ORIGINAL ARTICLE

Social Status and Participation in Health Checks in Men and Women in Germany

Results From the German Health Update (GEDA), 2009 and 2010

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SUMMARY

<u>Background:</u> Representative data for Germany were used to determine whether a person's social-status characteristics affect the likelihood of having a check-up for the early detection of disease.

<u>Methods:</u> The analyses reported here were performed on data obtained in the Robert Koch Institute's German Health Update (GEDA) in 2009 and 2010. The survey responses of 26 555 people about whether they had had a check-up were evaluated. For inclusion, participants were required to be over age 35 and covered by statutory health insurance. To study the potential links between social status and check-up participation rates, a multidimensional social-status index was used in addition to three individual components of social status (highest educational level attained, occupational status, income).

<u>Results:</u> 50.8% of the men and 49.8% of the women surveyed had had a check-up in the two years before the survey. Low social status was associated with a lower rate of check-ups for both sexes (for men, odds ratio [OR] 0.59, 95% confidence interval [CI] 0.50–0.70, p<0.001; for women, OR 0.63, 95% CI 0.55–0.72, p<0.001). For both men and women, occupational status and income each had independent effects on check-up participation, while educational level was not found to have any independent effect.

<u>Conclusion:</u> These findings indicate that socially disadvantaged persons are less likely to have check-ups than others. Efforts to increase check-up rates should take account of the demonstrated effects of income level and occupational status.

The early diagnosis and treatment of disease is considered an important determinant of the course of disease (1, 2). As part of statutory health insurance in Germany, by which almost 90 percent of the population in Germany is covered, regular medical check-ups for early detection of disease must be offered in the primary care setting. From the age of 35 onward, all persons covered by statutory health insurance have the right to such a medical examination once every two years for the early detection of diabetes, cardiovascular diseases, renal diseases, and the risk factors for these conditions (3). Population-wide early-detection programs are based on the expectation that common diseases can be detected in an asymptomatic precursor stage or an early established stage and that this, in turn, will enable disease progression to be prevented, or at least delayed (secondary prevention). The success of early-detection measures at the population level might depend, among other factors, on the degree to which they reach particularly vulnerable population groups.

A large number of pertinent studies and reviews have consistently shown that socially disadvantaged persons are more likely than others to suffer from a wide variety of diseases and health problems (4–6). Persons of low social status have been shown to be more likely to develop (among other diseases) diabetes, cardiovascular diseases, and the risk factors for these conditions (6–10). Thus, as part of the development of national health-policy goals for Germany, a call was issued for early-detection measures such as check-ups to be targeted to socially disadvantaged population groups more specifically than before (11).

Studies from Germany and abroad have repeatedly shown that persons of low social status are less likely than others to take advantage of early-detection measures when offered (12–20). These studies, however, were mainly concerned with early cancer detection. A few reports have already appeared on the subject of patients' participation in health check-ups in Germany (20–23), but these do not yield any consistent picture of the association (if any) between check-up participation and social characteristics. We studied this issue with the aid of current representative data for Germany. We analyzed the data with a multidimensional social-status index first, and then we assessed the relative importance of individual dimensions of social

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**Characterization of the sample by major features of the analysis
(a total of 26 555 persons over age 35 covered by statutory health insurance)**

	Number of persons (n)	Percentage of sample (%)	Percentage of relevant overall population (%)[*1]
Age			
35–44 years	7407	27.9	24.3
45–54 years	7060	26.6	24.3
55–64 years	5285	19.9	18.2
65 years and up	6803	25.6	33.2
Sex			
Male	10 406	39.2	45.5
Female	16 149	60.8	54.5
Social status			
Low	3239	12.2	22.5
Intermediate	16 006	60.3	62.0
High	7184	27.1	15.5
Missing data	126	0.5	–
Educational level			
Low	7772	29.3	43.3
Intermediate	12 838	48.3	45.4
High	5825	21.9	11.3
Missing data	120	0.5	–
Occupational level			
Low	3982	15.0	21.9
Intermediate	15 411	58.0	60.1
High	7019	26.4	18.0
Missing data	143	0.5	–
Income[*2]			
<60%	3048	11.5	15.3
≥ 60% and <150%	18 099	68.2	69.5
≥ 150%	5408	20.4	15.3

