

English version of "Gesundheitsbezogene Lebensqualität bei Erwachsenen in Deutschland. Ergebnisse der Studie zur Gesundheit Erwachsener in Deutschland (DEGS1)"
 Bundesgesundheitsbl 2013 · 56:643–649
 DOI 10.1007/s00103-013-1700-y
 © Springer-Verlag Berlin Heidelberg 2013

U. Ellert · B.M. Kurth

Department of Epidemiology and Health Monitoring, Robert Koch Institute, Berlin

Health-related quality of life in adults in Germany

Results of the German Health Interview and Examination Survey for Adults (DEGS1)

Background

Over the past few decades, the morbidity situation of the population of western industrial countries has undergone a fundamental change. Traditionally, in established epidemiological research, the relevance of an illness in a population was measured on the basis of the mortality data. With growing life expectancy and the medical treatment successes achieved in the fight against mortality, chronic illnesses now determine the morbidity spectrum. This means that health-related quality of life plays an increasingly important role as an indicator of health in the population [1]. Health-related quality of life is a comprehensive concept which is based on a holistic understanding of health and can be defined in different ways. All experts agree that health-related quality of life can be understood as a multidimensional concept which comprises physical, emotional, mental, social and behaviour-related components of wellbeing and depicts the ability to function from the subjective view of the affected person. In contrast with the classic medical criteria for assessing the health of a person, this concept includes the viewpoint of the affected persons with respect to their physical functioning and their wellbeing [2, 3, 4], which is significant for many aspects. It is therefore an important tool for describing a person's state of health.

One of the generic tools most frequently used worldwide for measuring

health-related quality of life is the Short Form 36 (SF-36). The validity, reliability and sensitivity of this instrument have been proven [5, 6, 7, 8, 9], the tool allows international comparison, and it has been translated into over 20 different languages [10, 11, 12]. A search in the literature database Scopus in January 2013 found 13,820 references [13]. Version 2 of SF-36 (SF-36V2) measures the same areas as version 1, but contains some changes in the language and answer categories and is intended to be easier to understand and ensure even better intercultural comparability [14, 15, 16]. To date, SF-36V2 has been used in the USA [17, 18, 19, 20], in other English-speaking countries such as Australia [13], New Zealand [21] and the United Kingdom [14], and in non-English-speaking countries including Brazil [22], China [23], Sweden [24] and Spain [25]. It was used in Germany for the first time in 2002 [26].

Using SF-36V2 guarantees both the international comparability of the collected data on health-related quality of life and provides the possibility of mapping trends in the health-related quality of life of the adult population in Germany between 1998 [27] and today.

The aim of this study is to provide reference data on the health-related quality of life of adults in Germany. The results of this study can serve as representative normative data for the adult population in Germany. Due to the fact that information on health-related behaviour, sociodemographics and health care util-

isation was compiled in addition to the SF-36V2, it is also possible to classify different socioeconomic and clinical groups with respect to their health-related quality of life.

Methods

The German Health Interview and Examination Survey for Adults ("Studie zur Gesundheit Erwachsener in Deutschland", DEGS) is part of the health monitoring system at the Robert Koch Institute (RKI). The concept and design of DEGS are described in detail elsewhere [28, 29, 30, 31, 32]. The first wave (DEGS1) was conducted from 2008–2011 and comprised interviews, examinations and tests [33, 34]. The target population comprises the residents of Germany aged 18–79 years. DEGS1 has a mixed design which permits both cross-sectional and longitudinal analyses. For this purpose, a random sample from local population registries was drawn to complete the participants of the German National Health Interview and Examination Survey 1998 (GNHIES98), who re-participated. A total of 8,152 persons participated, including 4,193 first-time participants (response rate 42%) and 3,959 revisiting participants of GNHIES98 (response rate 62%). In all 7,238 persons attended one of the 180 examination centres, and 914 were interviewed only. The net sample (n=7,988) permits representative cross-sectional and time trend analyses for the age range of 18–79 years in comparison

