



Key message

- ▶ In Germany, approximately every sixth woman aged between 18 and 79 years has her uterus removed.
- ▶ In almost half of the women (48.5%), the hysterectomy was performed between the ages of 40 to 49 years.
- ▶ In 2012 around 133,000 hysterectomies were performed in Germany.
- ▶ There is a relation between education, obesity and number of births and the prevalence of hysterectomy.
- ▶ It should be possible for every woman affected to make an informed decision regarding a hysterectomy after receiving individual advice and weighing up the benefits and risks.

Hysterectomy

Removal of the uterus (hysterectomy) currently ranks among the most frequent gynaecological procedures both in Germany (Statistisches Bundesamt 2013a) and internationally. Medical reasons (indications) for a hysterectomy other than malignant diseases of the uterus or ovaries include a variety of benign conditions of the uterus (Stang et al. 2011a). Apart from this, hysterectomies can be categorized according to whether they occur before or after the last menstrual period (pre- or post-menopausal) and whether the ovaries are removed at the same time (oophorectomy) (Figure 1).

In case of cancer of the uterine cervix (cervix uteri), the body of the cervix (corpus uteri) or of the ovaries and fallopian tubes, it is generally necessary to remove the uterus. However, hysterectomy is performed much more frequently as an elective procedure due to benign illnesses. The most frequent reasons here are uterine myoma or fibroids (benign tumours of smooth muscle origin), heavy menstrual bleeding (hypermenorrhoea) or a prolapse of the uterus (Stang et al. 2011a, AQUA-Institut 2013a). There are also other therapeutic possibilities for these illnesses or conditions, which means that the advantages and disadvantages of an operation have to be considered carefully.

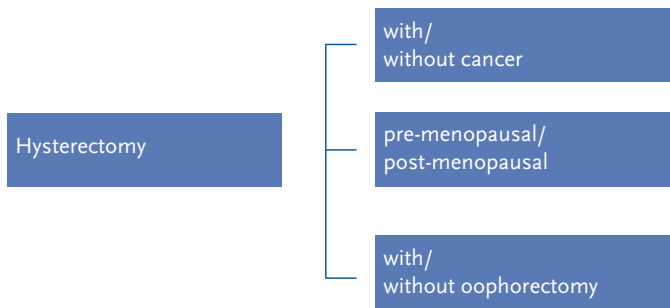
The most important underlying illnesses and the medical reasons for a hysterectomy will be presented in this article. In addition a more detailed description will be performed regarding the frequency of the operation and factors that can possibly influence it. One source of data used is the German Health Interview and Examination Survey for Adults (DEGS1) conducted by the Robert Koch Institute. Additional sources of data are official statistics as well as data from external quality assurance in hospitals and the German Centre for Cancer Registry Data.

Cancers of the Uterus and the Ovaries

The proportion of cancers (carcinoma) of the uterine cervix, the body of the uterus and of the ovaries of the total estimated number of newly diagnosed cancers among women is approximately 10.7% (RKI, GEKID 2013). Of these, uterine cancer (ICD-10: C54-55) is the most common. With approximately 11,550 new cases and accounting for approximately 5.1% of all malignant neoplasms, in 2010 it represented the fourth most common form of cancer in women. With about 7,790 new cases, ovarian cancer (ICD-10: C56) was in ninth place and cervical cancer (ICD-10: C53) with approx. 4,660 new cases featured in fourteenth place. The highest incidence rates for cervical cancer are to be observed in women in the 40 to 44-year-old age group.

Uterine and ovarian cancers tend to affect women in more advanced age, the highest incidence rates being found among women in the 75 to 79 and the 80

Figure 1
Classification of Hysterectomies
 Source: own graphic



to 84-year-old age groups (RKI, GEKID 2013). Whilst more than half of cervical carcinoma and over two-thirds of uterine (corpus) or endometrial carcinoma are diagnosed at an early stage (T1), the figure is only 23% for ovarian cancers. Here 61% of cases are not diagnosed until the late stage (T3), which explains the low relative 5-year survival rate when compared with the other types of cancer mentioned. This is currently approximately 42% set against cervical cancer at 69% and cancer of the uterus at 81%.

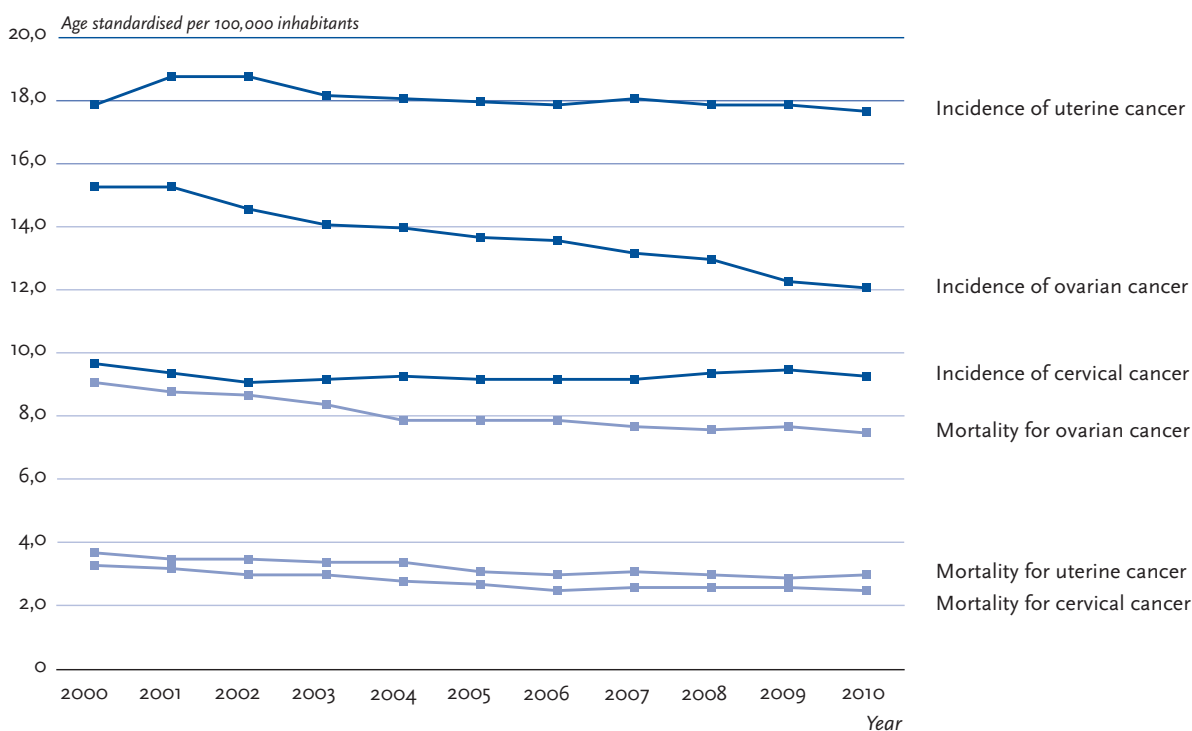
Overall, the incidence and mortality rates for cervical and uterine cancer are largely constant, whilst they are declining markedly for ovarian cancer (Figure 2) (RKI, GEKID 2013).

