was less prevalent (8.7%), probably due to improved cosmetic outcomes of BCS, which reduced the risks of deformities and asymmetry [12]. Another reason for this result may be the low rate of patient referrals for plastic consultations by the oncologic surgeon. An unsatisfactory aesthetic outcome of BCS alone affects up to 30% of patients, while with oncoplastic breast surgery, it drops to 0–18% [13].

Patients undergoing bilateral mastectomy were more likely to opt for reconstruction, possibly because of the higher perceived loss of femininity. Women who underwent breast reconstruction were significantly younger than those who did not. The reasons could be multifaceted, including a stronger desire to maintain body image, sexual function, and quality of life among younger women [14]. In addition, Fenlon et al. [15] described that breast reconstruction is rarely discussed in women over 70 years old despite their expressed interest.

Marital status and academic education significantly influence the decision to undergo breast reconstruction. Married women and those with higher academic education were more likely to choose reconstruction [16,17], reflecting the role of good support and understanding in decision-making. Most patients who underwent consultation with a plastic surgeon underwent breast reconstruction, stressing the importance of preoperative consultation for breast reconstruction [18].

Interestingly, socioeconomic status and number of children did not significantly affect the likelihood of breast reconstruction. These findings contrast with those of previous studies, suggesting the influence of socioeconomic status on surgical decisions [19].

Future studies should continue to explore the reasons behind the lower rates of breast reconstruction in older women, and efforts should be made to ensure that all women, regardless of age, material status, and education, have equal access to information and counseling to make fully informed decisions about their care.

LIMITATIONS

The study includes a small effect size (Cramer's V ≈ 0.0485) and insufficient statistical power (0.571), increasing the risk of a Type II error. The relatively small sample size of Bedouin women limits the ability to conduct subgroup analyses, potentially affecting the robustness of comparisons between groups.

The retrospective design and reliance on electronic medical records may have introduced unmeasured confounding factors, particularly regarding qualitative aspects such as cultural attitudes and personal decision-making influences, which were not captured in our dataset. In addition, results may have limited generalizability due to the specific ethnic groups and healthcare system studied. While findings suggest minimal differences in reconstruction rates between Bedouins and non-Bedouins, interpretation should be cautious. Further research with larger samples, prospective designs, or mixed-method approaches incorporating qualitative data is recommended to comprehensively assess disparities in plastic surgery among these populations.

CONCLUSIONS

It is important to consider various factors in breast reconstruction decision-making. While significant disparities were observed between the Bedouin and non-Bedouin populations in terms of age, number of children, socioeconomic status, and academic education, these factors did not influence the decision to undergo a breast recon-

struction procedure in either group. This finding suggests that despite socioeconomic and educational disparities, the Bedouin population of Israel has comparable access to reconstructive procedures following breast cancer surgery as the non-Bedouin population. Other factors, such as marital status and academic education, were also found to significantly influence the decision, while socioeconomic status and number of children were not. Age emerged as the most influential factor in deciding to undergo breast reconstruction following oncological breast surgery, with younger patients being more likely to opt for this procedure.

These findings have significant implications for cancer treatment strategies, particularly considering the psychological benefits of breast reconstruction. The data underscore the need to enhance patient education and shared decision-making in the context of breast reconstruction, especially among older patients. It is crucial to ensure that all patients, regardless of age, are adequately informed and supported in making decisions regarding reconstruction.

Further research is necessary to explore other variables, such as cultural norms, patient attitudes, physician bias, and health system factors in different contexts.

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**Throughout history, it has been the inaction of those who could have acted,
the indifference of those who should have known better
the silence of the voice of justice when it mattered most
that has made it possible for evil to triumph.**

Haile Selassie (1892–1975), Emperor of Ethiopia from 1930–1974