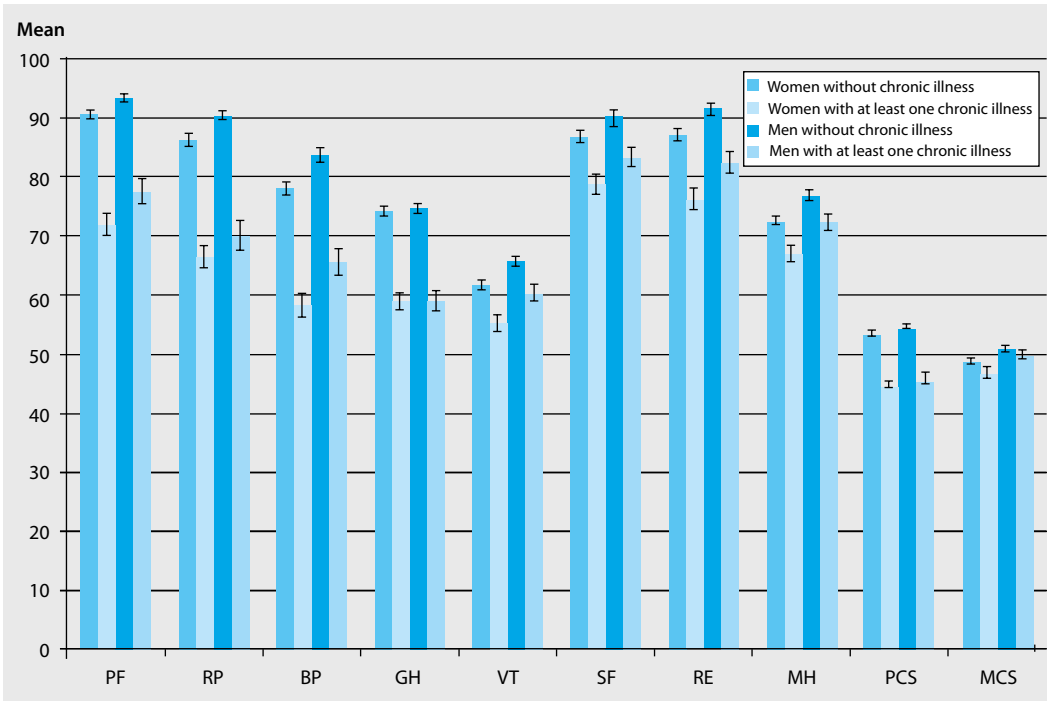


Fig. 1 ◀ Average scale values of the SF-36 subscales and total scales according to sex and presence or absence of a chronic illness. *PF* physical functioning, *RP* role physical, *BP* bodily pain, *GH* general health, *VT* vitality, *SF* social functioning, *RE* role emotional, *MH* mental health, *PCS* physical component score, *MCS* mental component score

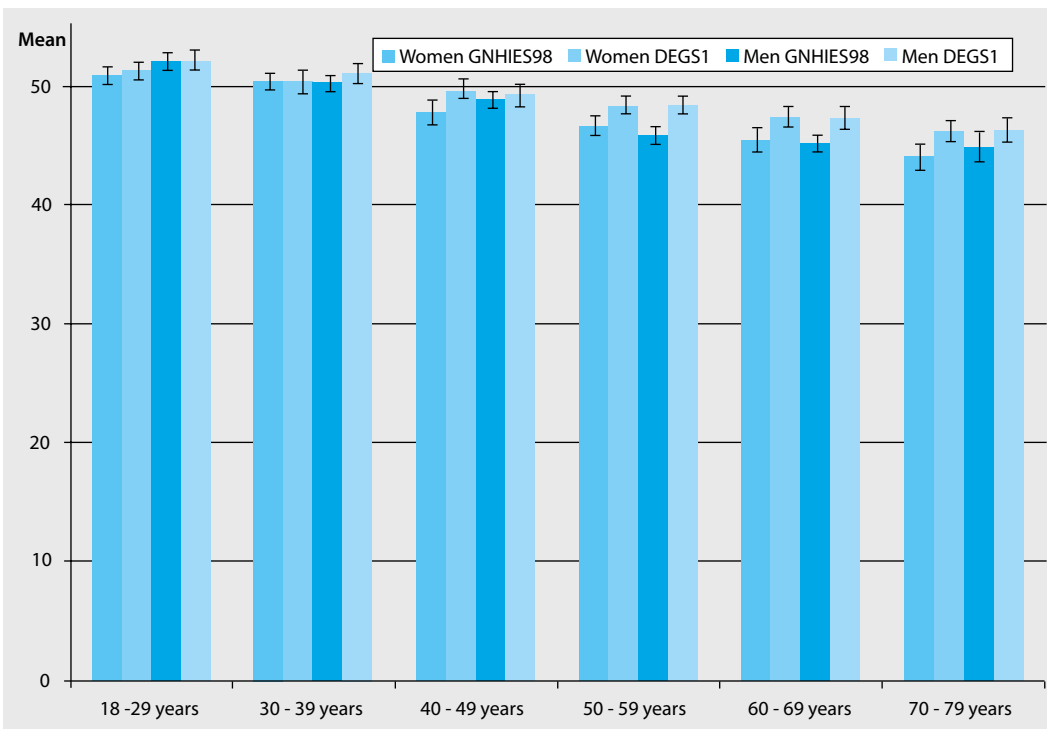


Fig. 2 ◀ Average scale values of the SF-36 general health subscale by survey wave and sex

with GNHIES98 (n=7,124) [29]. The data of the revisiting participants can be used for longitudinal analyses.