Benign diseases of the uterus

Very little data is available with regard to the prevalence of benign diseases of the uterus. On the one hand, this is due to the fact that subjective complaints and objective findings do not always correspond. On the other, women cope with complaints in different ways: they do not always seek medical treatment for their afflictions, which means that some illnesses are not really visible in the statistics or the available data.

Uterine fibroids or myoma (also: leiomyoma of uterus, ICD-10: D25) are the most commonly found tumours in women of reproductive age. It is estimated that around 20-30% of all women over the age of 30 have uterine fibroids but it is assumed that they only cause symptoms in approximately half of these women. The frequency of fibroids increases with increasing pre-menopausal age (Müller et al. 2004, David, Ebert 2012). Further information about the frequency of fibroids is provided by statistics on in- and out-patient care: According to the accounting data of the Association of Statutory Health Insurance Physicians for the North Rhine Region (ADT-Panel), 3.2% of patients in gynaecological practices were diagnosed with fibroids in 2012 (ZI 2013). According to hospital diagnosis statistics, there were 75,641 in-patient cases due to fibroids in 2011 (Statistisches Bundesamt 2013b). Prolapse of the uterus (female genital prolapse, ICD-10: N81) is also deemed to occur frequently although exact epidemiological data is unavailable.

Figure 2
Age-standardised incidence and mortality rates per 100,000 inhabitants for cancers of the cervix uteri (ICD-10: C53), of the uterus (ICD-10: C54-55) and of the ovaries (ICD-10: C56), estimates for Germany 1999-2010
 Data source: Krebs in Deutschland 2009/2010, RKI, GEKID 2013



Estimates based on gynaecological examinations assume a prevalence of 30 % and higher. It should be borne in mind, however, that minor alterations may not cause symptoms (Hendrix et al. 2002, Samuelsson et al. 1999, Jelovsek et al. 2007). In DEGS1, 4.0 % of the participating women aged between 18 and 79 years stated that they had suffered a prolapse of the uterus. According to the data of the Association of Statutory Health Insurance Physicians for the North Rhine Region, prolapse of the uterus was in twentieth place of diagnoses in gynaecological practices in 2012, at a figure of 3.3 % (ZI 2013). Uterine prolapse accounted for 52,691 cases treated in hospitals in 2011 (Statistisches Bundesamt 2013b).

Menstrual bleeding is defined as heavy (hypermenorrhoea) if the blood loss during menstruation exceeds 80 ml (60 ml being normal). Heavy menstrual bleeding may be caused by benign changes of the uterus such as myoma or polyps; however, in many cases the cause remains unknown (Bhattacharya et al. 2011). It is estimated that one in every 20 women suffers from heavy menstrual bleeding (IQWiG 2011, Shapley et al. 2004). Data on out-patient health care utilization show that menstrual abnormalities are in ninth place of all diagnoses in gynaecological practices in 2012, affecting 8.8 % of the patients (ZI 2013). Hospital diagnosis statistics for the year 2011 shows 21,476 in-patient cases due to excessive, frequent and irregular menstruation (ICD-10: N92) (Statistisches Bundesamt 2013b).

Age-standardised, in-patient case figures decrease in case of myoma and menstrual disorders (Figure 3). A reason for this might be that health care utilization has shifted to the out-patient domain; with the possible consequence that fewer operations are performed

Surgical methods

There are several surgical approaches available for the hysterectomy. The uterus can be removed abdominally i. e.

Risks and outcomes of the operation

The general risks associated with operations also apply with regard to a hysterectomy. These include post-operative bleeding, infections and complications associated with the anaesthesia.

According to external, in-patient quality assurance reports, intra-operative complications occurred in 1.4 % of hysterectomies with benign underlying conditions during 2012; most frequently injuries to the bladder or colon. In 4 % there were post-operative complications (most frequently infections of the urinary tract) (AQUA-Institut 2013a). In pre-menopausal women there may be an earlier onset of menopause after a hysterectomy, even in cases where the ovaries are not removed (Farquhar et al. 2005).

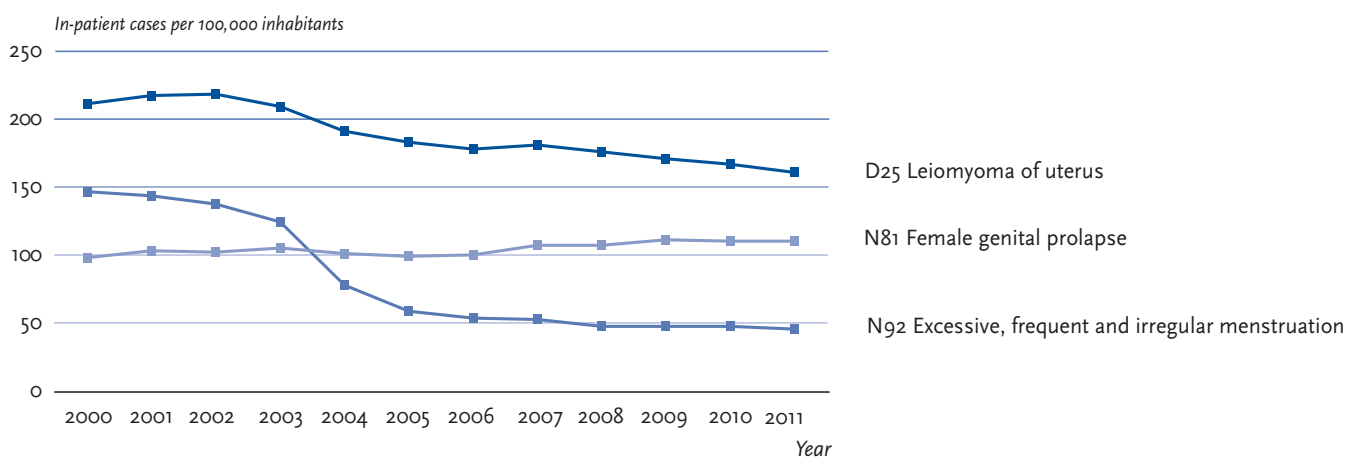
International studies show that in general the quality of life of the women improves after hysterectomy; negative effects on psychological health are rare (Kjerulff et al. 2000, Rannestad 2005, Khastgir et al. 2000, Flory et al. 2005). However, some women do perceive health restrictions following the operation (Khastgir et al. 2000, Flory et al. 2005, Pelka 2005, Cooper et al. 2009, McPherson et al. 2005).

