Participation in cancer screening among female migrants and non-migrants in Germany
A cross-sectional study on the role of demographic and socioeconomic factors

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Abstract
In many European countries, migrants utilize cancer screening less often than non-migrants. In Germany, in contrast, higher rates of utilization among migrants as compared with non-migrants have been reported. The role of demographic and socioeconomic factors potentially confounding the association between migration status and participation in screening, however, could not be studied. The present study aims to investigate the utilization of cancer screening among migrant and nonmigrant women residing in Germany, adjusting for potential confounders.

We used self-reported information from women surveyed on whether they have ever participated in screening for cancer (n = 11,709). The data was collected as part of a cross-sectional representative telephone survey conducted by the Robert Koch-Institute in 2010. We distinguished between three groups of women: (1) respondents of non-German nationality, those who had immigrated to Germany after their birth or those who have two foreign-born parents (“migrants with two-sided migration background”), (2) respondents who only have one foreign-born parent (“migrant with one-sided migration background”), and (3) all others (“non-migrants”).

To account for confounders, logistic regression analysis was performed. Only individuals proficient in German were included in the survey, allowing to control for a bias arising from poor language proficiency.

84.9% of nonmigrant women, 82.1% of women with a one-sided, and 70.5% of women with a two-sided migration background had utilized screening for cancer at least once in their lifetime before the survey. The adjusted odds ratios (OR) as compared with nonmigrant women were 0.99 (95% confidence interval [95% CI]: 0.77–1.27) and 0.55 (95% CI: 0.47–0.64), respectively.

The study shows that migrant women with a two-sided migration background residing in Germany utilize screening for cancer less often than nonmigrant women—indepedently of demographic and socioeconomic factors. This is in line with findings from other countries. Likely, barriers that migrant women encounter limit them from taking informed choices. These barriers need to be identified and appropriate measures aiming to enhance informed decision making must be implemented.

Abbreviations: 95% CI = 95% confidence interval, AME = average marginal effect, CATI = computer-assisted telephone interviews, GEDA = Gesundheit in Deutschland aktuell, OR = odds ratio, RDD = random-digit dialing, ref. = reference, SD = standard deviation, SES = socioeconomic status.

Keywords: cancer, Germany, immigrants, minority, screening

1. Introduction
Migrants constitute an increasing share of the population in many European countries. In Germany, around one fifth of the population is considered to have a “migration background.” This comprises non-German nationals as well as German nationals whose parents or who themselves immigrated to Germany from another country after 1949.

Migrants and non-migrants differ from each other in many aspects of health. This includes differences in health status and health care outcomes as well as in the utilization of health care services. Whereas studies have reported a higher utilization of general practitioner, hospital, and emergency outpatient ward care in migrants as compared with nonmigrant populations, the situation is different for preventive services, which migrants utilize less frequently than non-migrants. This is particularly the case for migrant women and is also reflected in the utilization of screening for cancer.

Similar to other measures of secondary prevention, the rationale of cancer screening is to improve treatment outcomes...
through early diagnosis. Although breast cancer screening is associated
with harms and benefits,[12–14] screening for several types of
cancer is recommended by stakeholders on the global[15,16] and
European[17–19] levels. In many countries, migrant women utilize
cancer screening less often than the respective majority
populations. For instance, a register-based study from the
Netherlands reported that only 63.1% of “non-Western” national
women utilize the national breast cancer screening program as
compared with 83.6% of Dutch women.[9] Also using register-
based data, Kristiansen et al.[20] showed that migrant women
from non-Western countries as compared with Danish-born
women had a 45% and migrant women from Western countries
had a 28% lower chance of participating in mammography
screening. Similarly, self-reported data from the Swiss Health
Survey 2002 show that 34.1% of Swiss women utilized
mammography in the year before the survey. The respective
proportions were considerably lower among non-Swiss women,
ranging from 31.7% in Spaniards to 16.7% in nationals from
Former Yugoslavia.[21] Comparable findings were reported from
the United States,[22] Canada,[23,24] and Australia.[25] Studies
which took into account the effect of confounding factors show
that differences between migrant and nonmigrant women in the
utilization of cancer screening are not only attributable to
the influence of demographic and socioeconomic factors such
as age, income, and education, commonly known to affect
preventive behavior including the utilization of screening for
cancer.[20,21,23–30] Aside from these factors, it is likely that
barriers which migrants experience in the health care system
resulting from poor language proficiency, discrimination, and
cultural beliefs not sufficiently taken into account by health care
institutions contribute to this differential.[31–33]