The cross-sectional and trend analyses were conducted using a weighting factor which corrects discrepancies in the sample from the population structure (as of 31 Dec 2010) with regard to age, sex, region and nationality, as well

as community type and education [29]. A separate weighting factor was prepared for the examination. Calculation of the weighting factor also considered re-participation probability of GNHIES98 participants based on a logistic regression model. For the purpose of conducting trend analyses, the data from the GNHIES98 were age-adjusted to the popu-

lation level as of 31 Dec 2010. A non-response analysis and a comparison of selected indicators with data from census statistics indicate a high level of representativity of the net sample for the resident population of Germany [29]. To take into account the weighting as well as the correlation of participants within a community, the confidence intervals were

determined using the SPSS-20 method for complex samples. Differences are regarded as statistically significant if the respective 95% confidence intervals do not overlap.

SF-36V2 was used to measure the health-related quality of life in DEGS1 [16]. It contains 36 questions, plus one additional question on health changes and was completed by the respondents themselves. The individual questions were interpreted according to guidelines in the manual, and missing values were substituted by the average values of the other questions of a scale, provided that at least half of the questions of a scale had been answered. Eight scales could be formed from the 36 questions. These stand for health dimensions: physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), mental health (MH). The scale values were converted to a range of 0–100, where higher values stand for better health-related quality of life.

Average values and 95% confidence intervals of the scales converted to 0–100 and the total scales differentiated according to age and sex were used to describe current health-related quality of life. In addition, social status and a question on the presence of a chronic illness were taken into account in order to differentiate the health-related quality of life of selected subgroups. Social status was determined using an index which includes information on school education and vocational training, professional status and net household income (weighted by household needs) and which enables a classification into low, middle and high status groups [35].

It is also possible to conduct so-called “norm-based scoring”, whereby the SF-36V2 scales are first Z-transformed using the average values and standard deviations of the 1998 American normative random sample and subsequently converted in such a way that the average value is 50 and the standard deviation is 10 [16]. Furthermore, two total scales can be formed from the eight scales: the physical component score (PCS) and the mental component score (MCS). For this purpose, the Z-transformed scale values are

Bundesgesundheitsbl 2013 · DOI 10.1007/s00103-013-1700-y
© Springer-Verlag Berlin Heidelberg 2013

U. Ellert · B.M. Kurth

Health-related quality of life in adults in Germany. Results of the German Health Interview and Examination Survey for Adults (DEGS1)

Abstract

The aim of this study is to describe health-related quality of life (HRQoL) of the German adult population and provide current representative normative data for the version 2 of the SF-36 (SF-36V2) in the German population. In the German Health Interview and Examination Survey for Adults (DEGS1) the SF-36V2 was used to measure health-related quality of life. Men report in all areas better HRQoL compared to women; a lower social status is associated with lower HRQoL values. Having one or more chronic diseases is associated with lower values in all dimensions of

HRQoL. Compared to 10 years ago, the general health seems to be much better in women aged 40–49 years and older and in men aged 50–59 years and older. Version 2 of the SF-36 has proved to be a robust instrument of health-related quality of life that is able to plausibly map differences regarding sociodemographic and health characteristics.

Keywords

Health-related quality of life · SF-36V2 · Adults · Health survey

Gesundheitsbezogene Lebensqualität bei Erwachsenen in Deutschland. Ergebnisse der Studie zur Gesundheit Erwachsener in Deutschland (DEGS1)

Zusammenfassung

Ziel der vorliegenden Arbeit ist es, die gesundheitsbezogene Lebensqualität der deutschen Erwachsenenbevölkerung darzustellen und aktuelle repräsentative Normdaten für die Version 2 des SF-36 (SF-36V2) in der deutschen Bevölkerung zu liefern. In der Studie zur Gesundheit Erwachsener in Deutschland (DEGS1) wurde der SF-36V2 zur Messung der gesundheitsbezogenen Lebensqualität eingesetzt. Männer berichten in allen Bereichen eine bessere gesundheitsbezogene Lebensqualität verglichen mit Frauen, ein niedrigerer sozialer Status geht mit geringeren Werten in der gesundheitsbezogenen Lebensqualität einher. Das Vorhandensein einer oder mehrerer chronischer Krankheiten

bringt Einbußen in allen Bereichen der gesundheitsbezogenen Lebensqualität mit sich. Die Allgemeine Gesundheit bei den Frauen ab dem Alter von 40 bis 49 Jahren und bei den Männern ab 50 bis 59 Jahren wird deutlich besser eingeschätzt, als vor 10 Jahren. Die Version 2 des SF-36 erweist sich als robustes Messinstrument der gesundheitsbezogenen Lebensqualität, das in der Lage ist, Unterschiede bezüglich soziodemografischer und gesundheitsbezogener Merkmale plausibel abzubilden.