after an abdominal incision or vaginally. Another option is to perform a laparoscopy, which can be used either as an independent method or to assist a vaginal hysterectomy (so-called LAVH, laparoscopic assisted vaginal hysterectomy). With regard to the results of the different surgical methods in cases of benign conditions, a systematic review shows that patients are able to leave the clinic and re-assume everyday activities more quickly after a vaginal hysterectomy. If a vaginal hysterectomy is not possible, the laparoscopic approach would, in many cases, appear to offer more advantages compared to abdominal surgery (Nieboer et al. 2009).

In a hysterectomy the entire uterus may be removed (total hysterectomy) or only the uterine body (subtotal or supracervical hysterectomy). The subtotal hysterectomy

Figure 3
Development in age-standardised in-patient case numbers with a main diagnosis of leiomyoma of uterus, genital prolapse, as well as excessive, frequent or irregular menstruation

Data source: Krankenhausdiagnosestatistik, Statistisches Bundesamt 2013 (age-standardised for the German population)



is particularly widespread in Scandinavian countries: In Denmark in 1998 the proportion of subtotal hysterectomies was 22 % (Gimbel et al. 2001).

There is some evidence that this surgical option is increasing in other countries as well. An advantage of the subtotal hysterectomy is that it is easier to perform laparoscopically. However, prolapses, micturition problems and sexual problems do not seem to occur less frequently after a subtotal hysterectomy (Lethaby et al. 2012).

In case of cancer, normally the entire uterus and the ovaries are removed. Depending on the tumour stage it may be necessary to conduct more extensive surgery (for example a so-called radical hysterectomy) along with additional chemotherapy or radiotherapy (RKI 2007). Since a hysterectomy is counted among the major surgical procedures, a stay in hospital is generally necessary.

Alternatives to surgery

Depending on the underlying condition, various alternatives to hysterectomy are possible in case of benign conditions of the uterus. For example, heavy menstrual bleeding can be treated with oral medication containing hormones or with the insertion of an intrauterine device (IUP) that releases the hormone progesterone. Another possible treatment is surgical endometrial ablation.

Possible treatments that preserve the uterus in the case of myoma include surgical removal (myomectomy) and shrinking the fibroids by reducing the blood supply to the uterus (uterine artery embolisation). Hormonal therapy should only be used for a limited period of time in order to shrink fibroids prior to surgery (David, Ebert 2012). Generally, high levels of patient satisfaction are reported, even when alternative procedures are used.

However, in the longer term it is not always possible to achieve adequate symptom control, which means that in some cases follow-up interventions are necessary (Bhattacharya et al. 2011, Gupta et al. 2012, Lethaby et al. 2000, Marjoribanks et al. 2006). Even in case of prolapse of the uterus, non-surgical treatments and organ-preserving surgical procedures are possible depending on the findings and these options should be discussed with the patients (Deutsche Gesellschaft für Gynäkologie und Geburtshilfe et al. 2008).

Prevalence of hysterectomy

The prevalence of hysterectomy can be described on the basis of the data from the representative German Health Interview and Examination Survey for Adults (DEGS1). For the purpose of DEGS1, a total of 8,151 men and women aged between 18 and 79 were examined and interviewed between 2008 and 2011 (www.degs-studie.de). In all, 3,705 women participated in the examination part of DEGS1. Of these, 205 women were excluded from this analysis due to incomplete answers, which means that data relating to

Data collection on hysterectomy and possible influencing factors in DEGS1

Eight questions concerning women's health were asked in DEGS1 (www.degs-studie.de) for example about contraception, births and gynaecological illnesses. The following questions were relevant for the analysis of hysterectomy:

- »Which of the following gynaecological disorders or procedures have you had?«
- »Hysterectomy« was one of five possible answers, followed by a question about the year of the operation.
- »When did you have your first menstruation?«
- »How old were you approximately when your menstruation stopped? By this we mean only the end of your menstruation without using the pill or other hormone preparations.«
- »Please tell us how many live births, miscarriages, still births and abortions you had.«

In addition, as part of a computer-assisted personal interview (CAPI), data was collected concerning all medically diagnosed cancers.

The information obtained enables calculation of age at hysterectomy as well as conclusions on a connection to gynaecological cancer, simultaneous oophorectomy and menopausal status at point of surgery.

For the number of live births, the classes 0, 1-2, >=3 were established. In addition, the variables of age, education, place of residence in 1988, and Body Mass Index (BMI) were used for the analyses.

Educational level was determined using the participants' responses regarding school and vocational qualifications. The international classification »Comparative Analysis of Social Mobility in Industrial Nations« (CASMIN) was used to divide into three educational groups »elementary«, »secondary« and »higher« (König et al. 1988; Lechert et al. 2006).

Place of residence in 1988 was chosen in order to determine regional differences in surgical frequency between the former regions of the GDR and the FRG.

In general the collection of data regarding hysterectomy in the survey is regarded as very reliable (Brett, Madans 1994).

3,500 women could be analysed. According to the DEGS1 data, a hysterectomy was performed on approximately 17.5 % (n=689) of the women aged between 18 and 79 years.