[*1] In relation to the adult resident population of Germany on 31.12.2008
[*2] Net equivalent income (net houselhold income weighted by need according to household size and age of household members according to the new OECD scale [30]; the categorization is based on percent of median income [31])

status (educational level, occupational status, income). In particular, we looked for differences between men and women in the way their social status affects their likelihood of having a check-up.

Methods

The analyses presented here were performed on data from the cross-sectional German Health Update (*Gesundheit in Deutschland aktuell,* GEDA) study, which is carried out at regular intervals by the Robert Koch Institute. Data acquired in 2009 and 2010 were pooled to increase the statistical power and to enable specific subgroup analyses. The data acquisition waves in 2009 and 2010 were based on random samples of telephone numbers from the German fixed-line network that had been generated by a Gabler–Häder process. The overall population of which this was a sample consisted of all the adults in Germany who were living in private households and were reachable on a fixed-line telephone. In the periods July 2008 – June 2009 (GEDA 2009) and September 2009 – July 2010 (GEDA 2010), a total of 43 312 persons were interviewed by computer-assisted telephone interviewing about health issues and sociodemographic features. The "response rate 3" according to the AAPOR definition (24), an international standard for expressing the extent of sample coverage, was 29.1% in GEDA 2009 and 28.9% in GEDA 2010. The cooperation rate of all persons contacted for the study was 51.2% for GEDA 2009 and 55.8% for GEDA 2010. Further information on the content and methods of the study can be found in the relevant GEDA reports (25, 26). The analyses for this study were performed on data from persons aged 35 or older who were covered by statutory health insurance and accordingly had a legal right to a check-up once every two years (n = 26 555). Based on the participants' responses, we created a binary variable (yes/no) for participation in a check-up in the last two years.

Social status was assessed with a multidimensional index on the basis of information from the respondents about their education and vocational training, occupational position, and net equivalent income (27). To generate an index, these three features of social status were transformed into three metric subscales with a range of 1.0 to 7.0 points each. The status index was the sum score of these three subscales; possible index values thus ranged from 3.0 to 21.0. For further analysis, the index was categorized according to its distribution: Persons with index values up to the 20th percentile were considered to have low social status; between the 20th and 80th percentiles, medium social status; and from the 80th percentile and above, high social status.

The use of this additive social-status index enabled the detection of cumulative effects of the individual dimensions (educational level, occupational status, income). Nonetheless, the effects of individual dimensions of social status might also be masked when a social-status index is used (28). The individual dimensions were, therefore, each considered separately in further analyses.

The respondents were divided according to their scholastic and professional training into three hierarchically

TABLE 2

Check-up participation rate in the two years before the survey, stratified by age and social status, in eligible men and women (total sample size, 26 555 persons)

	Men			Women		
	%	95% CI	p-value	%	95% CI	p-value
Overall	50.8	(49.6–52.0)		49.8	(48.8–50.9)	
By age						
35–44 years	32.7	(30.5–34.9)		36.1	(34.4–37.8)	
45–54 years	48.8	(46.5–51.2)	<0.001	48.5	(46.6–50.4)	<0.001
55–64 years	61.0	(58.3–63.6)		54.7	(52.5–56.9)	
65 years and up	62.1	(59.6–64.5)		57.0	(54.9–59.1)	
By social status						
Low	45.0	(41.7–48.4)		45.5	(42.9–48.3)	
Intermediate	51.1	(49.5–52.6)	<0.001	51.3	(50.1–52.6)	<0.001
High	55.9	(53.9–57.9)		50.6	(48.7–52.5)	