Schlüsselwörter

Gesundheitsbezogene Lebensqualität · SF-36V2 · Erwachsene · Gesundheitssurvey

multiplied by the respective coefficients for the physical or mental factor and then added together. The advantage of this “norm-based scoring” is that it guarantees international comparability and enables comparison with version 1. By using an algorithm provided by the developers of the SF-36 [16], it was possible to convert the data on health-related quality of life collected in GNHIES98 with the SF-36V1 [36, 37, 38] in such a way that it can be compared with the data of version 2 from DEGS1. For this reason, the values converted to an average value of 50 and a standard deviation

of 10 are used for the comparison between GNHIES98 and DEGS1. Average values and 95% confidence intervals are also shown here. As describing all scales at this point would go beyond the scope of this publication, we refer only to the “General health” scale as an example, because this scale covers both physical and mental health.

Results

Of the 7,988 surveyed adults aged from 18–79 years, between 7,662 (role emotional) and 7,795 (social functioning)

Tab. 1 Average scale values of the SF-36 sub- and summary scales by age group and sex

	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS								
	N=7688	N=7667	N=7784	N=7708	N=7729	N=7795	N=7662	N=7719	N=7525	N=7525								
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI								
18-29 years																		
Women	93.9	(92.6-95.2)	90.0	(88.2-91.7)	82.4	(80.3-84.4)	73.5	(72.0-75.0)	58.8	(57.4-60.2)	85.7	(83.7-87.8)	70.5	(69.0-72.0)	55.4	(54.8-56.1)	46.9	(45.9-48.0)
Men	95.8	(94.8-96.8)	93.0	(91.5-94.5)	87.5	(85.5-89.5)	75.3	(73.7-77.0)	61.9	(60.4-63.4)	88.5	(86.4-90.6)	74.2	(72.6-75.8)	56.1	(55.6-56.7)	49.1	(48.2-49.9)
Total	94.9	(94.0-95.7)	91.5	(90.4-92.6)	85.0	(83.5-86.5)	74.5	(73.3-75.6)	60.4	(59.4-61.4)	87.1	(85.6-88.7)	72.4	(71.2-73.5)	55.8	(55.4-56.2)	48.0	(47.3-48.7)
30-39 years																		
Women	92.3	(90.7-93.9)	86.6	(84.2-89.0)	76.7	(73.8-79.6)	71.6	(69.5-73.7)	58.1	(56.1-60.0)	84.7	(82.3-87.0)	71.0	(69.0-73.0)	53.6	(52.8-54.4)	47.6	(46.4-48.7)
Men	94.7	(93.3-96.2)	91.2	(89.1-93.3)	84.0	(81.5-86.5)	73.1	(71.5-74.7)	63.0	(61.5-64.4)	89.6	(87.5-91.8)	74.9	(73.2-76.6)	55.0	(54.3-55.8)	49.7	(48.8-50.6)
Total	93.5	(92.4-94.6)	88.9	(87.3-90.5)	80.3	(78.4-82.3)	72.3	(71.1-73.6)	60.5	(59.3-61.7)	87.1	(85.6-88.7)	73.0	(71.7-74.2)	54.3	(53.8-54.9)	48.7	(48.0-49.4)
40-49 years																		
Women	88.7	(87.1-90.2)	84.1	(82.2-85.9)	72.0	(69.8-74.2)	70.4	(68.8-72.0)	58.2	(56.5-60.0)	83.2	(81.1-85.3)	70.7	(69.2-72.2)	52.3	(51.6-53.0)	47.5	(46.4-48.5)
Men	90.3	(88.6-92.1)	86.9	(84.7-89.0)	78.5	(76.1-80.8)	69.3	(67.4-71.3)	63.1	(61.5-64.7)	88.0	(86.1-90.0)	74.8	(73.3-76.3)	52.5	(51.7-53.4)	50.1	(49.2-51.0)
Total	89.5	(88.3-90.7)	85.5	(84.1-86.9)	75.3	(73.6-76.9)	69.9	(68.6-71.1)	60.7	(59.4-61.9)	85.6	(84.2-87.1)	72.8	(71.6-73.9)	52.4	(51.9-52.9)	48.8	(48.1-49.5)
50-59 years																		
Women	82.7	(81.0-84.5)	76.7	(74.7-78.7)	69.9	(67.6-72.3)	67.6	(66.1-69.1)	59.3	(57.8-60.9)	82.2	(80.4-84.1)	69.1	(67.5-70.7)	49.9	(49.1-50.7)	47.5	(46.6-48.5)
Men	87.6	(86.1-89.1)	83.6	(81.5-85.7)	74.0	(71.7-76.3)	67.6	(66.0-69.1)	64.2	(62.7-65.6)	87.2	(85.5-88.9)	74.9	(73.5-76.3)	51.0	(50.1-51.8)	50.6	(49.8-51.5)
Total	85.2	(84.0-86.4)	80.1	(78.7-81.6)	72.0	(70.4-73.6)	67.6	(66.5-68.7)	61.8	(60.6-62.9)	84.7	(83.4-86.0)	72.0	(70.9-73.1)	50.4	(49.9-51.0)	49.1	(48.4-49.8)
60-69 years																		
Women	75.5	(73.4-77.5)	71.1	(68.6-73.6)	63.3	(61.0-65.6)	65.5	(63.8-67.3)	62.2	(60.6-63.8)	83.8	(81.4-86.1)	71.6	(69.9-73.3)	46.2	(45.4-47.1)	50.2	(49.2-51.2)
Men	80.7	(78.5-82.8)	74.0	(71.3-76.6)	69.7	(67.0-72.3)	65.3	(63.5-67.2)	66.5	(64.7-68.2)	87.1	(85.2-89.0)	76.0	(74.3-77.8)	47.7	(46.7-48.7)	52.2	(51.3-53.2)
Total	78.0	(76.5-79.5)	72.5	(70.6-74.4)	66.4	(64.6-68.2)	65.4	(64.1-66.8)	64.3	(63.1-65.4)	85.4	(83.8-86.9)	73.8	(72.5-75.0)	47.0	(46.3-47.6)	51.2	(50.5-51.9)