This proportion increases with advancing age: from 0.8 % in the 30 to 39-year-old age group, through 10.9 % (40 to 49-year-olds), 27.5 % (50 to 59-year-olds) up to 32.4 % among 60 to 69-year-olds and 39.4 % among the 70 to 79-year-olds. For most of the women (48.5 %) the hysterectomy took place at an age of between 40 and 49 years, the mean age at surgery being 43.9 years.

6.1 % of the women with a hysterectomy had cancer of the uterus or ovaries. A different age distribution was observed here compared to those women having surgery due to a benign condition (Figure 4). In 17.7 % of all women having a hysterectomy due to a benign condition (i. e. not reporting cancer) the ovaries were removed at the same

time. Of these women, the majority (46.7 %) were between 40 and 49 years old at the time of the operation, 28.1 % were over 50 years old. In 30.2 % of all cases, the uterus was removed after the menopause and of these interventions, 87.7 % were performed due to benign diseases.

Incidence

According to the DRG (diagnosis related groups) statistics provided by Statistisches Bundesamt, a total of 133,222 hysterectomies were carried out in 2012 (Figure 5) (Statistisches Bundesamt 2013a). Given a falling number of total and a slight increase in subtotal hysterectomies, figures for surgery overall are decreasing slightly. Using DRG data for the years 2005 and 2006, Stang et al. calculated a hysterectomy incidence rate of 362 per 100,000 person-years (Stang et al. 2011a, Stang et al. 2011b). The highest incidence rates were found among women aged between 40 and 49 years. Mean age at hysterectomy was 52 years; it is to be assumed that the large difference to the mean age in DEGS1 can be attributed to the fact that only women up to the age of 79 participated in DEGS1 and that women with cancer tended to be underrepresented.

Regarding the incidence, in around 12 % of the hysterectomies a gynaecological cancer was the reason for the operation. Vaginal hysterectomy was the most frequent method of surgery followed by abdominal hysterectomy. The type of surgery depended mostly on the indication. If a benign condition was the reason for the hysterectomy, in approximately 55 % of the cases the hysterectomy was conducted vaginally, in around 30 % abdominally; in approximately 12 % of the women the ovaries were removed at the same time. If a gynaecological cancer was the reason, an abdominal hysterectomy was performed in almost 90 % of the cases.

Regional variations in the frequency of hysterectomies have been found in several studies. An investigation by

German Health Interview and Examination Survey for Adults (DEGS1)

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|-----------------------|---|
| Data owner: | Robert Koch Institute |
| Objectives: | To provide up-to-date data on health-related topics, analysis of temporal developments and trends. The survey programme comprised a written questionnaire, physical examinations and tests, a physician interview, a medication interview and laboratory investigations (blood and urine sample). |
| Survey method: | The survey programme comprised a written questionnaire, physical examinations and tests, a physician interview, a medication interview and laboratory investigations (blood and urine sample). |
| Population: | German resident population, aged 18 and above. |
| Sample: | Total participation: 8.151 women and men. The study population is made up of persons aged 18 to 79 years, who were newly included in the investigation and of persons aged 28 to 91 years, who had already participated in GNHIES98 (mixed design). |
| Response rate: | 62 % among revisiting participants and 42 % first time participants. |
| Survey period: | 2008 to 2011 |

the Bertelsmann Stiftung showed that women who lived in (larger) towns or cities tended to experience a hysterectomy less frequently (Bertelsmann Stiftung, 2011). According to a study using accounting data from the health insurance funds, the highest hysterectomy rates are to be seen in less inhabited regions in central, north-eastern and north-western Germany. However, there are also sparsely populated regions with low operation rates, so there is no clear pattern to be observed (Geraedts, Malik, 2012). According to Stang et al. the lowest hysterectomy rates for

Figure 4
Age at time of hysterectomy and indication
Data source: DEGS1

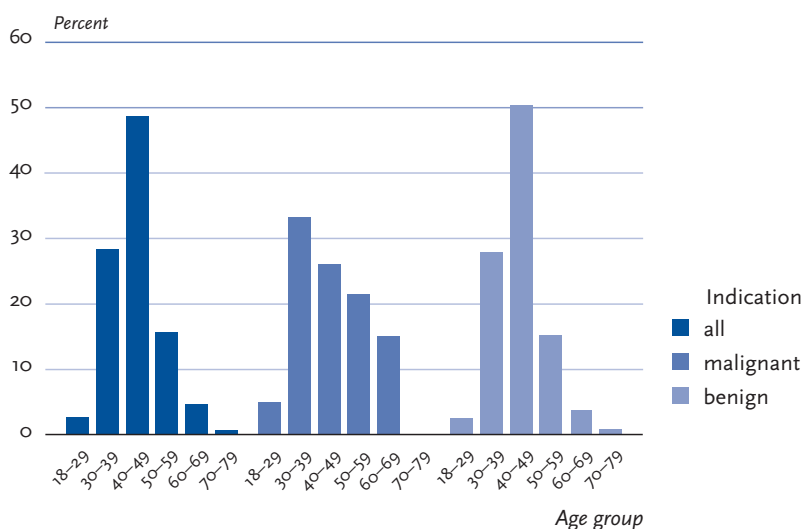
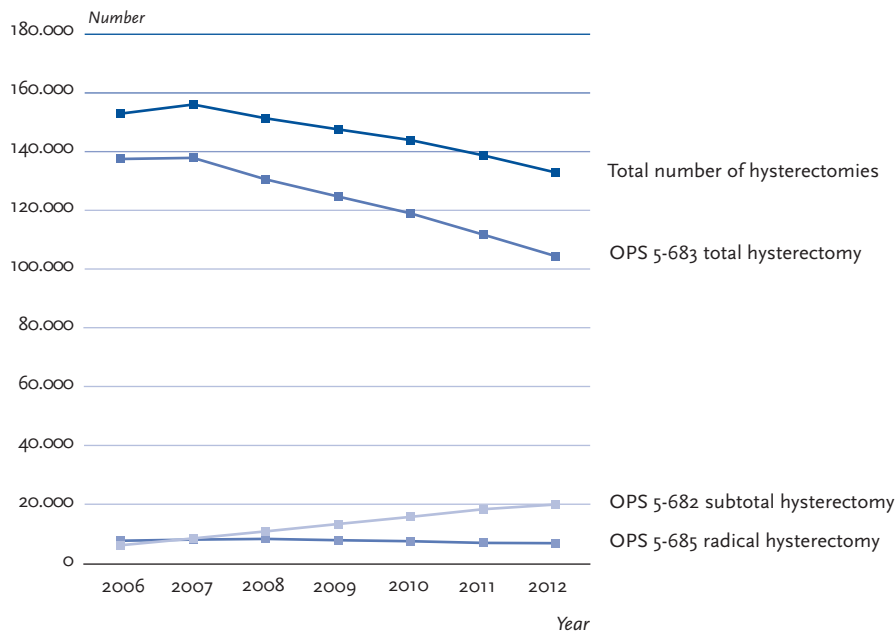