% = weighted percentage; CI = confidence interval

ordered groups, as defined by the internationally applied CASMIN classification of educational levels (29, 30). Their incomes were converted into net equivalent incomes for comparison. Net household income was weighted by need, according to the new OECD equivalency scale, in order to take adequate account of the cost-saving effect that arises when multiple persons share a household and act as an economic unit (31). In the GEDA study, missing income values were imputed by a multiple-regression process (27). The median net equivalent income was 1374 euros per month; respondents were divided for further analysis into three income groups: one with less than 60%, one with 60% up to (but not including) 150%, and one with 150% or more of this value as a median net equivalent income (31). Occupational status was rated on a scale ranging from 16 to 90 points as defined by the International Socio-Economic Index of Occupational Status (ISEI) (32). For further analysis, the respondents were divided into three groups with low, intermediate, and high occupational status (1st quintile, 2nd–4th quintile, and 5th quintile of ISEI values, respectively) *(Table 1)*.

In the descriptive analysis, sex-specific check-up participation rates in the two years before questioning—differentiated by age and social status—were calculated with cross-table analysis and tested for statistically significant differences with 95% confidence intervals (CI) and Pearson's χ^2 tests. In the multivariate analyses, binary logistic regressions were calculated for the check-up participation rates of men and women (separately), with the social-status indicators serving as predictors. Age was used from the outset as a control variable; additional control variables in further analyses included whether the respondent was living with another person in a marital or similar relationship (yes or no), the respondent's self-assessed state of health (good to very good vs. moderately good to very poor), cardiovascular risk

factors, and already diagnosed diseases. All of these data were based on information given by the respondents themselves. Persons were considered overweight if their body-mass index was 25 kg/m^2 or higher (33). They were considered physically inactive if they reported taking less than 2.5 hours of physical activity per week (34). They were classified as smokers (this category included self-designated "occasional" smokers), ex-smokers, or non-smokers. Data on already diagnosed conditions were based on information given by the respondents about medically diagnosed diseases such as diabetes, hypertension, depression, and renal insufficiency. The results of the binary logistic regressions were expressed in odds ratios (OR) with 95% CI and p-values. The analyses were performed with the survey-data procedures of the Stata 12.0 SE statistical software package. To enable representative conclusions to be drawn, the sample was adjusted with weighting factors to match the age, sex, and educational-level structure of the underlying population as well as its regional distribution (25, 26).

Results
About half of all eligible men and women in Germany had a check-up in the two years before the study. The frequency of check-ups rose markedly with increasing age in both men and women, more so in men *(Table 2)*. Men and women had check-ups equally often up to age 54, but men aged 55 and above had them more often than women.

The findings also included an association between check-up participation and social status *(Table 2)*. Eligible persons of low social status had check-ups less frequently (45.3%, 95% CI 43.2–47.4) than persons of medium (51.2%, 95% CI 50.2–52.2) and high social status (53.5%, 95% CI 52.1–54.9). Differences in participation based on social status were seen in women mainly up to age 54,
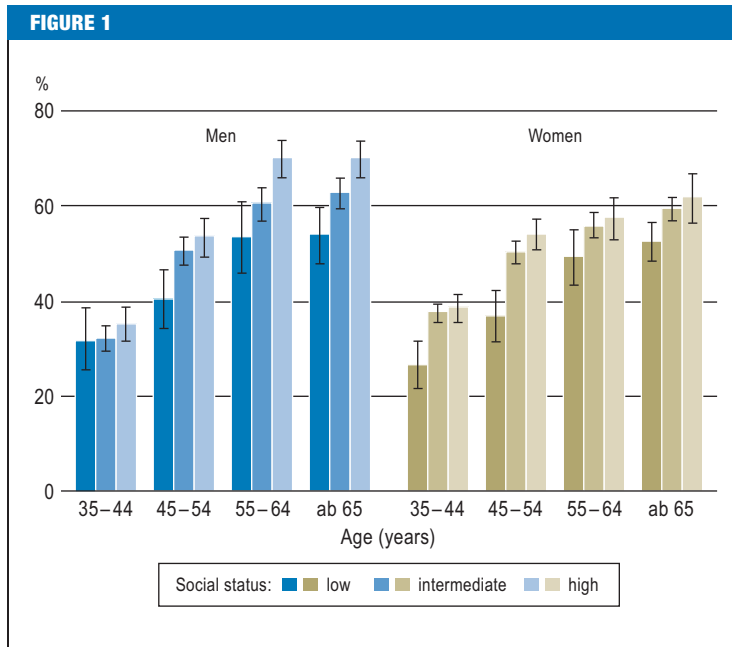
Participation in health check-ups in the two years before the survey, stratified by social status and age, in eligible men and women (participation rates with 95% confidence intervals in a total of 26 555 participants)