Tab. 1 Average scale values of the SF-36 sub- and summary scales by age group and sex (Continued)

	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS		
	N=7688	N=7667	N=7784	N=7708	N=7729	N=7795	N=7662	N=7719	N=7525	N=7525		
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI		
70-79 years												
Women	67.2	(64.4-70.0)	61.0	(58.3-63.8)	60.4	(58.3-62.5)	76.8	(73.7-79.8)	44.1	(43.1-45.1)	50.1	(49.0-51.2)
Men	76.4	(73.7-79.1)	70.3	(67.6-72.9)	66.0	(64.2-67.9)	83.4	(80.9-85.9)	46.0	(44.9-47.1)	52.9	(52.0-53.9)
Total	71.3	(69.4-73.3)	65.1	(63.2-67.1)	62.9	(61.5-64.4)	79.8	(77.7-81.9)	45.0	(44.2-45.7)	51.4	(50.7-52.1)
Total												
Women	84.5	(83.7-85.3)	79.7	(78.8-80.7)	71.5	(70.5-72.5)	83.3	(82.4-84.2)	50.8	(50.4-51.1)	48.1	(47.7-48.5)
Men	88.8	(88.0-89.6)	84.4	(83.3-85.5)	78.1	(77.0-79.2)	88.7	(87.9-89.5)	52.0	(51.6-52.4)	50.5	(50.1-50.9)
Total	86.6	(86.0-87.2)	82.1	(81.3-82.8)	74.8	(74.1-75.6)	86.0	(85.3-86.6)	51.4	(51.1-51.7)	49.3	(49.0-49.6)

PF physical functioning, RP role physical, BP bodily pain, GH general health, VT vitality, SF social functioning, RE role emotional, MH mental health, PCS physical component score, MCS mental component score.

participants filled in the SF-36 questions thoroughly enough that it was possible to form the individual scales. Both total scales could be formed for 7,525 persons. In addition, between 149 (vitality) and 151 (role emotional) persons filled in the SF-8, which was developed as a shortened form of the SF-36, in the context of a short questionnaire. We only report the results of the SF-36 in this article.

The average values of the sub-scales vary from 61.6 points in the vitality scale to 86.6 points in the role physical scale. Men achieve significantly higher values in quality of life than women in all scales, with the exception of general health. These gender differences are apparent in all age groups, although to differing extents (■ Tab. 1).

Health-related quality of life decreases with increasing age for both sexes and for all physical subscales and the summary scale. For women, this decrease is almost the same in the physical functioning, role physical and bodily pain scales and is equivalent to a difference of 27 points between the youngest and the oldest age group. For men, the most significant difference—24 points between the youngest and the oldest age group—is in the role physical scale. The decrease is almost identical for women and men in the general health scale with 11 and 12 points respectively and in the total physical scale with 11 and 10 points respectively.

Apart from in the role emotional scale, where a decrease is apparent in older age groups, there is no discernible age trend for women in the mental health scales. In fact, in the total mental health scale, a somewhat better quality of life can be recorded for women in the two oldest age groups than for women in the younger age groups. In the role emotional scale, a quality of life perceived as being significantly worse with increasing age can also be observed for men. In contrast, better quality of life is reported in men of the older age groups in the vitality, mental health and total mental health scales.

Social status has an influence on the health of both men and women in the sense that persons with a higher status report better health-related quality of life than those with middle or low social status (■ Tab. 2).

