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Human Papillomavirus and Related Diseases Report

GERMANY

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Executive summary

Human papillomavirus (HPV) infection is now a well-established cause of cervical cancer and there is growing evidence of HPV being a relevant factor in other anogenital cancers (anus, vulva, vagina and penis) as well as head and neck cancers. HPV types 16 and 18 are responsible for about 70% of all cervical cancer cases worldwide. HPV vaccines that prevent HPV 16 and 18 infections are now available and have the potential to reduce the incidence of cervical and other anogenital cancers.

This report provides key information for Germany on: cervical cancer; other anogenital cancers and head and neck cancers; HPV-related statistics; factors contributing to cervical cancer; cervical cancer screening practices; HPV vaccine introduction; and other relevant immunisation indicators. The report is intended to strengthen the guidance for health policy implementation of primary and secondary cervical cancer prevention strategies in the country.

Table 1: Key Statistics

Population		
Women at risk for cervical cancer (Female population aged >=15 years)		35.9 million
Burden of cervical cancer and other HPV-related cancers		
Annual number of cervical cancer cases		4,608
Annual number of cervical cancer deaths		2,011
Crude incidence rates per 100,000 and year:		
	Male	Female
Cervical cancer	-	11.0
Anal cancer ‡	1.3-3.4	2.2-5.4
Vulvar cancer ‡	-	5.0-12.2
Vaginal cancer ‡	-	0.9-1.9
Penile cancer ‡	1.4-2.8	-
Oropharyngeal cancer	5.8	2.6
Burden of cervical HPV infection		
Prevalence (%) of HPV 16 and/or HPV 18 among women with:		
	Normal cytology	3.2
	Low-grade cervical lesions (LSIL/CIN-1)	21.2
	High-grade cervical lesions (HSIL/CIN-2/CIN-3/CIS)	50.5
	Cervical cancer	76.5
Other factors contributing to cervical cancer		
Smoking prevalence (%), women		28.5 [23.0-34.4]
Total fertility rate (live births per women)		1.4
Oral contraceptive use (%) among women		37.2
HIV prevalence (%), adults (15-49 years)		-
Sexual behaviour		
Percentage of 15-year-old who have had sexual intercourse (men/women)		22 / 19
Range of median age at first sexual intercourse (men/women)		17.7-20.2 / 15.2-20.9
Cervical screening practices and recommendations		
Cervical cancer screening coverage, % (age and screening interval, reference)	52.8% (All women aged 20-69 screened every 3y, EUROSTAT Germany)	
Screening ages (years)		Above 20
Screening interval (years) or frequency of screens		1 year
HPV vaccine		
HPV vaccine introduction		
	HPV vaccination programme	National program
	Date of HPV vaccination routine immunization programme start	2007

‡Please see the specific sections for more information.

Contents

Executive summary	iii
1 Introduction	2
2 Demographic and socioeconomic factors	4
3 Burden of HPV related cancers	6
3.1 Cervical cancer	6
3.1.1 Cervical cancer incidence in Germany	6
3.1.2 Cervical cancer incidence by histology in Germany	11
3.1.3 Cervical cancer incidence in Germany across Western Europe	13
3.1.4 Cervical cancer mortality in Germany	15
3.1.5 Cervical cancer mortality in Germany across Western Europe	19
3.1.6 Cervical cancer incidence and mortality comparison, Premature deaths and disability in Germany	21
3.2 Anogenital cancers other than the cervix	23
3.2.1 Anal cancer	23
3.2.2 Vulvar cancer	25
3.2.3 Vaginal cancer	26
3.2.4 Penile cancer	27
3.3 Head and neck cancers	28
3.3.1 Oropharyngeal cancer	28
4 HPV related statistics	31
4.1 HPV burden in women with normal cervical cytology, cervical precancerous lesions or invasive cervical cancer	31
4.1.1 HPV prevalence in women with normal cervical cytology	32
4.1.2 HPV type distribution among women with normal cervical cytology, precancerous cervical lesions and cervical cancer	33
4.1.3 HPV type distribution among HIV+ women with normal cervical cytology	41
4.1.4 Terminology	42
4.2 HPV burden in anogenital cancers other than cervix	43
4.2.1 Anal cancer and precancerous anal lesions	43
4.2.2 Vulvar cancer and precancerous vulvar lesions	46
4.2.3 Vaginal cancer and precancerous vaginal lesions	49
4.2.4 Penile cancer and precancerous penile lesions	51
4.3 HPV burden in men	53
4.4 HPV burden in the head and neck	55
4.4.1 Burden of oral HPV infection in healthy population	55
4.4.2 HPV burden in head and neck cancers	55
5 Factors contributing to cervical cancer	59
6 Sexual and reproductive health behaviour indicators	61
7 HPV preventive strategies	63
7.1 Cervical cancer screening practices	63
7.2 HPV vaccination	66
8 Protective factors for cervical cancer	66

9 Indicators related to immunisation practices other than HPV vaccines	68
9.1 Immunisation schedule	68
9.2 Immunisation coverage estimates	68
10 Glossary	70

List of Figures

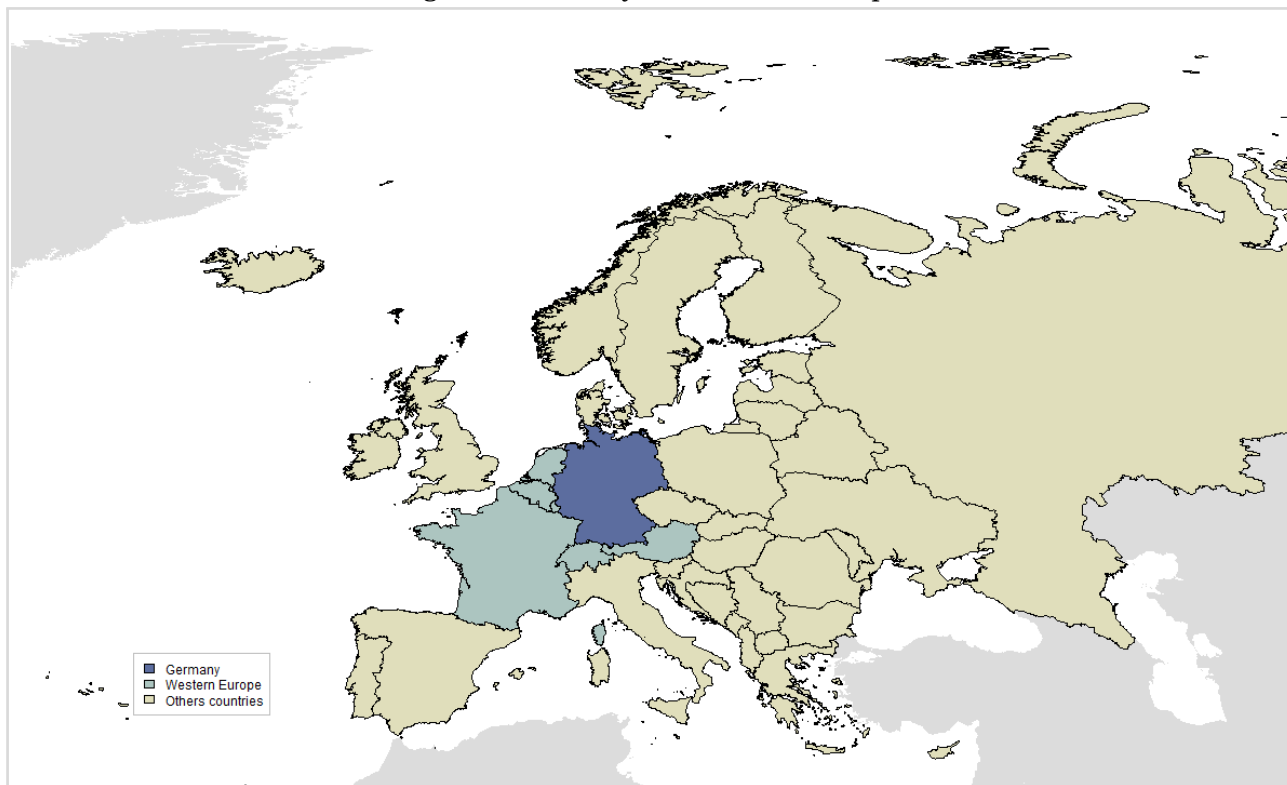
1	Germany and Western Europe	2
2	Population pyramid of Germany for 2017	4
3	Population trends in four selected age groups in Germany	4
4	HPV-related cancer incidence in Germany (estimates for 2012)	6
5	Comparison of cervical cancer incidence to other cancers in women of all ages in Germany (estimates for 2018)	8
6	Comparison of age-specific cervical cancer to age-specific incidence of other cancers among women 15-44 years of age in Germany (estimates for 2018)	9
7	Annual number of cases and age-specific incidence rates of cervical cancer in Germany (estimates for 2018)	10
8	Time trends in cervical cancer incidence in Germany (cancer registry data)	12
9	Age-standardised incidence rates of cervical cancer of Germany (estimates for 2018)	13
10	Annual number of new cases of cervical cancer by age group in Germany (estimates for 2018)	14
11	Comparison of cervical cancer mortality to other cancers in women of all ages in Germany (estimates for 2018)	16
12	Comparison of age-specific mortality rates of cervical cancer to other cancers among women 15-44 years of age in Germany (estimates for 2018)	17
13	Annual number of deaths and age-specific mortality rates of cervical cancer in Germany (estimates for 2018)	18
14	Comparison of age-standardised cervical cancer mortality rates in Germany and countries within the region (estimates for 2018)	19
15	Annual deaths number of cervical cancer by age group in Germany (estimates for 2018)	20
16	Comparison of age-specific cervical cancer incidence and mortality rates in Germany (estimates for 2018)	21
17	Comparison of annual premature deaths and disability from cervical cancer in Germany to other cancers among women (estimates for 2008)	22
18	Time trends in anal cancer incidence in Germany (cancer registry data)	24
19	Time trends in vulvar cancer incidence in Germany (cancer registry data)	25
20	Time trends in vaginal cancer incidence in Germany (cancer registry data)	26
21	Time trends in penile cancer incidence in Germany (cancer registry data)	27
22	Comparison of incidence and mortality rates of the oropharynx by age group and sex in Germany (estimates for 2018). Includes ICD-10 codes: C09-10	29
23	Crude age-specific HPV prevalence (%) and 95% confidence interval in women with normal cervical cytology in Germany	32
24	HPV prevalence among women with normal cervical cytology in Germany, by study	32
25	HPV 16 prevalence among women with normal cervical cytology in Germany, by study	33
26	HPV 16 prevalence among women with low-grade cervical lesions in Germany, by study	33
27	HPV 16 prevalence among women with high-grade cervical lesions in Germany, by study	34
28	HPV 16 prevalence among women with invasive cervical cancer in Germany, by study	34
29	Comparison of the ten most frequent HPV oncogenic types in Germany among women with and without cervical lesions	35
30	Comparison of the ten most frequent HPV oncogenic types in Germany among women with invasive cervical cancer by histology	36
31	Comparison of the ten most frequent HPV types in anal cancer cases in Europe and the World	44
32	Comparison of the ten most frequent HPV types in AIN 2/3 cases in Europe and the World	45
33	Comparison of the ten most frequent HPV types in cases of vulvar cancer in Europe and the World	48
34	Comparison of the ten most frequent HPV types in VIN 2/3 cases in Europe and the World	48
35	Comparison of the ten most frequent HPV types in cases of vaginal cancer in Europe and the World	50
36	Comparison of the ten most frequent HPV types in VaIN 2/3 cases in Europe and the World	50
37	Comparison of the ten most frequent HPV types in cases of penile cancer in Europe and the World	52
38	Comparison of the ten most frequent HPV types in PeIN 2/3 cases in Europe and the World	52
39	Estimated coverage of cervical cancer screening in Germany, by age and study	64
40	Reported HPV vaccination coverage in females by birth cohort in National HPV Immunization programme in Germany	66