while such difference in men began at age 45 and continued into old age *(Figure 1)*. After statistical adjustment for age, men of low social status were found to have lower odds of participation in the two years before the survey than men of high social status (OR 0.59, 95% CI 0.50–0.70, p<0.001). Among women, too, low social status conferred a lower age-adjusted odds of having a check-up compared with high social status (OR 0.63, 95% CI 0.55–0.72, p<0.001). A significantly lower age-adjusted odds of having a check-up among persons of medium compared to high social status was found in men (OR 0.79, 95% CI 0.71–0.88, p<0.001), but not in women (OR 0.92, 95% CI 0.84–1.00, p = 0.058).

Subgroup analyses were carried out to determine whether lifestyle-associated risk factors for cardiovascular disease and diabetes moderated the link between social status and check-up participation. Odds ratios were calculated separately for:
- overweight or obese study participants
- physically inactive study participants
- study participants who were current smokers or ex-smokers *(Figure 2)*.

The effect strengths of social status in each of these risk groups did not differ from those found in the overall group of eligible men and women.

The results of the logistic regressions with the individual social-status indicators are shown in *Table 3*. The odds ratios were adjusted to control for the effects of potential confounders (age, marital or comparable relationship, general state of health, cardiovascular risk factors, renal insufficiency, depression). When considered in separate regression models (model 1), all three of the individual indicators (educational level, occupational status, income)

were found to be associated with the check-up participation rate in both men and women. The status index had a somewhat stronger effect on check-up participation than the individual indicators. When the individual indicators were adjusted against one another (model 2), occupational status and, more strongly, income were still significantly associated with check-up participation in both men and women, but educational level was not. In addition to the sex-stratified analyses, common regression models for men and women were used to detect any interactions between sex and the social-status indicators as determinants of check-up participation; no interactions were found.

Discussion

The GEDA study shows that the frequency of check-ups among both men and women in Germany depends on social status: Eligible persons of low social status have check-ups less often than those of higher status. Income and occupational status were most strongly associated with check-up participation in both men and women, with each of these features exerting an independent effect. These findings underscore the importance of targeting early-detection measures more strongly to the socially disadvantaged. A call to do so was recently issued as part of the national health-policy goals for Germany.

The findings reported here accord with those of a large number of studies from various countries consistently showing that persons of low social status make less use of the early-detection measures that are offered to them than persons of higher status do (12–16). On the other hand, earlier studies that specifically dealt with health check-ups in Germany failed to show any consistent relationship between individuals' social-status characteristics and the frequency with which they made use of this particular preventive measure (20–23). This inconsistency may have resulted from the use of variable indicators of social status; in most of the earlier studies, only a single social-status indicator was used. The present study, in contrast, is the first representative study for all of Germany in which socially based differences in the frequency of check-ups were studied in relation to multiple social-status indicators. It might also be the case, however, that the differences we found in check-up frequencies across social groups have only come about in the last few years. This question can only be answered with trend analyses of social-status characteristics, but no such analyses have been carried out to date.