Tab. 2 Average scale values of the SF-36 sub-scales and total scales by social status and sex

	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS	
	N=7642	N=7623	N=7736	N=7662	N=7683	N=7747	N=7618	N=7674	N=7484	N=7484	
Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Social status											
Women											
Low	75.6 (73.3–77.8)	70.4 (67.8–73.1)	64.4 (61.7–67.0)	62.2 (60.7–63.7)	56.2 (54.4–58.0)	78.8 (76.5–81.0)	76.8 (74.3–79.3)	65.6 (63.9–67.3)	47.5 (46.5–48.5)	46.1 (44.9–47.3)	
Mid-dle	85.1 (84.2–86.1)	80.4 (79.3–81.4)	71.5 (70.2–72.8)	69.7 (68.9–70.5)	59.8 (58.9–60.7)	84.9 (83.9–85.9)	84.1 (83.0–85.2)	71.2 (70.4–72.0)	50.8 (50.4–51.2)	48.5 (48.0–49.0)	
High	91.9 (90.8–93.0)	87.4 (85.8–88.9)	79.7 (77.8–81.6)	74.3 (72.9–75.7)	61.3 (60.0–62.7)	87.3 (85.7–88.8)	87.6 (86.0–89.2)	74.1 (72.8–75.3)	53.9 (53.2–54.5)	49.0 (48.2–49.8)	
Men											
Low	81.8 (79.2–84.4)	74.3 (70.9–77.6)	70.4 (67.5–73.3)	63.7 (61.5–65.9)	61.0 (59.0–63.1)	84.0 (81.8–86.2)	83.0 (80.2–85.7)	70.6 (68.5–72.7)	48.7 (47.5–49.9)	48.8 (47.6–50.1)	
Mid-dle	89.3 (88.4–90.2)	85.2 (84.0–86.5)	78.3 (76.9–79.7)	69.8 (68.8–70.8)	63.8 (63.0–64.6)	88.2 (87.1–89.4)	89.0 (88.0–90.1)	75.6 (74.7–76.5)	52.2 (51.7–52.6)	50.6 (50.1–51.1)	
High	93.1 (92.2–94.0)	90.4 (88.7–92.0)	84.1 (82.4–85.7)	73.7 (72.5–75.0)	66.1 (65.0–67.3)	91.3 (90.1–92.5)	92.4 (91.2–93.6)	78.0 (77.0–79.0)	54.2 (53.6–54.7)	51.7 (51.1–52.2)	
Total											
Low	78.6 (76.8–80.3)	72.3 (70.2–74.4)	67.2 (65.4–69.1)	62.9 (61.6–64.3)	58.5 (57.1–60.0)	81.2 (79.7–82.8)	79.7 (77.9–81.6)	68.0 (66.6–69.4)	48.1 (47.3–48.8)	47.4 (46.5–48.3)	
Mid-dle	87.1 (86.4–87.8)	82.7 (81.9–83.5)	74.8 (73.8–75.7)	69.8 (69.1–70.4)	61.8 (61.1–62.4)	86.5 (85.7–87.3)	86.5 (85.7–87.3)	73.3 (72.7–73.9)	51.5 (51.2–51.8)	49.5 (49.2–49.9)	
High	92.6 (91.9–93.2)	89.0 (88.0–90.1)	82.1 (80.9–83.4)	74.0 (73.0–75.0)	64.0 (63.1–64.9)	89.5 (88.6–90.4)	90.2 (89.3–91.2)	76.3 (75.5–77.1)	54.0 (53.6–54.5)	50.5 (50.0–51.0)	

PF physical functioning, RP role physical, BP bodily pain, GH general health, VT vitality, SF social functioning, RE role emotional, MH mental health, PCS physical component score, MCS mental component score.

Women and men with one or more chronic illnesses assess their health-related quality of life as significantly worse in all areas than persons without a chronic illness. A remarkable result is that the differences in HRQoL between men and women with respect to the general health scale completely disappear when a chronic disease is present (■ Fig. 1).

The development of the general health scale in the different age groups over the past 10 years is illustrated in ■ Fig. 2. Women aged 40–49 years and men aged 50–59 years assess their general health today significantly better than women and men of the same age 10 years ago.

Discussion

This article presents current normative data for the quality of life of the adult population of Germany, differentiated according to age group and sex. So-called “norm-based scoring” was not used in the individual scales in order to avoid having to apply the weighting factors of the American normative random sample of 1998, as these may not be transferrable 1:1 to the German population [13, 26, 37]. Overall, the results of the DEGS1 indicate high acceptance of the SF-36V2 among the population surveyed.

The more negative assessment of health-related quality of life in the physical scales and the almost constant values with a slight upward trend in some cases in the mental health scales which can be observed with increasing age have also been reported in other studies [21, 24, 26, 27]. Women report a lower health-related quality of life than men in the German population; this is consistent with other studies [22, 26] and was already demonstrated in 1998 [27]. It is also shown in other studies [21, 22, 24, 26, 27] that persons with low social status indicate a worse health-related quality of life.