Figure 5
Number of hysterectomies in hospitals in Germany 2006-2012
 Data source: DRG-Statistik, Statistisches Bundesamt 2013



benign underlying conditions were found in Hamburg and the highest in Mecklenburg-Vorpommern (213.8 and 361.9 per 100,000 person-years respectively) (Stang et al. 2011b).

Influencing factors

It is known from international literature that there are associations between hysterectomy and socio-economic status (especially education level), the number of births and body weight. Using the DEGS1 data it was investigated whether these influencing factors also played a role in Germany.

One further question was to what extent uterine prolapse has an effect on the frequency of hysterectomies. Since only very few women declared having a hysterectomy in the 18 to 29-year-old age group, the analyses were conducted for women aged 30 to 79 years ($n=3,159$) (Table 1).

Education and place of residence

Similarly to social status (Prütz et al. 2013), significant differences are found between women with primary and women with secondary or higher education level: Whilst 31.0 % of women with primary education level had a hysterectomy, only 15.6 % of the women with secondary and 11.6 % with higher education level were affected. After age stratification, significant differences were revealed in the 40 to 49-year-old age group.

It is not possible to describe any differences in prevalence at a federal state level or according to community sizes (Prütz et al. 2013), however, for older women east-west differences are apparent: A comparison according to place of residence in 1988 shows that in the 70 to 79-year-old

age group, the prevalence of hysterectomies among women from the Federal Republic of Germany is significantly higher at 43.0 % than for women from the German Democratic Republic at 27.4 %.

Births, miscarriages and pregnancy terminations

A comparison of women who underwent a hysterectomy by number of births shows that women with three and more children differ significantly both from childless and from women with one to two children. A hysterectomy was performed in 8.6 % of women without children, whereas 20.9 % of women with one to two children and 28.0 % of women with three or more children had a hysterectomy. A comparison by miscarriages or pregnancy terminations revealed no significant results.

Health factors

A hysterectomy had been performed on 27.1 % of the women, who were overweight at the time of the survey (Body Mass Index ≥ 25), which is significantly more frequent than in non-overweight women at 13.9 %. Prolapse of the uterus was investigated as a further influential factor. Here too significant differences were found: Compared to 20.6 % of women without a uterine prolapse, 43.6 % of women who had a prolapse of the uterus stated that they underwent a hysterectomy (data not in table).

Discussion

In an international comparison, Germany ranks mid-table with the prevalence of hysterectomy of 17.5 % for women aged between 18 and 79 years. It is estimated that in the

Table 1

Hysterectomies in 30 to 79 year old women according to age group, education, place of residence in 1988, number of births, being overweight. Prevalence shown (in %) with 95 % confidence intervals (95 %-CI)

Data source: DEGS1

| | Age group | | | | | Overall | Number of cases |
|----------------------------|----------------|------------------|------------------|------------------|------------------|------------------|-----------------|
| | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | | |
| | % (95 %-CI) | % (95 %-CI) | % (95 %-CI) | % (95 %-CI) | % (95 %-CI) | % (95 %-CI) | |
| Education status | | | | | | | |
| Elementary | 1.8 (0.4-7.8) | 18.6 (12.1-27.7) | 34.6 (27.3-42.8) | 35.9 (29.2-43.2) | 40.9 (34.6-47.5) | 31.0 (27.6-34.6) | 1046 |
| Secondary | 0.7 (0.2-2.4) | 9.1 (6.2-13.2) | 24.1 (18.8-30.3) | 29.0 (22.5-36.5) | 33.5 (25.3-42.9) | 15.6 (13.4-18.0) | 1447 |
| Higher | 0.0 - | 3.7 (1.5-8.9) | 20.8 (13.9-29.9) | 24.7 (16.0-36.0) | 37.1 (21.6-55.9) | 11.6 (8.8-15.2) | 481 |
| Place of residence in 1988 | | | | | | | |
| GDR Region | 2.8 (0.5-14.5) | 12.4 (7.6-19.5) | 22.1 (16.6-28.9) | 31.6 (24.1-40.1) | 27.4 (19.0-37.7) | 19.7 (16.8-23.1) | 956 |
| FRG Region | 0.3 (0.1-1.5) | 11.2 (8.0-15.5) | 29.1 (24.1-34.5) | 32.5 (27.0-38.5) | 43.0 (36.8-49.5) | 22.0 (19.9-24.2) | 2027 |
| Births | | | | | | | |
| None | 0.0 - | 0.0 - | 24.7 (7.6-56.7) | 9.7 (1.0-52.8) | 0.0 - | 8.6 (3.1-21.6) | 52 |
| 1 to 2 | 0.6 (0.2-1.9) | 10.5 (7.0-15.4) | 28.0 (23.0-33.6) | 31.7 (26.5-37.4) | 38.4 (30.9-46.4) | 20.9 (18.7-23.3) | 1868 |
| 3+ | 2.7 (0.4-17.1) | 15.7 (9.1-25.9) | 28.1 (18.9-39.6) | 32.5 (23.3-43.4) | 43.3 (34.3-52.7) | 28.0 (23.9-32.4) | 587 |
| Overweight | | | | | | | |
| No | 0.3 (0.1-1.2) | 8.8 (5.6-13.5) | 23.6 (17.7-30.7) | 28.9 (22.0-37.0) | 28.7 (19.6-39.8) | 13.9 (11.6-16.4) | 1204 |
| Yes | 1.7 (0.4-7.3) | 14.8 (10.3-20.9) | 30.0 (24.6-35.9) | 34.3 (28.5-40.5) | 41.7 (35.5-48.2) | 27.1 (24.5-29.9) | 1750 |