List of Tables

1	Key Statistics	iii
2	Sociodemographic indicators in Germany	5
3	Cervical cancer incidence in Germany (estimates for 2018)	7
4	Cervical cancer incidence in Germany by cancer registry	7
5	Age-standardised incidence rates of cervical cancer in Germany by histological type and cancer registry	11
6	Cervical cancer mortality in Germany (estimates for 2018)	15
7	Premature deaths and disability from cervical cancer in Germany, Western Europe and the rest of the world (estimates for 2008)	21
8	Anal cancer incidence in Germany by cancer registry and sex	23
9	Vulvar cancer incidence in Germany by cancer registry	25
10	Vaginal cancer incidence in Germany by cancer registry	26
11	Penile cancer incidence in Germany by cancer registry	27
12	Incidence and mortality of cancer of the oropharynx in Germany, Western Europe and the rest of the world by sex (estimates for 2018). Includes ICD-10 codes: C09-10	28
13	Incidence of oropharyngeal cancer in Germany by cancer registry and sex	30
14	Prevalence of HPV16 and HPV18 by cytology in Germany	33
15	Type-specific HPV prevalence in women with normal cervical cytology, precancerous cervical lesions and invasive cervical cancer in Germany	38
16	Type-specific HPV prevalence among invasive cervical cancer cases in Germany by histology	40
17	Studies on HPV prevalence among HIV women with normal cytology in Germany	41
18	Studies on HPV prevalence among anal cancer cases in Germany (male and female)	43
19	Studies on HPV prevalence among cases of AIN2/3 in Germany	44
20	Studies on HPV prevalence among vulvar cancer cases in Germany	46
21	Studies on HPV prevalence among VIN 2/3 cases in Germany	46
22	Studies on HPV prevalence among vaginal cancer cases in Germany	49
23	Studies on HPV prevalence among VaIN 2/3 cases in Germany	49
24	Studies on HPV prevalence among penile cancer cases in Germany	51
25	Studies on HPV prevalence among PeIN 2/3 cases in Germany	51
26	Studies on HPV prevalence among men in Germany	53
27	Studies on HPV prevalence among men from special subgroups in Germany	53
28	Studies on oral HPV prevalence among healthy in Germany	55
29	Studies on HPV prevalence among cases of oral cavity cancer in Germany	55
30	Studies on HPV prevalence among cases of oropharyngeal cancer in Germany	56
31	Studies on HPV prevalence among cases of hypopharyngeal or laryngeal cancer in Germany	57
32	Factors contributing to cervical carcinogenesis (cofactors) in Germany	59
33	Percentage of 15-year-olds who have had sexual intercourse in Germany	61
34	Median age at first sex in Germany	61
35	Marriage patterns in Germany	61
36	Average number of sexual partners in Germany	62
37	Lifetime prevalence of anal intercourse among women in Germany	62
38	Main characteristics of cervical cancer screening in Germany	63
39	Estimated coverage of cervical cancer screening in Germany	64
40	Estimated coverage of cervical cancer screening in Germany, by region	65
41	National HPV Immunization programme in Germany	66
42	Prevalence of male circumcision in Germany	67
43	Prevalence of condom use in Germany	67
44	General immunization schedule in Germany	68
45	Immunization coverage estimates in Germany	69
46	Glossary	70

1 Introduction

Figure 1: Germany and Western Europe



The HPV Information Centre aims to compile and centralise updated data and statistics on human papillomavirus (HPV) and related cancers. This report aims to summarise the data available to fully evaluate the burden of disease in Germany and to facilitate stakeholders and relevant bodies of decision makers to formulate recommendations on cervical cancer prevention. Data include relevant cancer statistic estimates, epidemiological determinants of cervical cancer such as demographics, socioeconomic factors, risk factors, burden of HPV infection, screening and immunisation. This report is part of the PREHDICT project (health-economic modelling of Prevention strategies for Hpv-related Diseases in European CounTries) granted by the EU Seven Framework Programme. PREHDICT has been projected to provide objective data and supported criteria for future cancer prevention across European countries. Its overall goals are to determine prerequisites and strategies for vaccination in European countries and to predict the impact of vaccination on screening programmes. The report is structured into the following sections: The ICO Information Centre on HPV and Cancer (HPV Information Centre) participates in the PREHDICT project compiling and centralising updated data and statistics on human papillomavirus (HPV) and HPV-related cancers of European countries. The aim is to disseminate the information to all European countries concerned to facilitate stakeholders and relevant bodies of decision makers to formulate recommendations on the prevention of cervical cancer and other HPV-related cancers. This is a DEU report based on data from the European epidemiological database specifically created for this project. Data include relevant cancer statistic estimates, epidemiological determinants of cervical cancer such as demographics, socioeconomic factors, risk factors, burden of HPV infection, screening and immunisation. The report is structured into the following sections:

Section 2, Demographic and socioeconomic factors. This section summarises the sociodemographic profile of Germany, 43 European countries are covered in the PREHDICT project: *EU-27* (Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom), *12 Associated Countries* (Albania, Bosnia

and Herzegovina, Croatia, FYR Macedonia, Iceland, Israel, Liechtenstein, Montenegro, Norway, Serbia (including Kosovo), Switzerland and Turkey) and 4 countries from Eastern Europe (Russia Federation, Belarus, Republic of Moldova and Ukraine) (Figure 1).

Section 3, Burden of HPV related cancers. This section describes the current burden of invasive cervical cancer and other HPV-related cancers in Germany with estimates of prevalence, incidence, and mortality rates. Information in other HPV-related cancers includes other anogenital cancers (anus, vulva, vagina, and penis), head and neck cancers (oral cavity, oropharynx, and hypopharynx) genital warts and recurrent respiratory papillomatosis.

Section 4, HPV related statistics. This section reports on prevalence of HPV and HPV type-specific distribution in Germany, in women with normal cytology, precancerous lesions and invasive cervical cancer. In addition, the burden of HPV in other anogenital cancers (anus, vulva, vagina, and penis), head and neck cancers (oral cavity, oropharynx, and hypopharynx) and men are presented.

Section 5, Factors contributing to cervical cancer. This section describes factors that can modify the natural history of HPV and cervical carcinogenesis such as smoking, parity, oral contraceptive use, and co-infection with HIV.

Section 6, Sexual and reproductive health behaviour indicators. This section presents sexual and reproductive behaviour indicators that may be used as proxy measures of risk for HPV infection and anogenital cancers, such as age at first sexual intercourse, average number of sexual partners, and receptive anal intercourse among others.

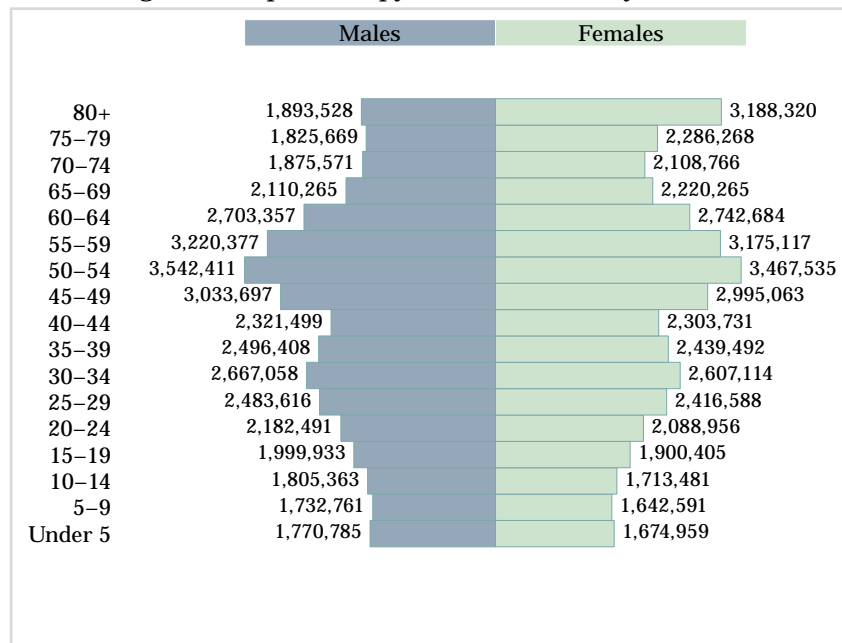
Section 7, HPV preventive strategies. This section presents preventive strategies that include basic characteristics and performance of cervical cancer screening status, status of HPV vaccine licensure introduction, and recommendations in national immunisation programmes.

Section 8, Protective factors for cervical cancer. This section presents male circumcision and the use of condoms.

Section 9, Indicators related to immunisation practices other than HPV vaccines. This section presents data on immunisation coverage and practices for selected vaccines. This information will be relevant for assessing the country's capacity to introduce and implement the new vaccines.

2 Demographic and socioeconomic factors

Figure 2: Population pyramid of Germany for 2017



Data accessed on 27 Mar 2017.

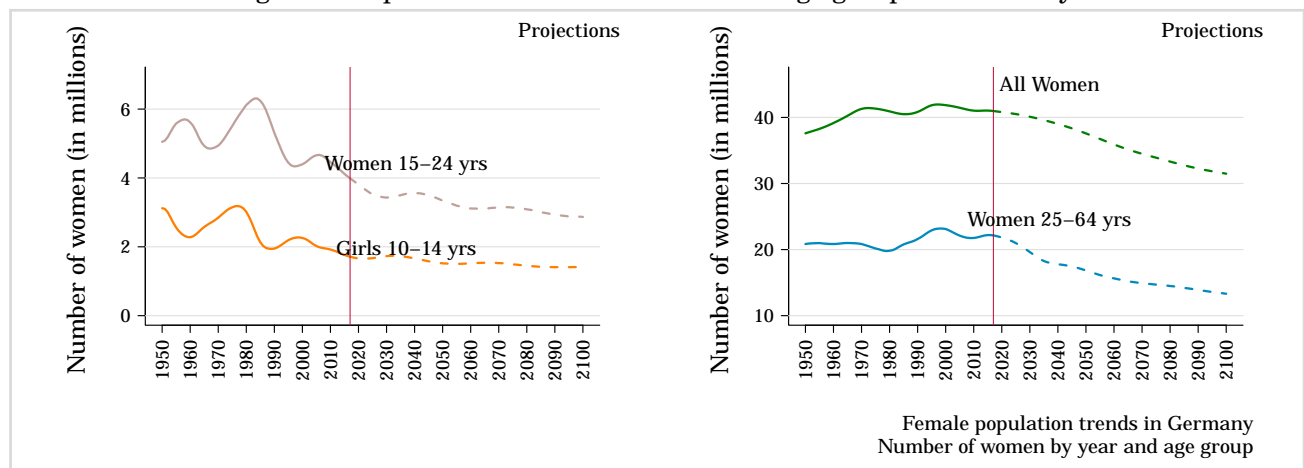
Please refer to original source for methods of estimation.

Year of estimate: 2017;

Data sources:

United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition. Available at: <https://esa.un.org/unpd/wpp/Download/Standard/Population/>. [Accessed on March 21, 2017].

Figure 3: Population trends in four selected age groups in Germany



Data accessed on 27 Mar 2017.

Please refer to original source for methods of estimation.

Year of estimate: 2017;

Data sources:

United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition. Available at: <https://esa.un.org/unpd/wpp/Download/Standard/Population/>. [Accessed on March 21, 2017].

Table 2: Sociodemographic indicators in Germany

Indicator	Male	Female	Total
Population in thousands ^{1,±}	39,664.8	40,971.3	80,636.1
Population growth rate (%) ^{1,∓}	-	-	0.1
Median age of the population (in years) ^{1,*}	-	-	46.2
Population living in urban areas (%) ^{2,*}	-	-	75.3
Crude birth rate (births per 1,000) ^{1,∓}	-	-	8.3
Crude death rate (deaths per 1,000) ^{1,∓}	-	-	10.8
Life expectancy at birth (in years) ^{3,a,b,*}	78.7	83.4	81.0
Adult mortality rate (probability of dying between 15 and 60 years old per 1,000) ^{4,*}	87	47	68
Maternal mortality ratio (per 100,000 live births) ^{3,c,*}	-	-	6
Under age five mortality rate (per 1,000 live births) ^{3,d,*}	-	-	3.7
Density of physicians (per 1,000 population) ^{5,e,*}	-	-	4.125
Gross national income per capita (PPP current international \$) ^{6,f,*}	-	-	49090
Adult literacy rate (%) (aged 15 and older) ⁷	-	-	-
Youth literacy rate (%) (aged 15-24 years) ⁷	-	-	-
Net primary school enrollment ratio ⁷	-	-	98.7 ^{g,*}
Net secondary school enrollment ratio ⁷	-	-	-

Data accessed on 27 Mar 2017.