A significantly worse quality of life in all scales can be observed in persons with one or more chronic illnesses; this result is consistent with other publications [1, 22, 24]. Although this lower quality of life is more pronounced in the physical scales (decline of between 15 and 20 points) than in the mental health scales (decline of between 5 and

11 points), it is still clearly evident in the latter. The decrease in the quality of life associated with the presence of a chronic illness is practically the same for men and women. It is worth noting that the difference between men and women with respect to their health-related quality of life, which is otherwise almost always identifiable, completely disappears both in the general health scale and in the physical component score when a differentiation is made according to the presence of a chronic illness.

The general health scale was used as an example in order to compare today's health-related quality of life with that of 10 years ago. As health-related quality of life was measured with the SF36V1 in GNHIES98, both scales had to be converted to "norm-based scoring" in order to make comparison possible. In comparison with 10 years ago, the assessment of general health has improved considerably, particularly in the older age groups. This positive trend is also reflected in the other evaluation results of DEGS1. Not only has the life expectancy of the population in general increased, but also the perception of general health in the older age groups. This can be taken as an indication of better health care, in particular for older people.

Conclusion

In synopsis, it can be said that the SF-36V2 is also highly suitable for illustrating differences in the health-related quality of life of population groups of different ages, genders and social or health conditions. The representative normative data described here can be used in the future to interpret the health-related quality of life of a wide variety of population or patient groups. DEGS offers a number of possibilities for further evaluations in association with the health-related quality of life. For example, factors which have a long-term effect on the health-related quality of life can be determined in longitudinal studies.

Corresponding address

Dr. U. Ellert

Department of Epidemiology and Health Monitoring, Robert Koch Institute
General-Pape-Str. 62–66, 12101 Berlin
Germany
EllertU@rki.de

Funding of the study. The study was financed by the Robert Koch Institute and the Federal Ministry of Health.

Conflict of interest. On behalf of all authors, the corresponding author states that there are no conflicts of interest.

References

1. Mar J, Larrañaga I, Arrospe A, Begiristain JM (2010) Impact of disability on different domains of health-related quality of life in the noninstitutionalized general population. *Clinicoecon Outcomes Res*:97–103
2. Bullinger M (2000) Lebensqualität—Aktueller Stand und neuere Entwicklungen der internationalen Lebensqualitätsforschung. In: Ravens-Sieberer U, Cieza A (eds) *Lebensqualität und Gesundheitsökonomie in der Medizin. Konzepte—Methoden—Anwendungen*. Ecomed, Landsberg
3. Bullinger M (2002) "Und wie geht es Ihnen?" Die Lebensqualität der Patienten als psychologisches. Forschungsthema in der Medizin. In: Brähler E, Strauß B (eds) *Handlungsfelder der psychosozialen Medizin*. Hogrefe, Göttingen, pp 308–329
4. Radoschewski M (2000) Gesundheitsbezogene Lebensqualität—Konzepte und Maße. *Entwicklungen und Stand im Überblick*. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitschutz 43:165–189
5. Ware JE Jr, Kosinski M, Bayliss MS et al (1995) Comparison of methods for the scoring and statistical analysis of SF-36 health profile and summary measures: summary of results from the medical outcome study. *Med Care* 33:264–279
6. Ware JE, Sherbourne CD (1992) The MOS 36-item short-form health survey (SF-36) I. Conceptual framework and item selection. *Med Care* 30(6):473–483
7. Hemingway H, Stafford M, Stansfeld S et al (1997) Is the SF-36 a valid measure of change in population health? Results from the Whitehall II study. *BMJ* 315:1273–1279
8. McHorney CA, Ware JE, Lu RJF, Donald Sherbourne C (1994) The MOS 36-Item Short-Form Health Survey (SF-36): III. Tests of data quality, scaling assumptions, and reliability across diverse patient groups. *Med Care* 32:40–66
9. McHorney CA, Ware JE, Raczek AE (1993) The MOS 36-Item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. *Med Care* 31:247–263
10. Bullinger M, Alonso J, Apolone G et al (1998) Translating health status questionnaires and evaluating their quality: the IQOLA project approach. *J Clin Epidemiol* 51(11):913–923
11. Wagner AK, Gandek B, Aaronson NK et al (1998) Cross-cultural comparison of the content of SF-36 translation across 10 countries: results from the IQOLA Project. *J Clin Epidemiol* 51(11):925–932
12. Gandek B, Ware JE Jr, Aaronson NK et al (1998) Tests of data quality, scaling assumptions, and reliability of the SF-36 in eleven countries: results from the IQOLA Project. *International Quality of Life Assessment*. *J Clin Epidemiol* 51:1149–1158
13. Hawthorne G, Osborne RH, Taylor A, Sansoni J (2007) The SF36 version 2: critical analyses of population weights, scoring algorithms and population norms. *Qual Life Res* 16:661–673
14. Jenkinson C, Stewart-Brown S, Petersen S, Paice C (1999) Assessment of the SF-36 version 2 in the United Kingdom. *J Epidemiol Community Health* 53:46–50
15. Turner-Bowker DM, DeRosa MA, Ware JEJ (2007) SF-36 health survey. *Encyclopedia of epidemiology*
16. Ware JE Jr, Kosinski M, Bjorner BJ et al (2007) *User's manual for the SF-36v2 health survey*, 2nd edn. QualityMetric Incorporated
17. Fryback PDG, Dunham PNC, Palta PM et al (2007) U.S. Norms for six generic health-related quality-of-life indexes from the national health measurement study. *Med Care* 45:1162–1170
18. Hays RD, Kim S, Spritzer KL et al (2009) Effects of mode and order of administration on generic health-related quality of life scores. *Value Health* 12:1035–1039
19. Maglinte GA, Hays RD, Kaplan RM (2012) US general population norms for telephone administration of the SF-36v2. *J Clin Epidemiol* 65:497–502
20. Turner-Bowker DM, Saris-Baglama RN, Derosa MA (2013) Single-item electronic administration of the SF-36v2 Health Survey. *Qual Life Res* 22:485–490
21. Stephens C, Alpass F, Baars M et al (2010) SF-36v2 norms for New Zealanders aged 55–69 years. *N Z Med J* 123:1–11
22. Laguardia J, Campos MR, Travassos CM et al (2011) Psychometric evaluation of the SF-36 (v.2) questionnaire in a probability sample of Brazilian households: results of the survey Pesquisa Dimensoes Sociais das Desigualdades (PDSO), Brazil, 2008. *Health Qual Life Outcomes* 9:61
23. Lam ET, Lam CL, Fong DY, Huang WW (2013) Is the SF-12 version 2 Health Survey a valid and equivalent substitute for the SF-36 version 2 health survey for the Chinese? *J Eval Clin Pract* 19:200–208
24. Taft C, Karlsson J, Sullivan M (2004) Performance of the Swedish SF-36 version 2.0. *Qual Life Res* 13:251–256
25. Sudano JJ, Perzynski A, Love TE et al (2011) Measuring disparities, bias in the short form-36v2 among Spanish-speaking medical patients. *Med Care* 49:481–488
26. Morfeld M, Bullinger M, Nantke J, Brähler E (2005) Die Version 2.0 des SF-36 Health Survey—Ergebnisse einer bevölkerungsrepräsentativen Studie. *Soz Präventivmed*:1–9
27. Bellach BM, Ellert U, Radoschewski M (2000) Der SF-36 im Bundesgesundheitsurvey—Erste Ergebnisse und neue Fragen. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitschutz* 43:210–216
28. Gößwald A, Lange M, Kamtsiuris P, Kurth BM (2012) DEGS: German Health Interview and Examination Survey for Adults. A nationwide cross-sectional and longitudinal study within the framework of health monitoring conducted by the Robert Koch-Institute. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitschutz* 55:775–780