In Germany, the regular utilization of several screening and
early detection measures is recommended for women of different
age groups above the age of 20, addressing cervix, breast, and
colorectal cancers.[34] Migrants with a residence status (this
includes all migrants except refugees and asylum seekers[35,36])
are entitled to use these measures of secondary prevention as well
as health care services in general free of charge as part of their
social insurance. Although studies conducted in Germany—
similar to those conducted in other countries—showed that
migrants utilize preventive services such as vaccination[37,38] and
rehabilitative care[18,40] less often than the majority population,
as little is known about the utilization of cancer screening in this
population group. Berens et al.[41] conducted a small-scale
register-based study and examined the participation of women of
Turkish and non-Turkish origin (aged 50–69 years) in a breast
cancer screening program in five cities in Germany. Contradic-
tory to most other studies in Europe, they found out that women
of Turkish origin had a 17% higher chance of utilizing breast
cancer screening than women of non-Turkish origin. The
respective chances differed considerably with age. Women in
the age group of 50 to 54, 55 to 59, and 60 to 64 years were at a
50%, 45%, and 12%, respectively, higher chance of participating
in breast cancer screening than nonmigrant women of the same
age. A lower proportion of utilization was only observed for
women aged 65 to 69 years. Socioeconomic and other factors
potentially confounding the association between migration status
and participation in cancer screening could not be adjusted for by
the authors. This contradictory finding warrants further research
into the utilization of cancer screening among migrant women
in Germany.

The aim of the present study was to examine the self-reported
utilization of cancer screening among migrant and nonmigrant
women in Germany. Unlike other studies, we focus on the lifetime
participation in cancer screening in general in order to identify
those who are particularly vulnerable by not using services on
cancer screening at all. Aside from investigating whether
potential differences in the rates of utilization are attributable to
the influence of demographic and socioeconomic factors we also
aimed to examine whether a similar age pattern as identified by
Beren et al can be observed in self-reported data.

2. Methods

2.1. Data source

The study uses data from the “Health in Germany Updated
2010” survey (Gesundheit in Deutschland aktuell 2010, GEDA
2010), a nationally representative cross-sectional survey based on
computer-assisted telephone interviews (CATI) carried out from
September 2008 to July 2009 by the Robert Koch Institute, a
body of the Federal Ministry of Health in Germany.[42] It is made
available by the Robert Koch Institute for research purposes. The
population from which the random sample was drawn comprises
all adults in Germany aged ≥18 years who live in a private
household with a landline telephone. The Galver–Häder method
was employed, which is a modified version of the random-digit
dialing (RDD) sampling design for telephone interviews. This
method takes into account the specific structure of telephone
numbers in Germany in order to achieve a representative sample.
The overall sample size was 22,050 respondents of which 12,483
were women. The survey was conducted in German language.
Therefore, it can only be considered representative for those
migrants who are proficient in the German language. This allows
us to exclude poor language proficiency as a potential covariate
confounding the association between the utilization of screening
and migration status. The survey was approved by the
responsible commissioner for data protection on the federal
and state levels and follows all necessary requirements and data-
protection guidelines of the Federal data protection act. As the
survey was fully anonymous, voluntary, and did not involve any
experiments, no further ethical approval was necessary.[43]

2.2. Outcome and group variable

We assessed if the respondent has ever participated in a cancer
screening (0=no, 1=yes). Only women who were ≥20 years
were included in the analysis, which resulted in a sample
consisting of 12,037 cases. Following the approach of other
studies in the field, we distinguished between three groups of
women: (1) respondents of non-German nationality, those who
had immigrated to Germany after their birth or those who have
two foreign-born parents (“migrants with two-sided migration
background”), (2) respondents who only have one foreign-born
parent (“migrant with one-sided migration background”), and
(3) all others (“non-migrants”).