Please refer to original source for methods of estimation.

^aWorld Population Prospects, the 2015 revision (WPP2015). New York (NY): United Nations DESA, Population Division.^bWHO annual life tables for 1985–2015 based on the WPP2015, on the data held in the WHO Mortality Database and on HIV mortality estimates prepared by UNAIDS. WHO Member States with a population of less than 90 000 in 2015 were not included in the analysis.^cWHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Trends in maternal mortality: 1990 to 2015. Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2015 (<http://www.who.int/reproductivehealth/publications/monitoring/maternal-mortality-2015/en/>, accessed 25 March 2016). WHO Member States with a population of less than 100 000 in 2015 were not included in the analysis.^dLevels & Trends in Child Mortality. Report 2015. Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation. New York (NY), Geneva and Washington (DC): United Nations Children's Fund, World Health Organization, World Bank and United Nations; 2015 (http://www.unicef.org/publications/files/Child_Mortality_Report_2015_Web_9_Sept_15.pdf, accessed 26 March 2016).^eNumber of medical doctors (physicians), including generalist and specialist medical practitioners, per 1 000 population.^fGNI per capita based on purchasing power parity (PPP). PPP GNI is gross national income (GNI) converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GNI as a U.S. dollar has in the United States. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in current international dollars based on the 2011 ICP round.^gUIS Estimation

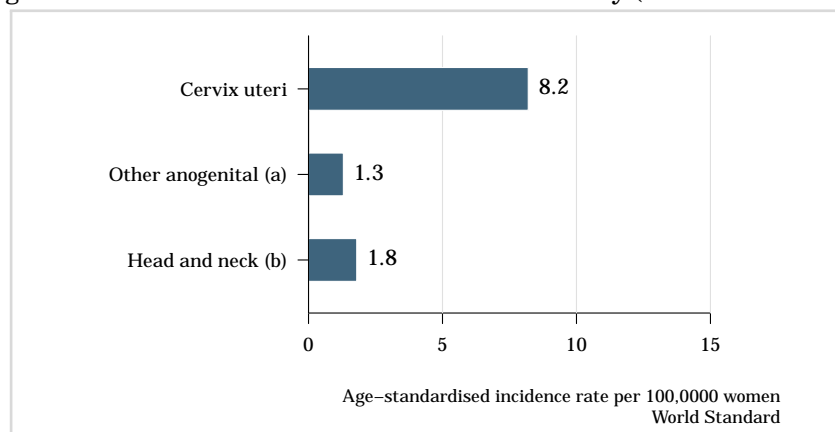
Year of estimate: ± 2017; ∓ 2010-2015; * 2015; * 2014;

Data sources:¹United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition. Available at: <https://esa.un.org/unpd/wpp/Download/Standard/Population/>. [Accessed on March 21, 2017].²United Nations, Department of Economic and Social Affairs, Population Division (2014). World Urbanization Prospects: The 2014 Revision, CD-ROM Edition. Available at: <https://esa.un.org/unpd/wup/CD-ROM/>. [Accessed on March 21, 2017].³World Health Statistics 2016. Geneva, World Health Organization, 2016. Available at: http://who.int/entity/gho/publications/world_health_statistics/2016/en/index.html. [Accessed on March 21, 2017].⁴World Health Organization. Global Health Observatory data repository. Available at: <http://apps.who.int/gho/data/view.main.1360?lang=en>. [Accessed on March 21, 2017].⁵The 2016 update, Global Health Workforce Statistics, World Health Organization, Geneva (<http://www.who.int/hrh/statistics/hwfstats/>). [Accessed on March 21, 2017].⁶World Bank, World Development Indicators Database. Washington, DC. International Comparison Program database. Available at: <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators#>. [Accessed on March 21, 2017].⁷UNESCO Institute for Statistics Data Centre [online database]. Montreal, UNESCO Institute for Statistics. Available at: <http://stats.uis.unesco.org> [Accessed on March 21, 2017].

3 Burden of HPV related cancers

HPV is the cause of almost all cervical cancer cases and is responsible for an important fraction of other anogenital and head and neck cancer. Here, we present the most recent estimations on the burden of HPV-associated cancer.

Figure 4: HPV-related cancer incidence in Germany (estimates for 2012)



Data accessed on 08 May 2017.

^aOther anogenital cancer cases (vulvar, vaginal, anal, and penile).

^bHead and neck cancer cases (oropharynx, oral cavity and larynx).

ASR: Age-standardized rate, rates per 100,000 per year.

Please refer to original source for methods.

GLOBOCAN quality index for availability of incidence data: High quality regional (coverage between 10% and 50%).

GLOBOCAN quality index of methods for calculating incidence: Methods to estimate the sex- and age-specific incidence rates of cancer for a specific country: Rates projected to 2012

Data sources:

de Martel C, Plummer M, Vignat J, Franceschi S. Worldwide burden of cancer attributable to HPV by site, country and HPV type. *Int J Cancer*. 2017

3.1 Cervical cancer

Cancer of the cervix uteri is the 3rd most common cancer among women worldwide, with an estimated 569,847 new cases and 311,365 deaths in 2018 (GLOBOCAN). The majority of cases are squamous cell carcinoma followed by adenocarcinomas. (*Vaccine 2006, Vol. 24, Suppl 3; Vaccine 2008, Vol. 26, Suppl 10; Vaccine 2012, Vol. 30, Suppl 5; IARC Monographs 2007, Vol. 90*)

This section describes the current burden of invasive cervical cancer in Germany and in comparison to geographic region, including estimates of the annual number of new cases, deaths, incidence, and mortality rates.

3.1.1 Cervical cancer incidence in Germany

KEY STATS.

About **4,608 new cervical cancer cases** are diagnosed **annually in Germany** (estimates for 2018).

Cervical cancer **ranks* as the 15th leading cause** of female cancer in **Germany**.

Cervical cancer is the **4th most common** female cancer in **women aged 15 to 44 years in Germany**.

* Ranking of cervical cancer incidence to other cancers among all women according to highest incidence rates (ranking 1st) excluding non-melanoma skin cancer and considering separated colon, rectum and anus. Ranking is based on crude incidence rates (actual number of cervical cancer cases). Ranking using age-standardized rate (ASR) may differ.

Table 3: Cervical cancer incidence in Germany (estimates for 2018)

Indicator	Germany	Western Europe	World
Annual number of new cancer cases	4,608	9,658	569,847
Crude incidence rate ^a	11.0	9.8	15.1
Age-standardized incidence rate ^a	7.5	6.8	13.1
Cumulative risk (%) at 75 years old ^b	0.7	0.7	1.4

Data accessed on 05 Oct 2018.

For more detailed methods of estimation please refer to <http://gco.iarc.fr/today/data-sources-methods>

^aRates per 100,000 women per year.

^bCumulative risk (incidence) is the probability or risk of individuals getting from the disease during ages 0-74 years. For cancer, it is expressed as the % of new born children who would be expected to develop from a particular cancer before the age of 75 if they had the rates of cancer observed in the period in the absence of competing causes.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

Table 4: Cervical cancer incidence in Germany by cancer registry

Cancer registry ¹	Period	N cases ^a	Crude rate ^b	ASR ^b
Bavaria	2008-2012	3,529	11.1	7.3
Bremen	2008-2012	172	10.1	6.7
Hamburg	2008-2012	635	14.0	8.9
Lower Saxony	2008-2012	2,343	11.6	7.7
Munich	2008-2012	1,274	10.9	7.1
North Rhine-Westphalia	2008-2012	4,958	10.9	7.0
Rhineland-Palatinate	2008-2012	1,141	11.2	7.5
Saarland	2008-2012	363	13.9	9.7
Schleswig-Holstein	2008-2012	916	12.7	7.9

Data accessed on 05 Oct 2018.

ASR: Age-standardized rate, Standardized rates have been estimated using the direct method and the World population as the reference;

Please refer to original source (available at <http://ci5.iarc.fr/CI5-XI/Default.aspx>)

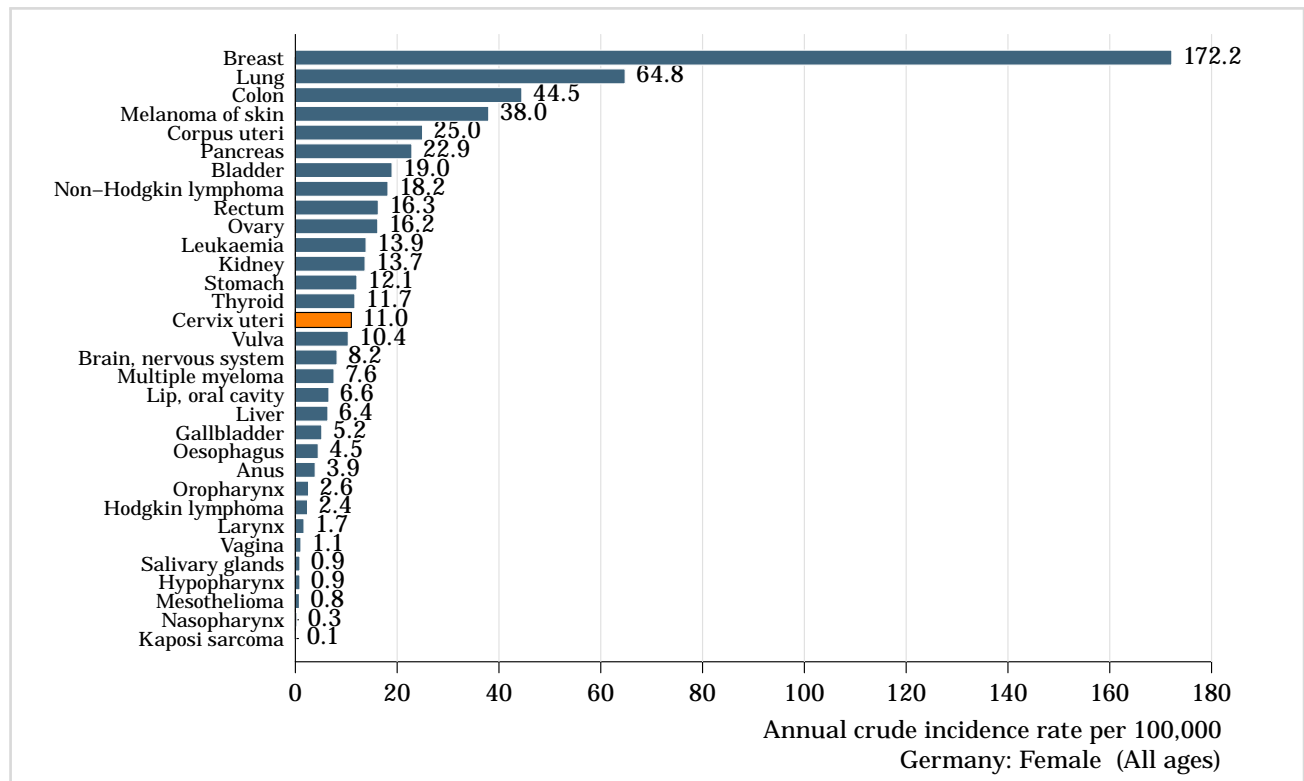
^aAccumulated number of cases during the period in the population covered by the corresponding registry.

^bRates per 100,000 women per year.

Data sources:

¹Bray F, Colombet M, Mery L, Piñeros M, Znaor A, Zanetti R and Ferlay J, editors (2017). Cancer Incidence in Five Continents, Vol. XI (electronic version). Lyon: International Agency for Research on Cancer. Available from: <http://ci5.iarc.fr>, accessed [05 October 2018].