29. Kamtsiuris P, Lange M, Hoffmann R et al (2013) The first wave of the German Health Interview and Examination Survey for Adults (DEGS1). Sampling design, response, sample weights and representativeness. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 56:620–630
30. Kurth BM (2012) Das RKI-Gesundheitsmonitoring—was es enthält und wie es genutzt werden kann. *Public Health Forum* 20(76):4.e1–4.e3
31. Kurth BM, Lange C, Kamtsiuris P, Hölling H (2009) Health monitoring at the Robert Koch-Institute. Status and perspectives. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 52:557–570
32. Scheidt-Nave C, Kamtsiuris P, Gößwald A et al (2012) German Health Interview and Examination Survey for Adults (DEGS)—design, objectives and implementation of the first data collection wave. *BMC Public Health* 12:730
33. Gößwald A, Lange M, Dölle R, Hölling H (2013) The first wave of the German Health Interview and Examination Survey for Adults (DEGS1). Participant recruitment, fieldwork, and quality management. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 56:611–619
34. Robert Koch-Institut (ed) (2009) DEGS—Studie zur Gesundheit Erwachsener in Deutschland. Projektbeschreibung. Beiträge zur Gesundheitsberichterstattung des Bundes. RKI, Berlin
35. Lampert T, Kroll L, Müters S, Stolzenberg H (2013) Measurement of Socioeconomic Status in the German Health Interview and Examination Survey for Adults (DEGS1). *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 56:631–636
36. Ellert U, Bellach BM (1999) The SF-36 in the Federal Health Survey—description of a current normal sample. *Gesundheitswesen (Bundesverband der Ärzte des Öffentlichen Gesundheitsdienstes (Germany))* 61(Spec No):S184–S190
37. Ellert U, Kurth BM (2004) Methodological views on the SF-36 summary scores based on the adult German population. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 47:1027–1032
38. Kurth BM, Ellert U (2002) The SF-36 questionnaire and its usefulness in population studies: results of the German Health Interview and Examination Survey 1998. *Soz Präventivmed* 47:266–277