USA more than a third of women undergo a hysterectomy by the age of 60 (Whiteman et al. 2008), in Great Britain the figure is roughly 20 % by the age of 55 (Vessey et al. 1992). In contrast only around 10 % of women in Denmark are hysterectomised (Settnes, Jorgensen 1996). Comparable data from Germany is available in a study from Bremen conducted in 2000, in which more than 3000 women aged between 40 and 70 years participated. This study shows a prevalence of hysterectomy of 25 %, which is slightly higher the prevalence among women from West Germany in DEGS1 (21 %) (Senator für Arbeit, Frauen, Gesundheit, Jugend und Soziales 2001). The average age at hysterectomy in the Bremen study is 43 years and thus corresponds to the value ascertained in DEGS1. The Bremen study indicates a higher value of 9 % compared to 6.1 % in DEGS1 for the proportion of hysterectomies performed for malignant indications. This could be due to the greater age range among DEGS1 participants, or to the fact that the reason for hysterectomy was not asked directly in DEGS1 but reconstructed from other data (see box »Data collection on hysterectomy and possible influencing factors in DEGS1«). There is no data available in the Bremen report about hysterectomies with simultaneous oophorectomy or on menopausal status at the point of surgery.

As to the analyses in DEGS1, again the limitation should be mentioned that the prevalence figures were calculated using age data. It may also be difficult to assess whether a hysterectomy was pre- or post-menopausal because most hysterectomies are performed around the age of the last menstruation. Declining numbers of operations could point to the fact that there is increasing critical awareness with regard to therapeutic indications (Bertelsmann Stif-

tung 2011) or that new and especially non-surgical treatment methods are being used more frequently. Looking at the incidences of hysterectomies, the proportion carried out due to a malignant disease is significantly higher than in the prevalence figures (despite declining incidence of gynaecological cancers). This could be another sign of a tendency to operate less frequently in case of benign uterine conditions.

Since the regional variations do not follow a clear pattern and cannot be explained by variations in the density of providers, it is assumed that the question whether there is an indication for hysterectomy in cases of benign conditions is being evaluated differently in different regions (Bertelsmann Stiftung 2011, Geraedts, Malik 2012).

A study from the USA shows that physicians actually often differ in their assessment of whether there is an indication for hysterectomy or not (Bickell et al. 1995). The factors which could influence the physician's recommendation include the urban-rural localisation of the physician (Gimbel et al. 2002) and the time elapsed since medical training (Bickell et al. 1994). With regard to Germany, it was shown that gynaecologists prefer different surgical methods of hysterectomy depending on gender, place of work (clinic or private practice) and professional experience (David et al. 2012).

A relationship between hysterectomy and indicators of socio-economic status can be found in several international studies (Cooper et al. 2008a, Brett et al. 1997, Marks, Shinberg 1997) and can also be described using the Bremen study and the DEGS1 data (Prütz et al. 2013, Senator für Arbeit, Frauen, Gesundheit, Jugend und Soziales 2001). Education appears to play an important role here

(Settnes, Jorgensen 1996, Harlow, Barbieri 1999, Kjerulff et al. 1993). In the Bremen study the proportion of women who underwent a hysterectomy was highest in the group with a general school leaving qualification and lowest in the group with school degrees that allow access to tertiary education.

This relationship between low education level and greater probability of hysterectomy is also shown with the DEGS1 data. The interpretations discussed in the literature could also apply here: a better level of health care, higher utilisation of early detection programmes among women with higher education level, as well as greater knowledge regarding the possible therapies and a greater willingness of physicians to point out alternatives to hysterectomy (Settnes, Jorgensen 1996, Cooper et al. 2008a, Brett et al. 1997, Marks, Shinberg 1997, Kjerulff et al. 1993).

International studies discuss interdependencies between the number of births, overweight and social status. In addition, health factors as injuries caused by birth, uterine prolapse, a higher body weight of multiparous women, or menstrual disorders could explain the association between the number of births and hysterectomy (Vessey et al. 1992, Settnes et al. 1997, Cooper et al. 2008b). Menstrual disorders may also play a role in the relationship between hysterectomy and overweight (Settnes et al. 1996).

It is to be noted as a limitation, though, that the analysis in DEGS1 is based on the participants' current BMI and not the BMI at the time of the hysterectomy. According to the DEGS1 data, age at menarche, which is also referred to as an influencing factor in international literature, does not appear to play a significant role in Germany (Prütz, et al. 2013).

There is a need for further research with regard to the interactions between the influencing factors, further associations (e.g. with the type of health insurance; Domenighetti, Casabianca 1997), the development of incidence and prevalence of hysterectomy, as well as the frequency of benign uterine disorders. The link between hormonal therapy during the menopause and hysterectomy should also be investigated, especially the question whether the decline in prescriptions of hormone therapy (Du et al. 2007) can also be found in women who underwent hysterectomy.

Outlook

The first representative nationwide survey of the prevalence of hysterectomy shows that approximately every sixth woman in Germany underwent hysterectomy. Influencing factors are found not only in women's (reproductive) health but also in their social status and in health care practices. The assessment if there is an indication for a surgical intervention plays an important role for hysterectomies due to benign gynaecological conditions.

A guideline on the indications and methods of hysterectomy is currently being developed under the leadership of the German Society for Gynaecology and Obstetrics and should be completed at the end of 2014 (AWMF 2010). Within the

framework of external, in-patient quality assurance, there is a continuous monitoring of hysterectomies, especially of those performed on benign indications and because of cervical and uterine cancer. In addition, »hysterectomy in patients without malignant findings and below 35 years of age« was defined as a quality indicator (AQUA-Institut, 2013a).

These activities may also be perceived as an expression of an increasing sensitisation for the topic of hysterectomy and as a change in practice towards a more differentiated and individualised approach (AQUA-Institut 2013b). It is of major importance to inform patients about the benefits and risks of hysterectomy (e.g. IQWiG 2011, FFGZ). The aim has to be an informed, autonomous and self-determined patient participating in the decision about the appropriate therapy, in line with the principles of shared decision-making.