Figure 5: Comparison of cervical cancer incidence to other cancers in women of all ages in Germany (estimates for 2018)



Data accessed on 07 Oct 2018.

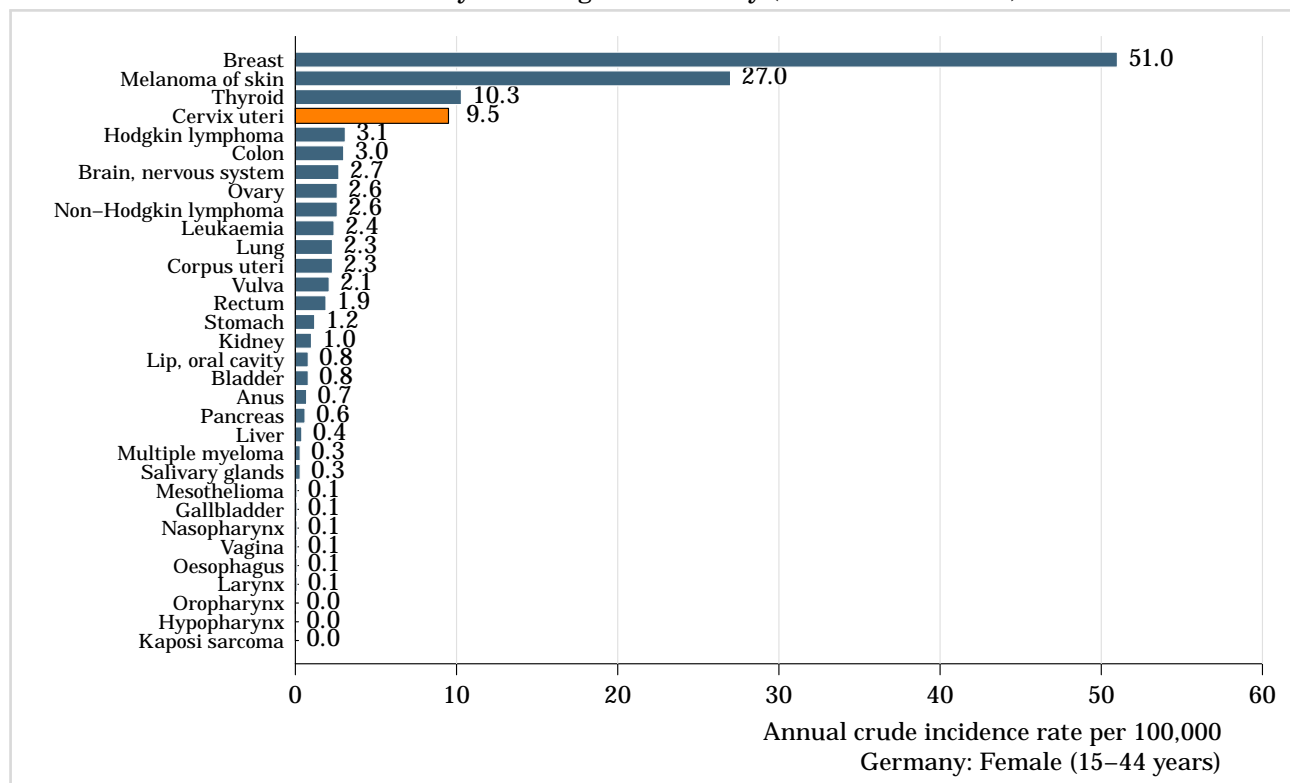
Non-melanoma skin cancer is not included.

Rates per 100,000 women per year.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

Figure 6: Comparison of age-specific cervical cancer to age-specific incidence of other cancers among women 15-44 years of age in Germany (estimates for 2018)



Data accessed on 07 Oct 2018.

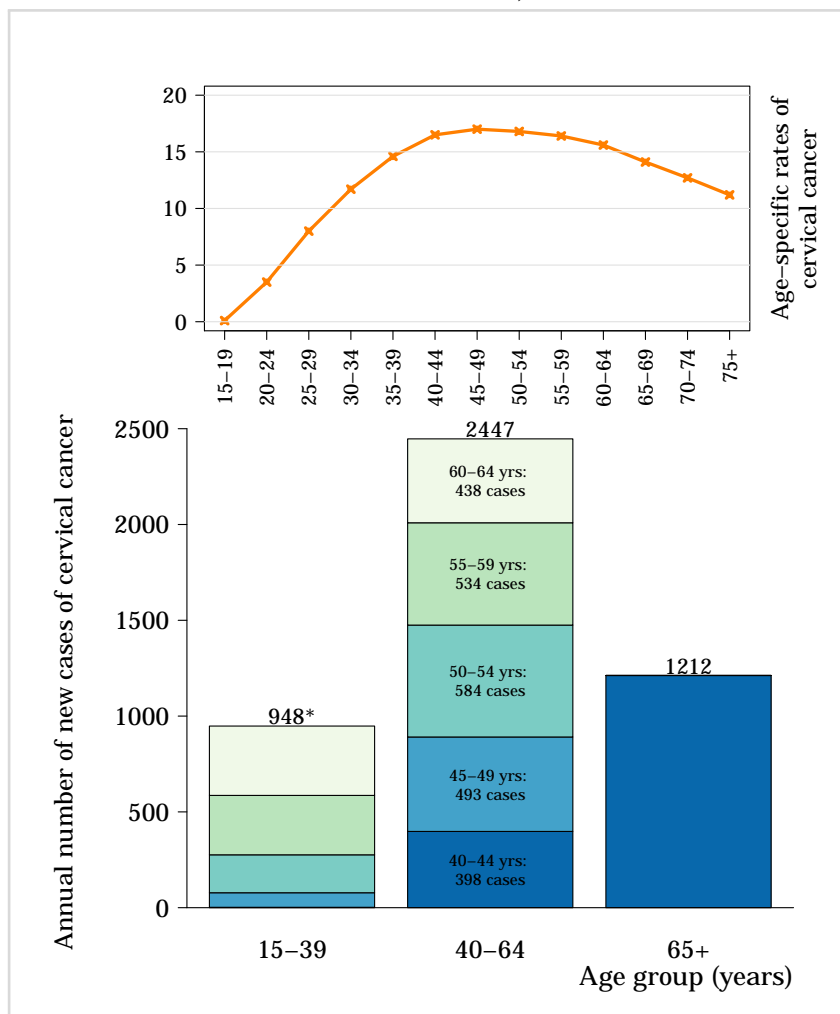
Non-melanoma skin cancer is not included.

Rates per 100,000 women per year.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

Figure 7: Annual number of cases and age-specific incidence rates of cervical cancer in Germany (estimates for 2018)



*15-19 yrs: 2 cases. 20-24 yrs: 76 cases. 25-29 yrs: 198 cases. 30-34 yrs: 310 cases. 35-39 yrs: 362 cases.

Data accessed on 05 Oct 2018.

Rates per 100,000 women per year.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

3.1.2 Cervical cancer incidence by histology in Germany

Table 5: Age-standardised incidence rates of cervical cancer in Germany by histological type and cancer registry

Cancer registry	Period	Carcinoma			
		Squamous	Adeno	Other	Unspec.
Bavaria	2008-2012	5.3	1.2	0.2	0.3
Bremen	2008-2012	5.0	1.2	0.4	0.1
Hamburg	2008-2012	5.5	2.2	0.3	0.2
Lower Saxony	2008-2012	5.2	1.3	0.3	0.1
Munich	2008-2012	5.2	1.2	0.2	0.2
North Rhine-Westphalia	2008-2012	4.7	1.3	0.2	0.2
Rhineland-Palatinate	2008-2012	5.2	1.4	0.3	0.2
Saarland	2008-2012	7.4	1.3	0.5	0.3
Schleswig-Holstein	2008-2012	5.6	1.4	0.3	0.2

Data accessed on 05 Oct 2018.

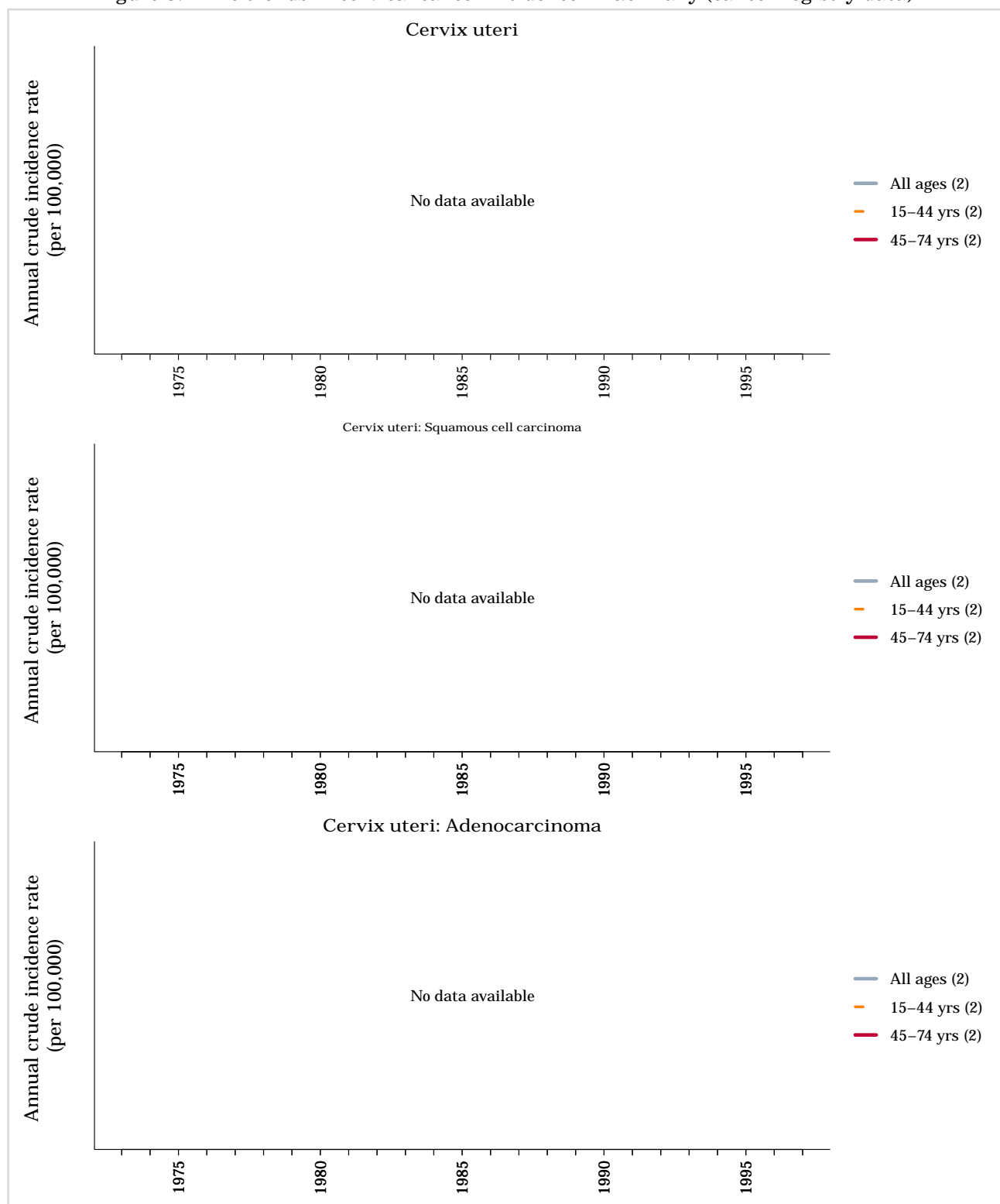
Adeno: adenocarcinoma; Other: Other carcinoma; Squamous: Squamous cell carcinoma; Unspec: Unspecified carcinoma;
Rates per 100,000 women per year.

Standardized rates have been estimated using the direct method and the World population as the references.

Data sources:

¹Bray F, Colombet M, Mery L, Piñeros M, Znaor A, Zanetti R and Ferlay J, editors (2017). Cancer Incidence in Five Continents, Vol. XI (electronic version). Lyon: International Agency for Research on Cancer. Available from: <http://ci5.iarc.fr>, accessed [05 October 2018].