2.3. Covariates

We took into account common demographic, socioeconomic,
and health variables which usually differ between migrants and
non-migrants and which are also associated with the uptake of
preventive services. Respondents’ age was considered as a
variable with 10-year categories (20–29, . . . , 70–79) (the dataset
did not allow us to account for age as a continuous variable as
this information was not available). In order to operationalize
socioeconomic status (SES), we used three variables. These
comprised the educational level (lower secondary, intermediate secondary, higher secondary, other [including primary], school dropout, and still enrolled/no degree), the occupational status (blue-collar, white-collar, civil service, self-employed/freelancer, other, and still enrolled/trained/no vocational degree/never worked), and the monthly equivalized income in Euros (the variable was log-transformed in order to take into account the nonlinear relationship between income and many health-related outcomes). For relationship status we used a 6-category variable (married, divorced/widowed/separated, never married, in a relationship, and cohabiting). Finally, we took into account possible health differences between the population groups by controlling for self-rated health (very good, good, moderate, poor/very poor), the presence of chronic diseases (yes and no), smoking status (daily, sometimes, past, and never), and a prior cancer diagnosis (yes and no), each based on self-reported information.

All independent variables had <2% of missing values.

2.4. Statistical analysis

First, we compared the numbers and shares between migrants with a two-/one-sided migration background and non-migrants regarding their participation rates in cancer screening, their socioeconomic, demographic, and health characteristics. To test for differences between migrants and non-migrants, χ²-square tests and analysis of variance (ANOVA) were used depending on the measurement level of variables.

To adjust for covariates, we fitted two logistic regression models. The first model included the migrant status variable, age, relationship status, and the health status variables. The second model additionally included the three socioeconomic variables. In a third model, we added an interaction term between the group and age variables to examine whether differences between the three groups in terms of the utilization of cancer screening differ with age.

As comparisons of odds ratio (OR) between models may be biased by unobserved heterogeneity,[44] we present average marginal effects (AME) along ORs in the results section.

3. Results

Of all women aged ≥20 years, 11,709 had valid information for the outcome and all independent variables. Table 1 shows the means and distributions of all variables stratified by the three groups of interest. Descriptive statistics revealed that women with a two-sided migration background differed from nonmigrant women with respect to almost all variables, whereas women with one-sided migration background were very similar to nonmigrant women regarding the majority of the variables.

Women with two-sided migration background were younger than nonmigrant women and had a lower SES which became evident in a higher proportion of blue-collar workers and a lower income. In terms of health status, they reported a lower number of chronic diseases and previous cancers than nonmigrant women. The proportion of daily or occasional smokers, in contrast, was slightly higher than for non-migrants.

Regarding the utilization of cancer screening, nonmigrant women and women with a one-sided migration background reported a similar utilization (84.9% and 82.1%, respectively). Women with a two-sided migration background had significantly lower proportions of lifetime utilization (70.5%) meaning that about one third had never participated in any type of cancer screening.

Model 1 in Table 2 shows the results of the multivariable logistic regression for lifetime participation in cancer screening. All independent variables except SES were included. Migrant women with a two-sided migration background had a significantly lower chance than nonmigrant women for having participated in a cancer screening at least once in their lifetime (OR=0.48). Again, no differences between non-migrants and migrants with a one-sided migration background could be observed (OR=0.99). All covariates were significantly associated with the outcome. Age had a nearly linear and positive effect except for the oldest category (≥60 years) for which the participation rate decreased but still was significantly higher than for the reference group. A previous diagnosis of cancer, the presence of a chronic disease, being married, reporting a good health status, and not being a daily smoker increased the chance of the utilization of cancer screening significantly.

In Model 2, we additionally included the three socioeconomic variables, which were all significantly associated with lifetime participation in cancer screening. Respondents with intermediate and high secondary educational degrees had a higher chance of participation compared with those with a lower secondary degree, whereas the chance was lower for persons belonging to the category “other” which also includes individuals with a primary degree. Concerning the occupational status, blue-collar workers had a significantly lower chance of ever having participated in a cancer screening than white-collar employees and civil servants. Most importantly, adjusting for the socioeconomic variables could not explain the different participation rates between nonmigrant women and women with a two-sided migration background as the latter still had about half the chance of a lifetime participation than the former (OR=0.55). In both models, AMEs were in line with ORs, indicating that unobserved heterogeneity between the models did not bias model comparison.