As for the validity of the present findings, it should be borne in mind that the underlying data are based on self-reported information. Bias in the ascertainment of the features under study thus cannot be excluded. For example, the respondents might conceivably have confused check-ups with other kinds of medical examination; yet the check-up participation rates recorded in the GEDA study have been found to be only a few percentage points higher than those implied by billing data of the statutory health-insurance carriers (35). Moreover, certain groups of people, including people with an immigrant background, were underrepresented in the GEDA study samples, and this may have caused selection bias in the results.

TABLE 3

Odds ratios for health check-up participation in the two years before the survey in eligible men and women, stratified by individual features of social status (results of binary logistic regressions for a total of 26 555 participants)

	Men (10 406 subjects)					Women (16 149 subjects)				
		Model 1		Model 2			Model 1		Model 2	
	%	OR* (95% CI)	p-value	OR* (95% CI)	p-value	%	OR* (95% CI)	p-value	OR* (95% CI)	p-value
Social status										
Low	45.0	0.58 (0.49–0.70)	p<0.001	–		45.5	0.61 (0.53–0.71)	p<0.001	–	
Intermediate	51.1	0.76 (0.68–0.86)	p<0.001	–		51.3	0.91 (0.83–1.00)	n.s.	–	
High	55.9	1.00		–		50.6	1.00		–	
Educational level										
Low	52.5	0.72 (0.64–0.82)	p<0.001	0.87 (0.74–1.03)	n.s.	51.3	0.83 (0.73–0.94)	p<0.01	0.95 (0.82–1.08)	n.s.
Intermediate	46.9	0.77 (0.68–0.87)	p<0.001	0.88 (0.76–1.02)	n.s.	48.7	0.93 (0.84–1.03)	n.s.	1.01 (0.90–1.13)	n.s.
High	56.0	1.00		1.00		49.0	1.00		1.00	
Occupational status										
Low	44.5	0.66 (0.55–0.78)	p<0.001	0.75 (0.61–0.92)	p<0.01	47.2	0.74 (0.64–0.85)	p<0.001	0.80 (0.69–0.93)	p<0.01
Intermediate	50.4	0.79 (0.70–0.89)	p<0.001	0.88 (0.76–1.02)	n.s.	50.5	0.92 (0.83–1.01)	n.s.	0.96 (0.86–1.07)	n.s.
High	56.8	1.00		1.00		51.7	1.00		1.00	
Income										
<60%	45.0	0.63 (0.52–0.77)	p<0.001	0.68 (0.55–0.84)	p<0.001	44.5	0.66 (0.56–0.78)	p<0.001	0.70 (0.59–0.83)	p<0.001
≥ 60% to <150%	50.9	0.82 (0.72–0.92)	p<0.01	0.84 (0.74–0.96)	p<0.05	50.7	0.88 (0.79–0.99)	p<0.05	0.90 (0.80–1.01)	n.s.
≥ 150%	55.2	1.00		1.00		52.3	1.00		1.00	

OR, odds ratio; CI, confidence interval; %, weighted percentage; * adjusted for age, living with partner (yes/no), general state of health, overweight/obesity (yes/no), physical inactivity (yes/no), smoking status (smoker/ex-smoker/nonsmoker), hypertension (yes/no), depression (yes/no), diabetes (yes/no), renal insufficiency (yes/no); n.s., not significant (p ≥ 0.05); model 1, individual effects of social-status features; model 2, effects of socia-status features adjusted against one another

It is not known for certain what mechanisms underlie the observed effects of income and occupational status. One may speculate that anxieties about the future vary across income classes, with low earners tending to worry mainly about their financial security, rather than about future health problems, so that they make less use of preventive health-care measures. Many people also seem not to know that they need not pay anything at all for the heath check-ups to which they are entitled by German law. Moreover, persons with a general feeling that they have no decision-making ability or opportunity for independent action on the job might be guided by a similar feeling when assessing their chances of making a difference in other areas, such as disease prevention. The longstanding experience of not being able to steer one's own way in life may favor the development of a fatalistic overall attitude that makes preventive measures seem pointless (36). Educational level was not found to have any independent effect in the present study but may still indirectly affect participation behavior, as careers and incomes obviously depend to a large degree on educational attainments (37). The lack of an independent effect of educational level may also be due to methodological issues: The education variable had a markedly different distribution than the occupational-status and income variables, as is seen particularly in the relatively large group of people with low

educational attainments *(Table 1)*. This fact may well have influenced the findings on the relative importance of education, occupational status, and income.