Figure 8: Time trends in cervical cancer incidence in Germany (cancer registry data)



Data accessed on 27 Apr 2015.

^a Estimated annual percentage change based on the trend variable from the net drift for the most recent two 5-year periods.

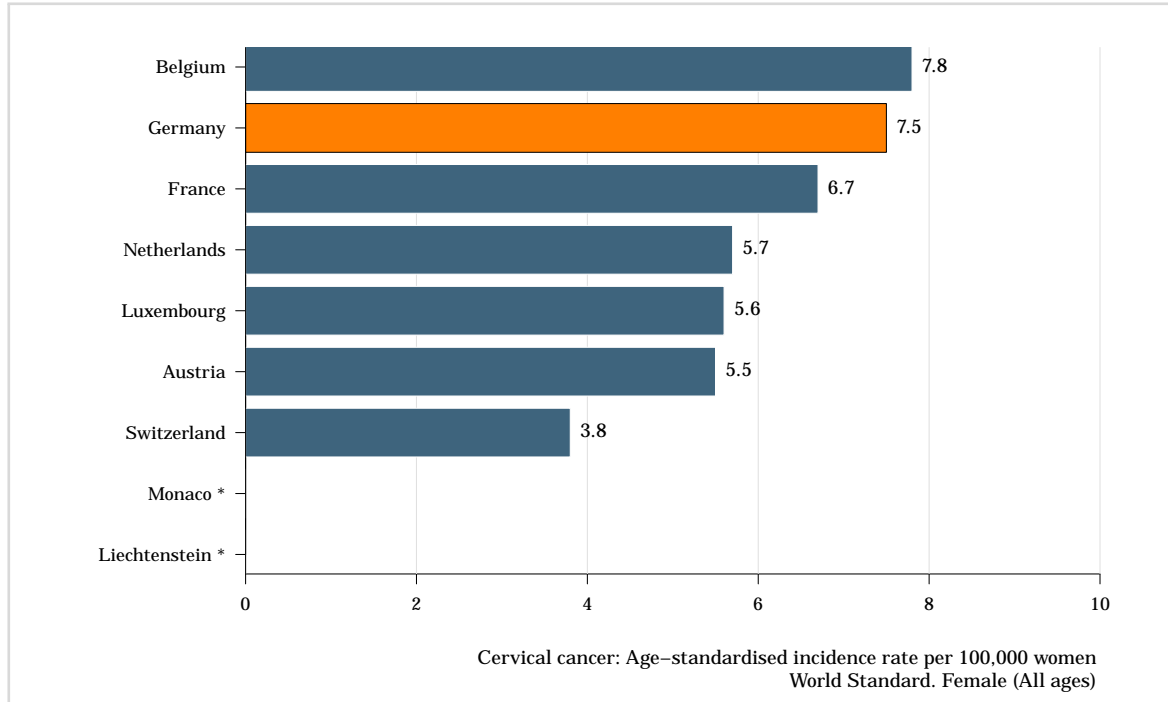
Data sources:

¹ Vaccarella S, Lortet-Tieulent J, Plummer M, Franceschi S, Bray F. Worldwide trends in cervical cancer incidence: Impact of screening against changes in disease risk factors. *eur J Cancer* 2013;49:3262-73.

² Ferlay J, Bray F, Steliarova-Foucher E and Forman D. Cancer Incidence in Five Continents, CI5plus: IARC CancerBase No. 9 [Internet]. Lyon, France: International Agency for Research on Cancer; 2014. Available from: <http://ci5.iarc.fr>

3.1.3 Cervical cancer incidence in Germany across Western Europe

Figure 9: Age-standardised incidence rates of cervical cancer of Germany (estimates for 2018)



* No rates are available.

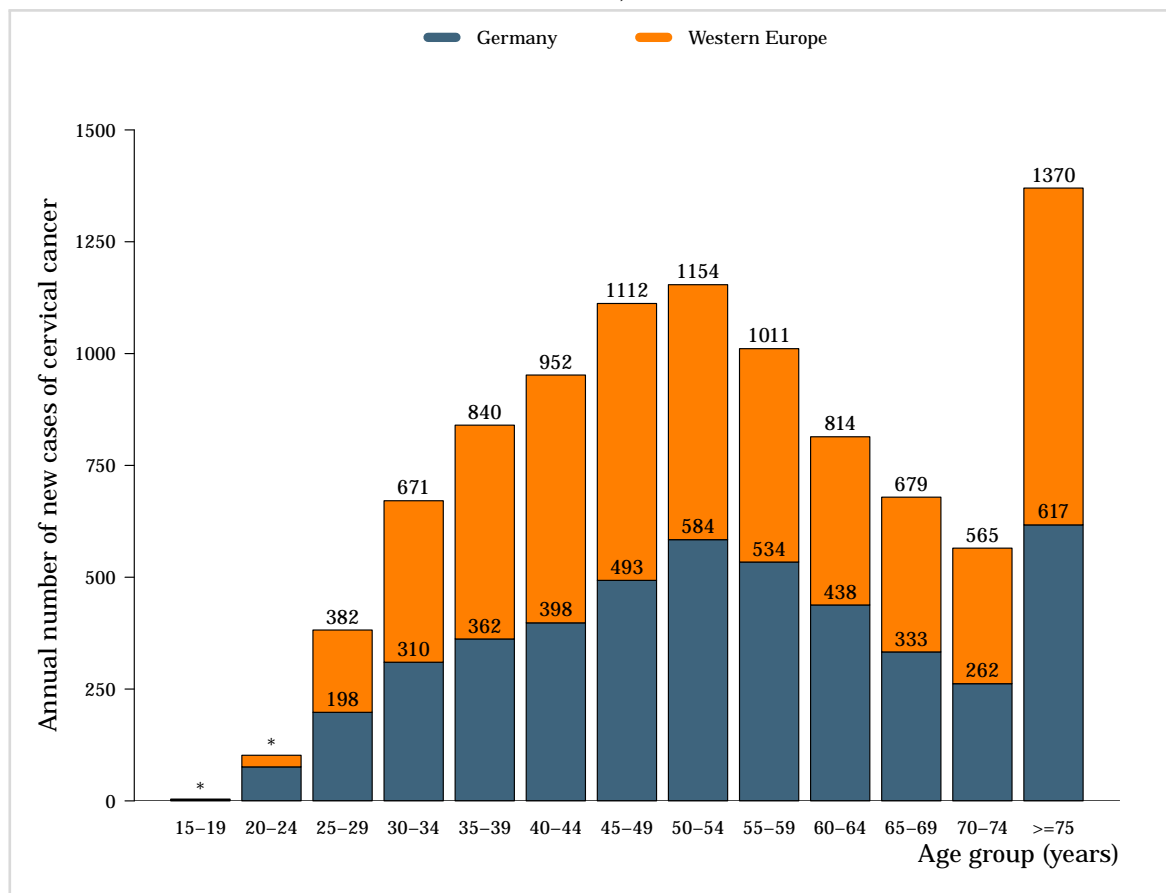
Data accessed on 05 Oct 2018.

Rates per 100,000 women per year.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

Figure 10: Annual number of new cases of cervical cancer by age group in Germany (estimates for 2018)



*2 cases for Germany and 4 cases for Western Europe in the 15-19 age group. 76 cases for Germany and 102 cases for Western Europe in the 20-24 age group.

Data accessed on 05 Oct 2018.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

3.1.4 Cervical cancer mortality in Germany

KEY STATS.

About **2,011 cervical cancer deaths occur annually in Germany** (estimates for 2018).

Cervical cancer **ranks* as the 17th leading cause** of female cancer deaths in **Germany**.

Cervical cancer is the **3rd leading cause of cancer deaths in women aged 15 to 44 years in Germany**.

* Ranking of cervical cancer incidence to other cancers among all women according to highest incidence rates (ranking 1st) excluding non-melanoma skin cancer and considering separated colon, rectum and anus. Ranking is based on crude incidence rates (actual number of cervical cancer cases). Ranking using age-standardized rate (ASR) may differ.

Table 6: Cervical cancer mortality in Germany (estimates for 2018)

Indicator	Germany	Western Europe	World
Annual number of deaths	2,011	4,246	311,365
Crude mortality rate ^a	4.8	4.3	8.2
Age-standardized mortality rate ^a	2.2	2.1	6.9
Cumulative risk (%) at 75 years old ^b	0.2	0.2	0.8

Data accessed on 05 Oct 2018.

For more detailed methods of estimation please refer to <http://gco.iarc.fr/today/data-sources-methods>

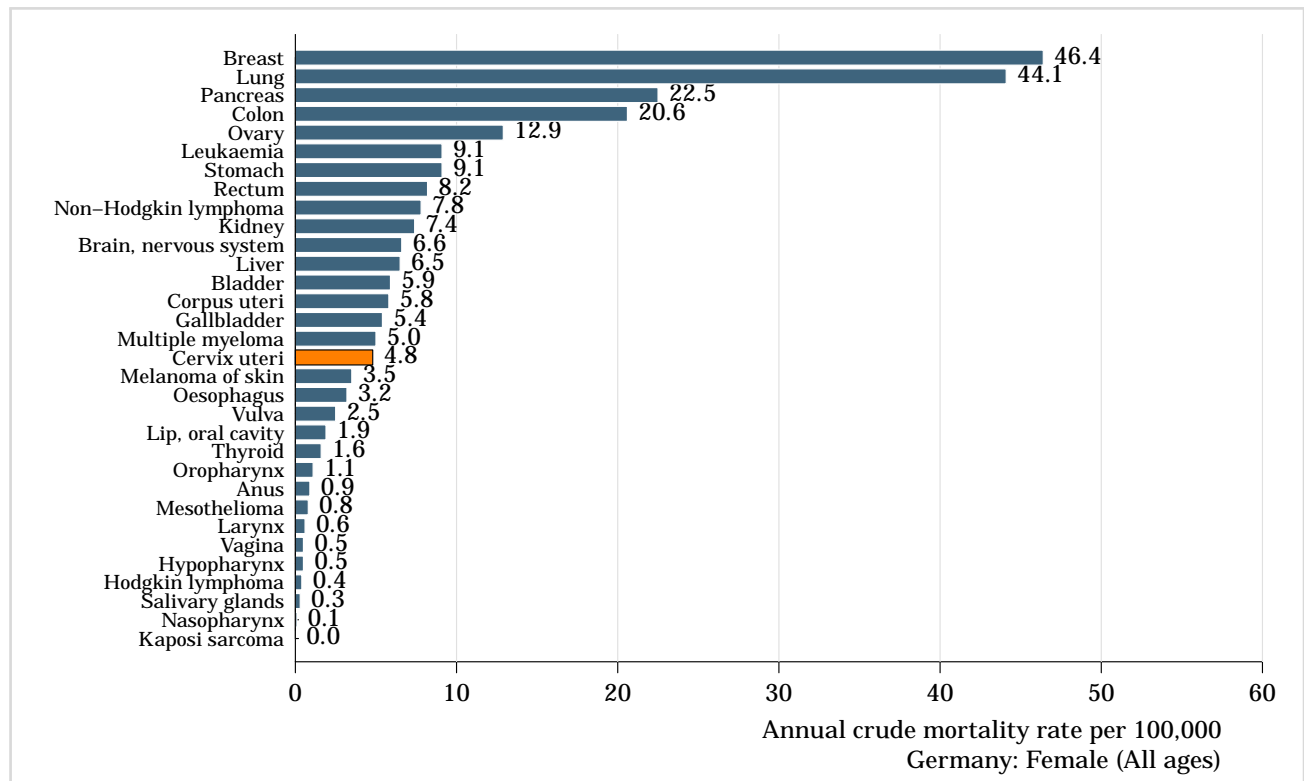
^aRates per 100,000 women per year.

^bCumulative risk (mortality) is the probability or risk of individuals dying from the disease during ages 0-74 years. For cancer, it is expressed as the % of new born children who would be expected to die from a particular cancer before the age of 75 if they had the rates of cancer observed in the period in the absence of competing causes.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

Figure 11: Comparison of cervical cancer mortality to other cancers in women of all ages in Germany (estimates for 2018)



Data accessed on 07 Oct 2018.