We also tested for interactions between age and the group variable in order to examine different age trends of participation rates between migrants and non-migrants. No significant interactions were identified (results not shown).

4. Discussion

Migrants utilize preventive services, including cancer screening, less often than non-migrants. Whereas also for Germany a lower utilization of preventive services among migrants as compared with non-migrants has been reported, little is known about the utilization of cancer screening. Unlike other studies in Europe, the only available study for Germany showed that women of Turkish origin had a higher chance of utilizing breast cancer screening than women of non-Turkish origin. The role of socioeconomic factors as confounding variables could not be taken into account.[41]

Based on data from a large national sample survey, our study, in contrast, shows that women with a two-sided migration background residing in Germany utilize cancer screening less often than nonmigrant women. The findings cannot be explained by a different distribution of demographic or socioeconomic factors between both population groups or by differences in the self-reported health status. Even after adjusting for these factors, women with a two-sided migration background still had about half the chance of ever having participated in any kind of cancer screening. Our results are in line with European and studies from other countries conducted on the utilization of cancer screening in migrant communities, most of which reported lower rates of
Our investigation adds to existing research by focusing on the lifetime participation in cancer screening in general thus allowing to identify those who are particularly vulnerable by not using services on cancer screening at all. Our study has further shown that women with a one-sided migration background are very similar to the autochthonous population in terms of their utilization of cancer screening. This corresponds to findings from other studies on the health and health care utilization of migrants in Germany.\cite{45,46}

The lower utilization of cancer screening among women with a two-sided migration background may have several reasons. Migrants experience different barriers in the health care system, potentially reducing their access to health services. These barriers include a poor cultural sensitivity of health services, discrimination, and insufficient community resources.\cite{47-49} Also, barriers and a limited health literacy resulting from poor proficiency of the language of the host country have been identified to limit access to preventive services for migrants, including cancer screening.\cite{11,50} As the GEDA survey that we used for our study is conducted in German language and only respondents with sufficient language skills are included,\cite{42} poor language proficiency, however, cannot explain our results.

A lower uptake of screening for cancer can also reflect differences in illness perceptions. Migrants tend to have less strong perceptions of the risk and consequences associated with cancer.\cite{11} Kristiansen et al\cite{20} hypothesize that this may be attributable to the lower incidence of cancer in the countries where migrants originate from, resulting in an overall lower awareness toward the disease.

### Table 1

<table>
<thead>
<tr>
<th>Shares and means of participation in cancer screening and independent variables for women (aged ≥20 years) by migrant status.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Migrants</strong></td>
</tr>
<tr>
<td><strong>Two-sided migration background</strong></td>
</tr>
<tr>
<td>%</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Ever participated in a cancer screening</td>
</tr>
<tr>
<td>Age group, y</td>
</tr>
<tr>
<td>20–29</td>
</tr>
<tr>
<td>30–39</td>
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<tr>
<td>40–49</td>
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<tr>
<td>50–59</td>
</tr>
<tr>
<td>≥60</td>
</tr>
<tr>
<td>Education</td>
</tr>
<tr>
<td>Low secondary</td>
</tr>
<tr>
<td>Intermediate secondary</td>
</tr>
<tr>
<td>High secondary</td>
</tr>
<tr>
<td>Other (including primary)</td>
</tr>
<tr>
<td>Still enrolled/no degree</td>
</tr>
<tr>
<td>Occupational status</td>
</tr>
<tr>
<td>Blue-collar</td>
</tr>
<tr>
<td>White-collar</td>
</tr>
<tr>
<td>Civil service</td>
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<tr>
<td>Self-employed/freelancer</td>
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<tr>
<td>Other</td>
</tr>
<tr>
<td>Still enrolled/trainee/no voc. degree/never worked</td>
</tr>
<tr>
<td>Equivalized income in € (log-transformed; means, standard deviations in parentheses)</td>
</tr>
<tr>
<td>Relationship status</td>
</tr>
<tr>
<td>Married</td>
</tr>
<tr>
<td>Divorced/widowed/separated</td>
</tr>
<tr>
<td>Never married</td>
</tr>
<tr>
<td>In a relationship</td>
</tr>
<tr>
<td>Cohabiting</td>
</tr>
<tr>
<td>Self-reported health status</td>
</tr>
<tr>
<td>Very good</td>
</tr>
<tr>
<td>Good</td>
</tr>
<tr>
<td>Moderate</td>
</tr>
<tr>
<td>Poor/very poor</td>
</tr>
<tr>
<td>Existing chronic diseases</td>
</tr>
<tr>
<td>Prior cancer diagnosis</td>
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<tr>
<td>Smoking status</td>
</tr>
<tr>
<td>Daily</td>
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<tr>
<td>Sometimes</td>
</tr>
<tr>
<td>Past</td>
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<tr>
<td>Never</td>
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</tbody>
</table>