Aside from the question of mechanisms, future research should address the effects and potential risks of population-wide measures for the early detection of disease. Studies from abroad indicate that population-wide early-detection measures in primary care have not yet led to any meaningful reduction of disease-related morbidity and mortality (38). One possible reason for this is presumed to be low participation by socially disadvantaged persons, as such persons are at higher risk for disease than the general population and thus stand to benefit more from preventive measures. If more men and women with low incomes and low occupational status were to participate, then preventive offerings like the free check-up in Germany might have a better chance of achieving a significant effect at the population level. For this to happen, such offerings would have to be more closely adapted to this particular target group.

Physicians should raise the issue specifically with their socially disadvantaged patients and tell them that persons over age 35 who are covered by statutory health insurance in Germany need not pay anything at all for the check-ups to which the law entitles them (no direct payments, co-payments, etc.). When taking the social history from a

FIGURE 2
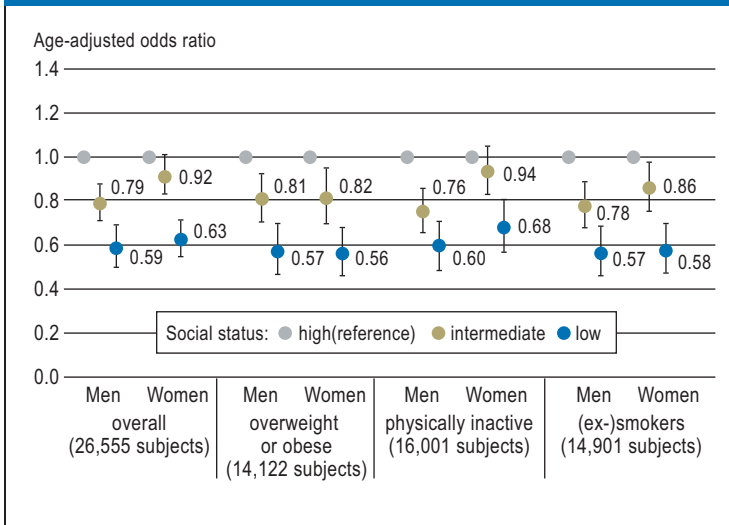
The relationship between social status and check-up participation among eligible men and women in the two years before the survey, stratified by risk group (age-adjusted odds ratios with 95% confidence intervals for a total of 26 555 participants)

patient, physicians should be sure to ask about the patient's social living situation. This aspect should also be emphasized more strongly in medical-school classes on medical sociology. Moreover, letters could be specifically sent to socially disadvantaged persons inviting them to get a check-up, and special scheduling and reminder systems to ensure that they get, and keep, their appointments could become a part of practice management in primary care. Multiple studies have shown that such systems increase participation in early-detection programs (39). Yet, in the end, reducing reducing social inequalities in health cannot be considered the exclusive task of the health-care system. A comprehensive social-policy strategy is needed to address the complex causes of health inequality, including the living and working conditions to which people are continually exposed (40).

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KEY MESSAGES

- Half of all eligible men and women in Germany had a health check-up in the two years before the survey.

- Eligible persons of low social status participated in check-ups at a lower rate (45.3%) than persons of intermediate (51.2%) or high status (53.5%).

- After statistical adjustment for age, men and women of low social status were found to have a lower participation rate than men and women of high social status (for men, odds ratio [OR] = 0.59, p<0.001; for women, OR = 0.63, p<0.001).

- Low check-up participation rates were particularly evident among men and women who had a low income level and a low occupational status.

- Persons of low income and low occupational status should be specifically offered health check-ups and should be informed that they are eligible for a check-up free of charge.

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