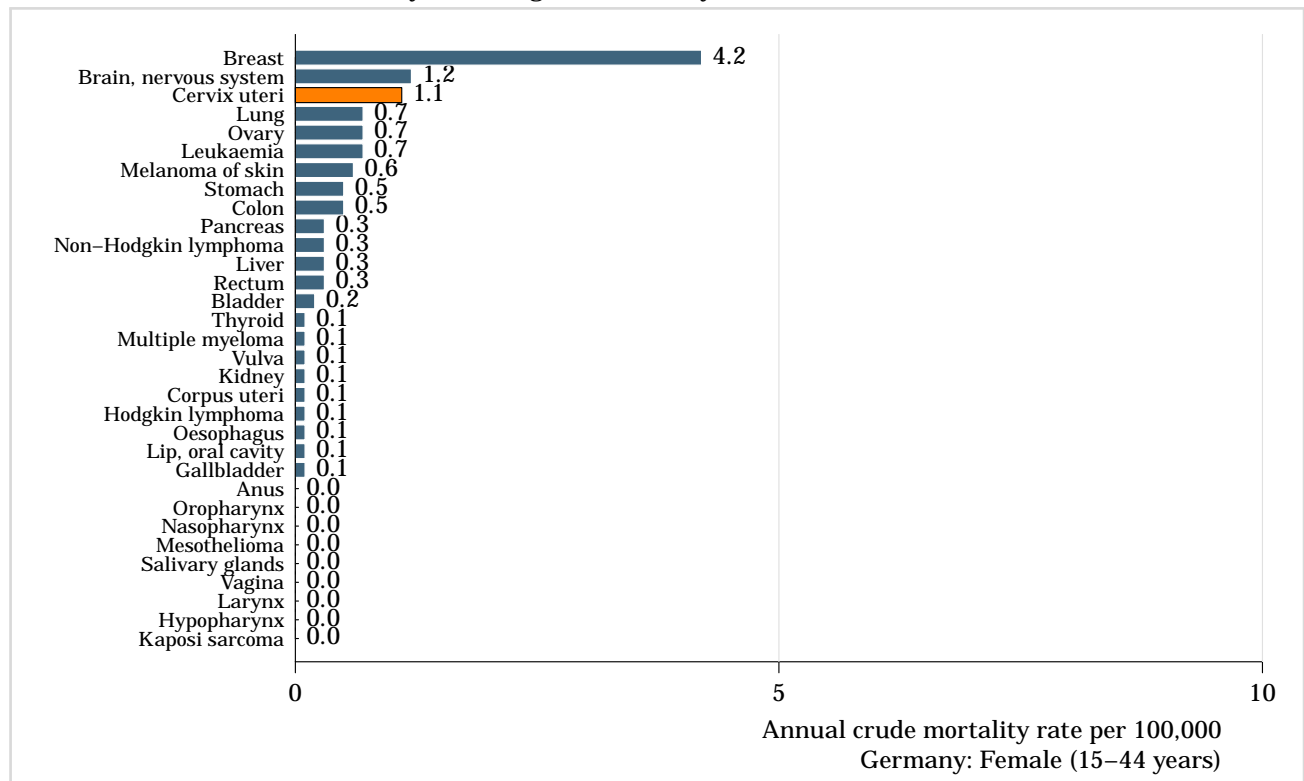
Non-melanoma skin cancer is not included.

^aRates per 100,000 women per year.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

Figure 12: Comparison of age-specific mortality rates of cervical cancer to other cancers among women 15-44 years of age in Germany (estimates for 2018)



Data accessed on 07 Oct 2018.

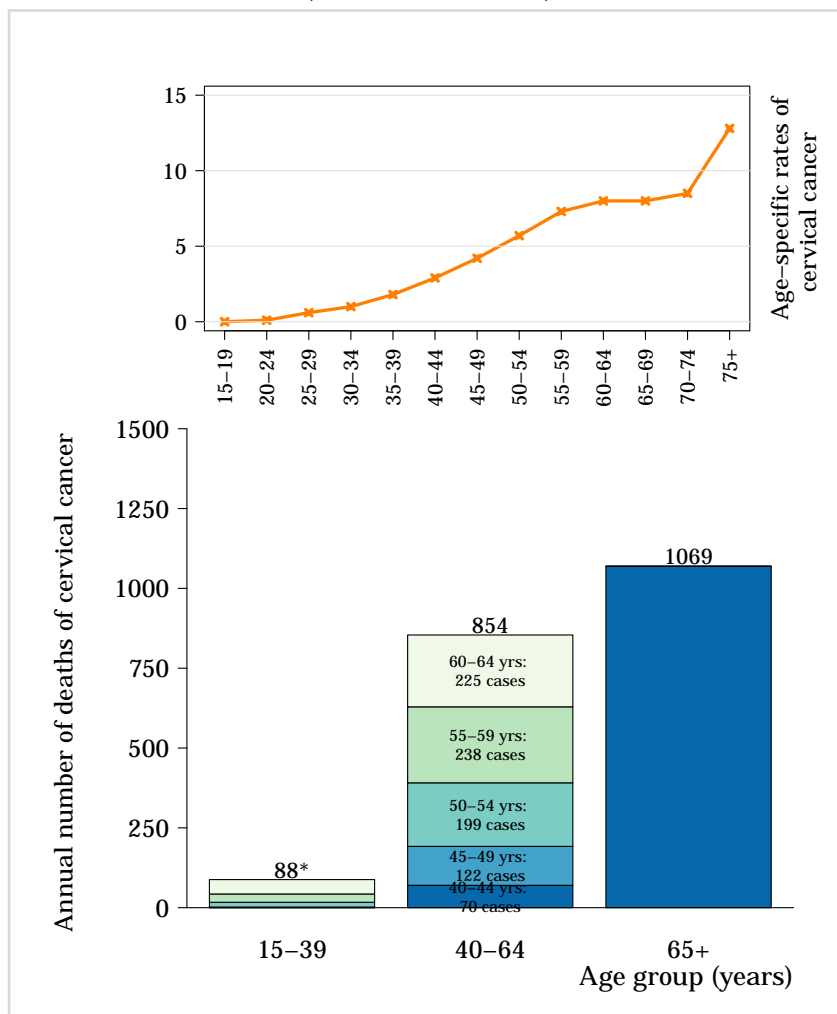
Non-melanoma skin cancer is not included.

^aRates per 100,000 women per year.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

Figure 13: Annual number of deaths and age-specific mortality rates of cervical cancer in Germany (estimates for 2018)



* 15-19 yrs: 0 cases. 20-24 yrs: 2 cases. 25-29 yrs: 15 cases. 30-34 yrs: 26 cases. 35-39 yrs: 45 cases.

Data accessed on 05 Oct 2018.

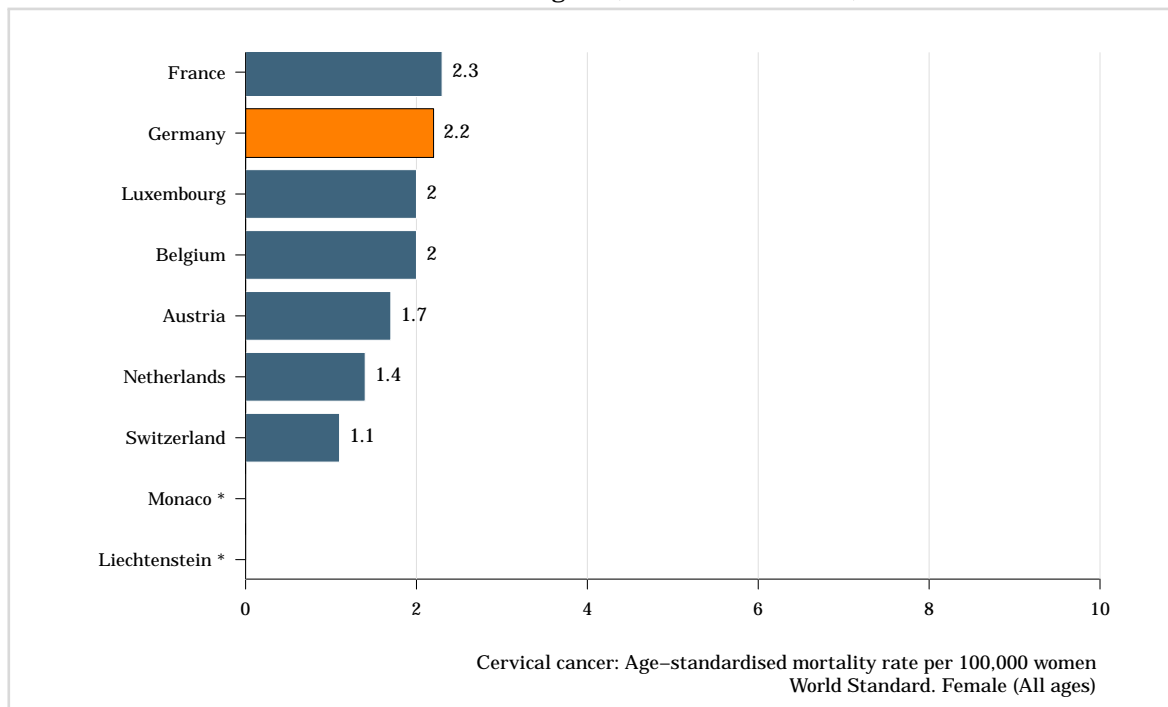
Rates per 100,000 women per year.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

3.1.5 Cervical cancer mortality in Germany across Western Europe

Figure 14: Comparison of age-standardised cervical cancer mortality rates in Germany and countries within the region (estimates for 2018)



* No rates are available.

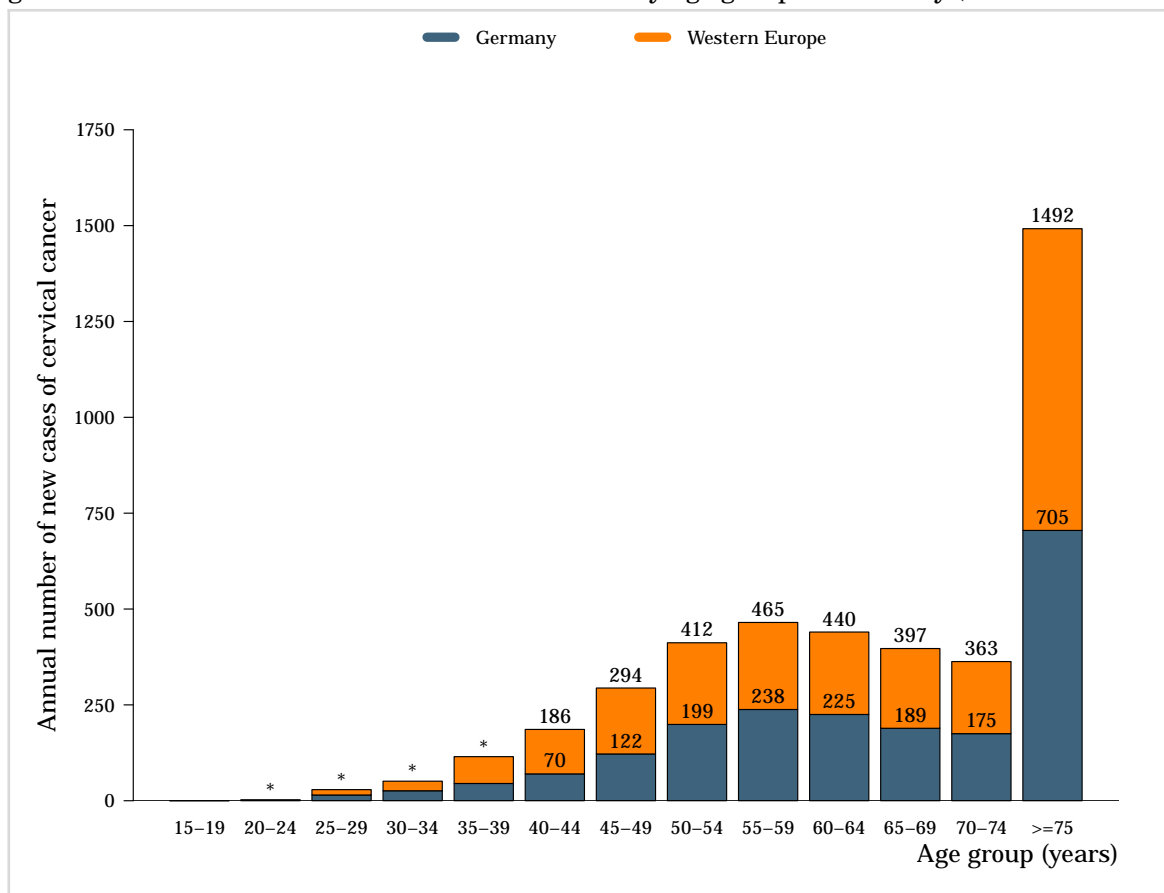
Data accessed on 05 Oct 2018.