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Department of Epidemiology and Health Monitoring

Literature

- AQUA-Institut (2013a) Bundesauswertung zum Verfahrensjahr 2012. 15/1 - Gynäkologische Operationen. Qualitätsindikatoren. <https://www.sqg.de> (Accessed: 22.01.2014)
- AQUA-Institut (2013b) Beschreibung der Qualitätsindikatoren für das Verfahrensjahr 2012. 15/1 - Gynäkologische Operationen. <http://www.sqg.de> (Accessed: 22.01.2014)
- AWMF (2010) Angemeldetes Leitlinienvorhaben: Indikation und Methodik der Hysterektomie, Registriernummer 015 - 070 <http://www.awmf.org/leitlinien> (Accessed: 22.01.2014)
- Bhattacharya S, Middleton L, Tsourapas A et al. (2011) Hysterectomy, endometrial ablation and Mirena® for heavy menstrual bleeding: a systematic review of clinical effectiveness and costeffectiveness analysis. *Health Technology Assessment* 15(19): 252
- Bertelsmann Stiftung (Hrsg) (2011) Faktencheck Gesundheit. Regionale Unterschiede in der Gesundheitsversorgung. Bertelsmann Stiftung, Gütersloh
- Bickell NA, Earp J, Evans AT et al. (1995) A matter of opinion about hysterectomies: experts' and practicing community gynecologists' ratings of appropriateness. *Am J Public Health* 85 (8 Pt 1): 1125–1128
- Bickell NA, Earp JA, Garrett JM et al. (1994) Gynecologists' sex, clinical beliefs, and hysterectomy rates. *Am J Public Health* 84 (10): 1649–1652
- Brett KM, Madans JH (1994) Hysterectomy use: the correspondence between self-reports and hospital records. *Am J Public Health* 84(10): 1653–1655
- Brett KM, Marsh JV, Madans JH (1997) Epidemiology of hysterectomy in the United States: demographic and reproductive factors in a nationally representative sample. *J Womens Health* 6(3): 309–316
- Cooper R, Lucke J, Lawlor DA et al. (2008a) Socioeconomic position and hysterectomy: a cross-cohort comparison of women in Australia and Great Britain. *J Epidemiol Community health* 62(12): 1057–1063
- Cooper R, Hardy R, Kuh D (2008b) Timing of menarche, childbearing and hysterectomy risk. *Maturitas* 61(4): 317–322
- Cooper R, Mishra G, Hardy R et al. (2009) Hysterectomy and subsequent psychological health: findings from a British birth cohort study. *J Affective Disorders* 115(1-2): 122–130
- David M, Ebert A (2012) Uterus myomatosus und Adenomyosis uteri. *Ärztliche Praxis Gynäkologie* (1/2012): 20–24
- David M, Wild D, Wernecke KD et al. (2012) Attitudes toward mode of hysterectomy: a survey-based study among German gynecologists. *Eur J Obstet, Gynecol Reprod Biol* 164 (2): 216–220
- Deutsche Gesellschaft für Gynäkologie und Geburtshilfe (DGGG), Deutsche Gesellschaft für Urologie e.V. (DGU), Arbeitsgemeinschaft für Urogynäkologie und rekonstruktive Beckenbodenchirurgie Österreich et al. (2008) Descensus genitalis der Frau - Diagnostik und Therapie - AWMF-Leitlinien-Register Nr. 015/006. <http://www.awmf.org> (Accessed: 22.01.2014)
- Domenighetti G, Casabianca A (1997) Rate of hysterectomy is lower among female doctors and lawyers' wives. *BMJ* 314 (7091): 1417
- Du Y, Doren M, Melchert HU et al. (2007) Differences in menopausal hormone therapy use among women in Germany between 1998 and 2003. *BMC Women's Health* 7: 19
- Farquhar CM, Sadler L, Harvey SA et al. (2005) The association of hysterectomy and menopause: a prospective cohort study. *BJOG: An International Journal of Obstetrics & Gynaecology* 112 (7): 956–962
- FFGZ - Feministisches Frauengesundheitszentrum e.V. Berlin (Hrsg) (o. D.) Gebärmutterentfernung - Häufig ein vermeidbarer Eingriff, <http://www.ffgz.de> (Accessed: 22.01.2014)
- Flory N, Bissonnette F, Binik YM (2005) Psychosocial effects of hysterectomy: literature review. *J Psychosom Res* 59 (3): 117–129
- Geraedts M, Malik M (2012) Regionale Unterschiede bei Hysterektomien und Ovarektomien. In: Klauber J Geraedts M, Friedrich J, Wasem J (Hrsg) Krankenhaus-Report 2012 Schwerpunkt: Regionalität. Schattauer, Stuttgart
- Gimbel H, Settnes A, Tabor A (2001) Hysterectomy on benign indication in Denmark 1988-1998. A register based trend analysis. *Acta obstetrica et gynecologica Scandinavica* 80 (3): 267–272
- Gimbel H, Ottesen B, Tabor A (2002) Danish gynecologists' opinion about hysterectomy on benign indication: results of a survey. *Acta Obstetrica et Gynecologica Scandinavica* 81 (12): 1123–1131
- Gupta JK, Sinha A, Lumsden MA et al. (2012) Uterine artery embolization for symptomatic uterine fibroids. *Cochrane database of systematic reviews* (Online) 5: CD005073
- Harlow BL, Barbieri RL (1999) Influence of education on risk of hysterectomy before age 45 years. *Am J Epidemiol* 150(8): 843–847
- Hendrix SL, Clark A, Nygaard I et al. (2002) Pelvic organ prolapse in the Women's Health Initiative: gravity and gravidity. *Am J Obstet Gynecol* 186 (6): 1160–1166
- IQWiG - Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen (Hrsg) (2011) Gesundheitsinformation.de. Überblick: Starke Regelblutung (Hypermenorrhoe) <http://www.gesundheitsinformation.de> (Accessed: 22.01.2014)
- Jelovsek JE, Maher C, Barber MD (2007) Pelvic organ prolapse. *The Lancet* 369 (9566): 1027–1038
- Kjerulff K, Langenberg P, Guzinski G (1993) The socioeconomic correlates of hysterectomies in the United States. *Am J Public Health* 83(1): 106–108
- Kjerulff KH, Langenberg PW, Rhodes JC et al. (2000) Effectiveness of hysterectomy. *Obstetrics and gynecology* 95(3): 319–326
- Khastgir G, Studd JW, Catalan J (2000) The psychological outcome of hysterectomy. *Gynecolo Endocrinol* 14(2): 132–141
- König W, Lüttinger P, Müller W (1988) A comparative analysis of the development and structure of educational systems. Methodological foundations and the construction of a comparative educational scale. Institut für Sozialwissenschaften, Mannheim
- Lechert Y, Schroedter J, Lüttinger P (2006) Die Umsetzung der Bildungsklassifikation CASMIN für die Volkszählung 1970, die Mikrozensus-Zusatzerhebung 1971 und die Mikrozensus 1976-2004. ZUMA, Mannheim
- Lethaby A, Shepperd S, Cooke I et al. (2000) Endometrial resection and ablation versus hysterectomy for heavy menstrual bleeding. *Cochrane database of systematic reviews* (Online) 2: CD000329
- Lethaby A, Mukhopadhyay A, Naik R (2012) Total versus subtotal hysterectomy for benign gynaecological conditions. *Cochrane database of systematic reviews* (Online) 4: CD004993
- Marjoribanks J, Lethaby A, Farquhar C (2006) Surgery versus medical therapy for heavy menstrual bleeding. *Cochrane database of systematic reviews* (Online) (2): CD003855