N = 1310 498 9901

* P-value from χ²-square test for categorical variables and ANOVA for continuous variables.
The decision to undergo early detection for cancer is a complex process. Not using such services can also result from an informed decision-making process in which individuals weigh the harms and benefits of screening and decide for or against utilizing such services. In this case, lower rates of utilization would not be indicative of health disparities. However, knowledge about screening for cancer is usually low, particularly among migrants. In Germany, the proportion of women aged ≥ 50 years who were invited to attend mammography in a specialized center and who made informed choices for or against participation was considerably lower among migrants than among non-migrants.

Age is a known determinant of screening uptake, which was also the case in our study. Unlike previous research, we did not observe that the effect of age differed for migrants and non-migrants (or, conversely, that the participation rates for migrants and non-migrants differed with age). One reason for age-specific difference between migrants and non-migrants in preventive behavior is that older migrants tend to be particularly prone to poor proficiency of the host country's language. A possible explanation that we did not identify any interaction therefore is that the sample of migrants included in our data was proficient in German.

With respect to the diverging results as compared with the study by Berens et al., it has to be considered that the respective authors used data from five selected cities in Germany. In contrast, our investigation is based on data from a national sample survey. Differences in the rates of utilization between the two studies could therefore also reflect the role of regional variation of participation rates in cancer screening which studies in Germany and other countries have observed.

Some limitations of our study must be taken into account. First, we examined the utilization of cancer screening in general and did not distinguish between screenings for different types of cancers. This could also explain differences to other investigations that specifically focus on screening for selected types of cancer. Second, as we were only able to compare rather broad categories of migrants, the diversity of the population in terms of culture,
religion, origin, length of stay, and acculturation could not be considered—a limitation which is frequently encountered in studies based on secondary data in Germany. Studies from other countries have shown that these factors may be significantly related to participation in cancer screening and other health services.²⁻⁴⁻⁶⁻¹⁻³⁻⁸⁻¹⁻⁵ Future investigations, therefore, also need to examine their role among migrants in Germany in order to devise appropriate patient-oriented services. Third, households without a landline telephone were not included in the sample. This is a potential source of selection bias. Around 7% of the population are estimated to be users of mobile phones only and therefore cannot be reached by surveys which are based on landline phone sampling. However, as a comparison with of telecommunications.

Fourth, our analysis is restricted to migrants with good German-language proficiency, as this was one of the inclusion criteria, which had to be met by respondents in order to be included in the survey. Therefore, the sample of migrants included in the survey cannot be considered representative for all migrants in Germany.¹² This is also reflected in the socioeconomic profile, which in our study is higher for migrants than according to official statistics. Thus, our analyses were based on a migrant population better educated, having a better occupational position, and experiencing less language barriers than the actual population of migrants residing in Germany. All of these factors are strong positive predictors of cancer screening participation, so differences in participation rates in favor of the autochthonous population that were revealed in our study can be expected to be even larger in the actual migrant population of Germany.

5. Conclusion
Migrant women with a two-sided migration background utilize cancer screening less often than nonmigrant women in Germany, independently of demographic and socioeconomic factors. This is in line with findings from other countries. Available evidence suggests that differences in the utilization of cancer screening additionally are caused by barriers that migrants experience in the health care process which potentially prevent them from taking informed choices. Appropriate measures aiming to enhance informed decision making need to be implemented. Migrants not only need to be able to access health information in languages they understand, these information—same as the services as such—in addition must be sensitive toward their needs in order to allow informed decision making.

References


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