Rates per 100,000 women per year.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

Figure 15: Annual deaths number of cervical cancer by age group in Germany (estimates for 2018)



*0 cases for Germany and 0 cases for Western Europe in the 15-19 age group. 2 cases for Germany and 2 cases for Western Europe in the 20-24 age group. 15 cases for Germany and 29 cases for Western Europe in the 25-29 age group. 26 cases for Germany and 51 cases for Western Europe in the 30-34 age group. 45 cases for Germany and 115 cases for Western Europe in the 35-39 age group.

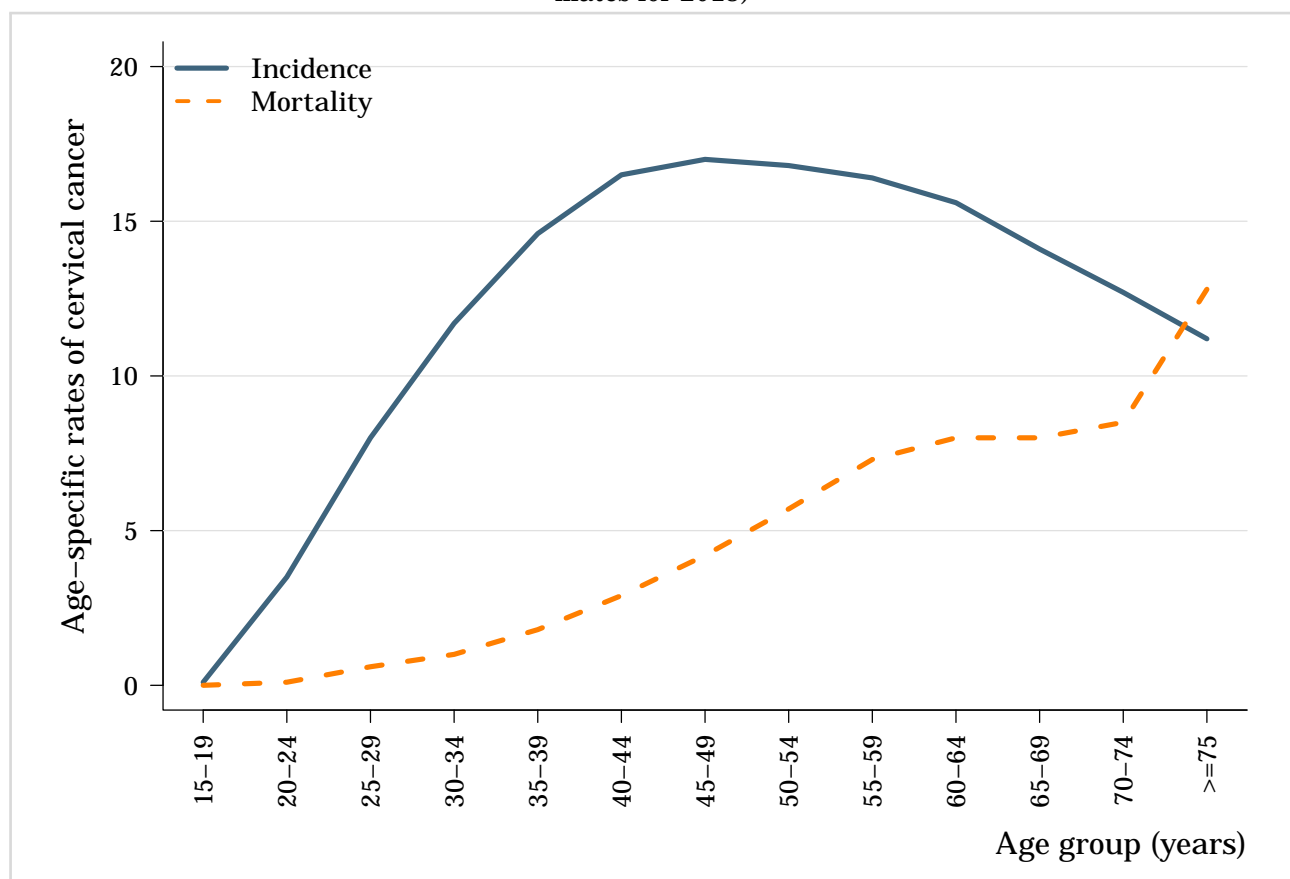
Data accessed on 05 Oct 2018.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

3.1.6 Cervical cancer incidence and mortality comparison, Premature deaths and disability in Germany

Figure 16: Comparison of age-specific cervical cancer incidence and mortality rates in Germany (estimates for 2018)



Data accessed on 05 Oct 2018.

Rates per 100,000 women per year.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

Table 7: Premature deaths and disability from cervical cancer in Germany, Western Europe and the rest of the world (estimates for 2008)

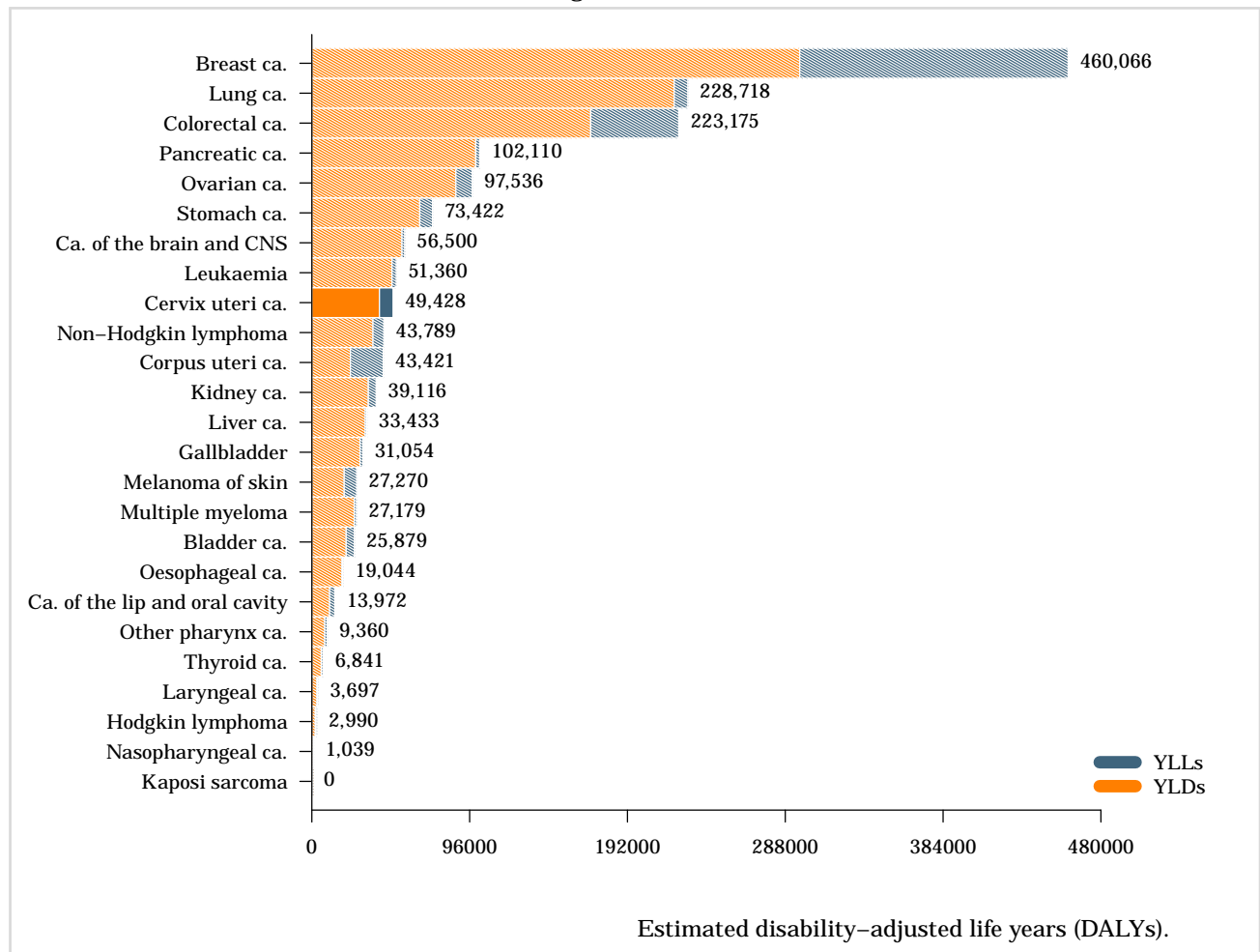
Indicator	Germany		Western Europe		World	
	Number	ASR (W)	Number	ASR (W)	Number	ASR (W)
Estimated disability-adjusted life years (DALYs)	49,428	80	102,518	79	8,738,004	293
Years of life lost (YLLs)	41,135	62	82,237	58	7,788,282	264
Years lived with disability (YLDs)	8,293	18	20,282	20	949,722	28

Data accessed on 04 Nov 2013.

Data sources:

Soerjomataram I, Lortet-Tieulent J, Parkin DM, Ferlay J, Mathers C, Forman D, Bray F. Global burden of cancer in 2008: a systematic analysis of disability-adjusted life-years in 12 world regions. *Lancet*. 2012 Nov 24;380(9856):1840-50.

Figure 17: Comparison of annual premature deaths and disability from cervical cancer in Germany to other cancers among women (estimates for 2008)



Data accessed on 04 Nov 2013.

CNS: Central Nervous System; YLDs: years lived with disability; YLLs: Years of life lost;

Data sources:

Soerjomataram I, Lortet-Tieulent J, Parkin DM, Ferlay J, Mathers C, Forman D, Bray F. Global burden of cancer in 2008: a systematic analysis of disability-adjusted life-years in 12 world regions. *Lancet*. 2012 Nov 24;380(9856):1840-50.

3.2 Anogenital cancers other than the cervix

Data on HPV role in anogenital cancers other than cervix are limited, but there is an increasing body of evidence strongly linking HPV DNA with cancers of anus, vulva, vagina, and penis. Although these cancers are much less frequent compared to cervical cancer, their association with HPV make them potentially preventable and subject to similar preventative strategies as those for cervical cancer. (*Vaccine 2006, Vol. 24, Suppl 3; Vaccine 2008, Vol. 26, Suppl 10; Vaccine 2012, Vol. 30, Suppl 5; IARC Monographs 2007, Vol. 90*).

3.2.1 Anal cancer

Anal cancer is rare in the general population with an average worldwide incidence of 1 per 100,000, but is reported to be increasing in more developed regions. Globally, there are an estimated 27,000 new cases every year (*de Martel C et al. Lancet Oncol 2012;13(6):607-15*). Women have higher incidences of anal cancer than men. Incidence is particularly high among populations of men who have sex with men (MSM), women with history of cervical or vulvar cancer, and immunosuppressed populations, including those who are HIV-infected and patients with a history of organ transplantation. These cancers are predominantly squamous cell carcinoma, adenocarcinomas, or basaloid and cloacogenic carcinomas.