- Marks NF, Shinberg DS (1997) Socioeconomic differences in hysterectomy: the Wisconsin Longitudinal Study. *Am J Public Health* 87(9): 1507–1514
- McPherson K, Herbert A, Judge A et al. (2005) Psychosexual health 5 years after hysterectomy: population-based comparison with endometrial ablation for dysfunctional uterine bleeding. *Health Expectations* 8(3): 234–243
- Müller A, Thiel F, Binder H et al. (2004) Myome - Teil 1. *Geburtsh Frauenheilk* 64(10): R229–R244
- Nieboer TE, Johnson N, Lethaby A et al. (2009) Surgical approach to hysterectomy for benign gynaecological disease. *Cochrane database of systematic reviews (Online)* (3): CD003677
- Pelka M (2005) Zur Bewältigungsfähigkeit nach Hysterektomie. Eine Interviewstudie mit 100 Frauen nach Hysterektomie wegen gutartiger Gebärmuttererkrankungen, Abteilung für gynäkologische Endokrinologie und Reproduktionsmedizin der Frauenklinik, Medizinische Hochschule Hannover, Hannover
- Prütz F, Knopf H, Lippe E et al. (2013) Prävalenz von Hysterektomien bei Frauen im Alter von 18 bis 79 Jahren. *Bundesgesundheitsbl* 56(5-6): 716–722
- Rannestad T (2005) Hysterectomy: effects on quality of life and psychological aspects. *Best practice & research Clinical obstetrics & gynaecology* 19 (3): 419–430
- RKI - Robert Koch-Institut (Hrsg) (2007) Gebärmuttererkrankungen. Gesundheitsberichterstattung des Bundes, Heft 37. Robert Koch-Institut, Berlin
<http://www.rki.de/gbe> (Accessed: 22.01.2014)
- RKI - Robert Koch-Institut, GEKID - Gesellschaft der epidemiologischen Krebsregister in Deutschland e. V. (Hrsg) (2013) Krebs in Deutschland 2009 / 2010. 9. Ausgabe. Robert Koch-Institut, Berlin
<http://www.rki.de/gbe> (Accessed: 22.01.2014)
- Samuelsson EC, Victor FT, Tibblin G et al. (1999) Signs of genital prolapse in a Swedish population of women 20 to 59 years of age and possible related factors. *Am J Obstet Gynecol* 180(2 Pt1): 299–305
- Senator für Arbeit, Frauen, Gesundheit, Jugend und Soziales (2001) Frauengesundheitsbericht Bremen 2001. Bremen
- Settnes A, Jorgensen T (1996) Hysterectomy in a Danish cohort. Prevalence, incidence and socio-demographic characteristics. *Acta Obstetrica et Gynecologica Scandinavica* 75(3): 274–280
- Settnes A, Jorgensen T, Lange AP (1996) Hysterectomy in Danish women: weight-related factors, psychologic factors, and life-style variables. *Obstetrics and Gynecology* 88(1): 99–105
- Settnes A, Lange AP, Jorgensen T (1997) Gynaecological correlates of hysterectomy in Danish women. *Int J Epidemiol* 26(2): 364–370
- Shapley M, Jordan K, Croft PR (2004) An epidemiological survey of symptoms of menstrual loss in the community. *Brit J Gen Pract* 54(502): 359–363
- Stang A, Merrill RM, Kuss O (2011a) Nationwide rates of conversion from laparoscopic or vaginal hysterectomy to open abdominal hysterectomy in Germany. *Eur J Epidemiol* 26(2): 125–133
- Stang A, Merrill RM, Kuss O (2011b) Hysterectomy in Germany: a DRG-based nationwide analysis, 2005-2006. *Dtsch Arztebl Int* 108(30): 508–514
- Statistisches Bundesamt (2013a) Fallpauschalenbezogene Krankenhausstatistik (DRG-Statistik), Diagnosen und Prozeduren der vollstationären Patientinnen und Patienten in Krankenhäusern
<http://www.gbe-bund.de> (Accessed: 22.01.2014)
- Statistisches Bundesamt (2013b) Krankenhausstatistik - Diagnosedaten der Patienten und Patientinnen in Krankenhäusern
<http://www.gbe-bund.de> (Accessed: 22.01.2014)
- Vessey MP, Villard-Mackintosh L, McPherson K et al. (1992) The epidemiology of hysterectomy: findings in a large cohort study. *British journal of obstetrics and gynaecology* 99(5): 402–407
- Whiteman MK, Hillis SD, Jamieson DJ et al. (2008) Inpatient hysterectomy surveillance in the United States, 2000-2004. *Am J Obstet Gynecol* 198(1): 34 e31–37
- ZI - Zentralinstitut für die kassenärztliche Versorgung (2013) Häufigste Diagnosen in Prozent der Behandlungsfälle in Arztpraxen in Nordrhein (ADT-Panel Nordrhein)
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