Table 8: Anal cancer incidence in Germany by cancer registry and sex

Cancer registry ¹	Period	MALE			FEMALE		
		N cases ^a	Crude rate ^b	ASR ^b	N cases ^a	Crude rate ^c	ASR ^c
Bavaria	2008-2012	390	1.3	0.7	751	2.4	1.2
Bremen	2008-2012	31	1.9	1.1	66	3.9	2.0
Hamburg	2008-2012	146	3.4	2.1	244	5.4	2.8
Lower Saxony	2008-2012	273	1.4	0.7	501	2.5	1.2
Munich	2008-2012	178	1.6	0.8	345	3.0	1.5
North Rhine-Westphalia	2008-2012	781	1.8	1.0	1,188	2.6	1.3
Rhineland-Palatinate	2008-2012	128	1.3	0.7	231	2.3	1.1
Saarland	2008-2012	43	1.7	1.0	58	2.2	1.2
Schleswig-Holstein	2008-2012	153	2.2	1.2	257	3.6	1.8

Data accessed on 05 Oct 2018.

ASR: Age-standardized rate, Standardized rates have been estimated using the direct method and the World population as the reference;

Please refer to original source (available at <http://ci5.iarc.fr/CI5-XI/Default.aspx>)

^aAccumulated number of cases during the period in the population covered by the corresponding registry.

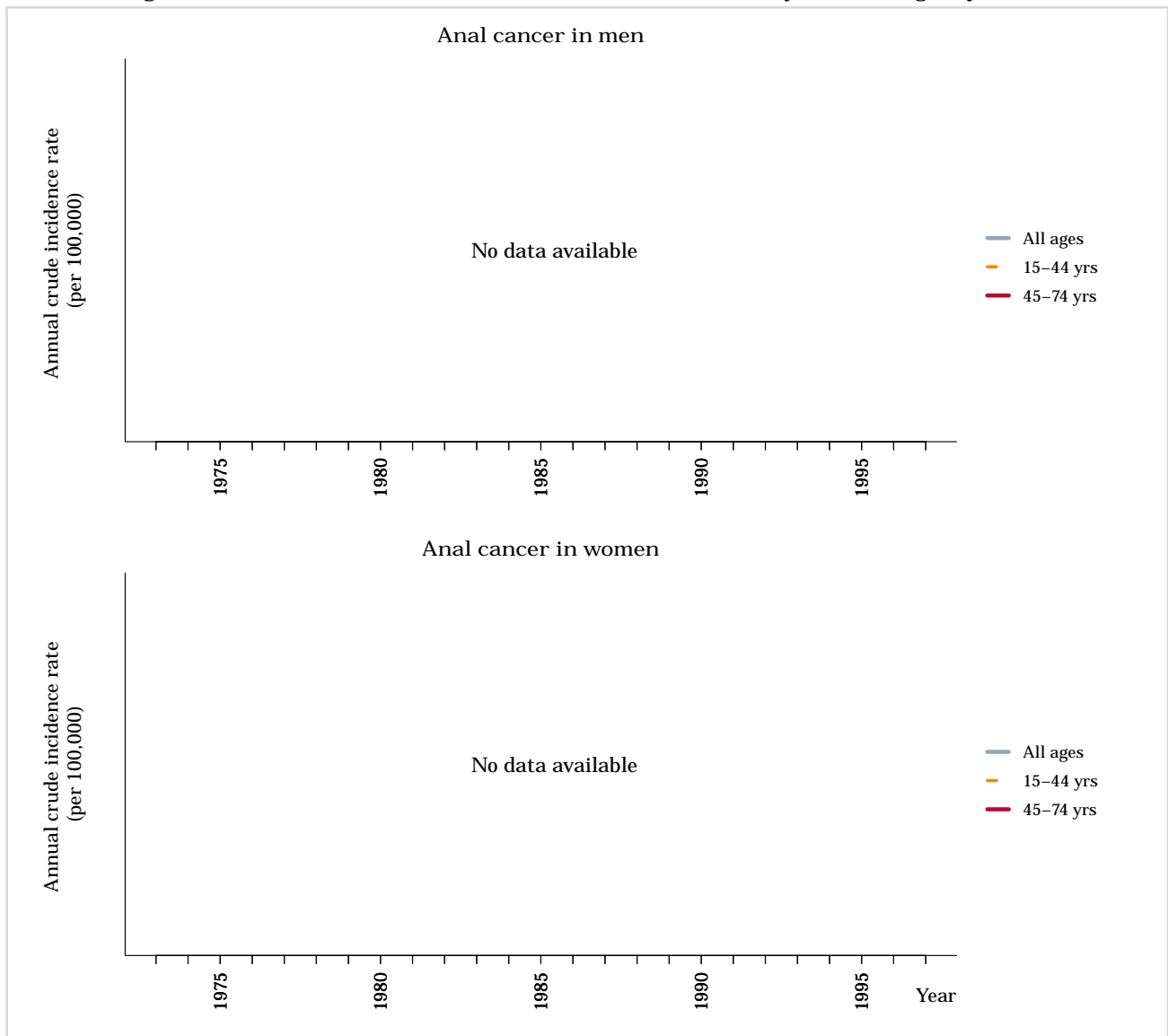
^bRates per 100,000 men per year.

^cRates per 100,000 women per year.

Data sources:

¹Bray F, Colombet M, Mery L, Piñeros M, Znaor A, Zanetti R and Ferlay J, editors (2017). Cancer Incidence in Five Continents, Vol. XI (electronic version). Lyon: International Agency for Research on Cancer. Available from: <http://ci5.iarc.fr>, accessed [05 October 2018].

Figure 18: Time trends in anal cancer incidence in Germany (cancer registry data)



Data accessed on 27 Apr 2015.

Data sources:

Ferlay J, Bray F, Steliarova-Foucher E and Forman D. Cancer Incidence in Five Continents, CI5plus: IARC CancerBase No. 9 [Internet]. Lyon, France: International Agency for Research on Cancer; 2014. Available from: <http://ci5.iarc.fr>

3.2.2 Vulvar cancer

Cancer of the vulva is rare among women worldwide, with an estimated 27,000 new cases in 2008, representing 4% of all gynaecologic cancers (*de Martel C et al. Lancet Oncol 2012;13(6):607-15*). Worldwide, about 60% of all vulvar cancer cases occur in more developed countries. Vulvar cancer has two distinct histological patterns with two different risk factor profiles: (1) basaloid/warty types (2) keratinising types. Basaloid/warty lesions are more common in young women, are very often associated with HPV DNA detection (75-100%), and have a similar risk factor profile as cervical cancer. Keratinising vulvar carcinomas represent the majority of the vulvar lesions (>60%), they occur more often in older women and are more rarely associated with HPV (*IARC Monograph Vol 100B*).

Table 9: Vulvar cancer incidence in Germany by cancer registry

Cancer registry ¹	Period	N cases ^a	Crude rate ^b	ASR ^b
Bavaria	2008-2012	1,750	5.5	2.3
Bremen	2008-2012	135	8.0	3.3
Hamburg	2008-2012	422	9.3	4.3
Lower Saxony	2008-2012	1,460	7.2	3.1
Munich	2008-2012	585	5.0	2.0
North Rhine-Westphalia	2008-2012	4,000	8.8	3.8
Rhineland-Palatinate	2008-2012	722	7.1	2.9
Saarland	2008-2012	320	12.2	5.7
Schleswig-Holstein	2008-2012	766	10.6	4.7

Data accessed on 05 Oct 2018.

ASR: Age-standardized rate, Standardized rates have been estimated using the direct method and the World population as the reference;

Please refer to original source (available at <http://ci5.iarc.fr/CI5-XI/Default.aspx>)

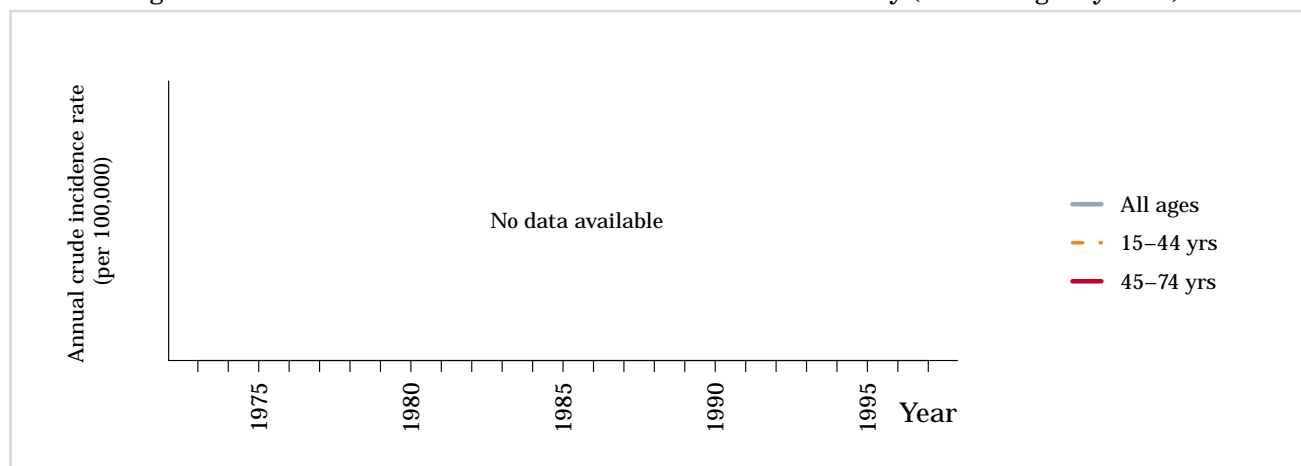
^aAccumulated number of cases during the period in the population covered by the corresponding registry.

^bRates per 100,000 women per year.

Data sources:

¹Bray F, Colombet M, Mery L, Piñeros M, Znaor A, Zanetti R and Ferlay J, editors (2017). Cancer Incidence in Five Continents, Vol. XI (electronic version). Lyon: International Agency for Research on Cancer. Available from: <http://ci5.iarc.fr>, accessed [05 October 2018].

Figure 19: Time trends in vulvar cancer incidence in Germany (cancer registry data)



Data accessed on 27 Apr 2015.

Data sources:

Ferlay J, Bray F, Steliarova-Foucher E and Forman D. Cancer Incidence in Five Continents, CI5plus: IARC CancerBase No. 9 [Internet]. Lyon, France: International Agency for Research on Cancer; 2014. Available from: <http://ci5.iarc.fr>

3.2.3 Vaginal cancer

Cancer of the vagina is a rare cancer, with an estimated 13,000 new cases in 2008, representing 2% of all gynaecologic cancers (*de Martel C et al. Lancet Oncol 2012;13(6):607-15*). Similar to cervical cancer, the majority of vaginal cancer cases (68%) occur in less developed countries. Most vaginal cancers are squamous cell carcinoma (90%) generally attributable to HPV, followed by clear cell adenocarcinomas and melanoma. Vaginal cancers are primarily reported in developed countries. Metastatic cervical cancer can be misclassified as cancer of the vagina. Invasive vaginal cancer is diagnosed primarily in old women (≥ 65 years) and the diagnosis is rare in women under 45 years whereas the peak incidence of carcinoma in situ is observed between ages 55 and 70 (*Vaccine 2008, Vol. 26, Suppl 10*).

Table 10: Vaginal cancer incidence in Germany by cancer registry

Cancer registry ¹	Period	N cases ^a	Crude rate ^b	ASR ^b
Bavaria	2008-2012	279	0.9	0.4
Bremen	2008-2012	18	1.1	0.4
Hamburg	2008-2012	85	1.9	0.8
Lower Saxony	2008-2012	237	1.2	0.5
Munich	2008-2012	104	0.9	0.4
North Rhine-Westphalia	2008-2012	486	1.1	0.4
Rhineland-Palatinate	2008-2012	107	1.0	0.4
Saarland	2008-2012	35	1.3	0.5
Schleswig-Holstein	2008-2012	72	1.0	0.4

Data accessed on 05 Oct 2018.

ASR: Age-standardized rate, Standardized rates have been estimated using the direct method and the World population as the reference;

Please refer to original source (available at <http://ci5.iarc.fr/CI5-XI/Default.aspx>)

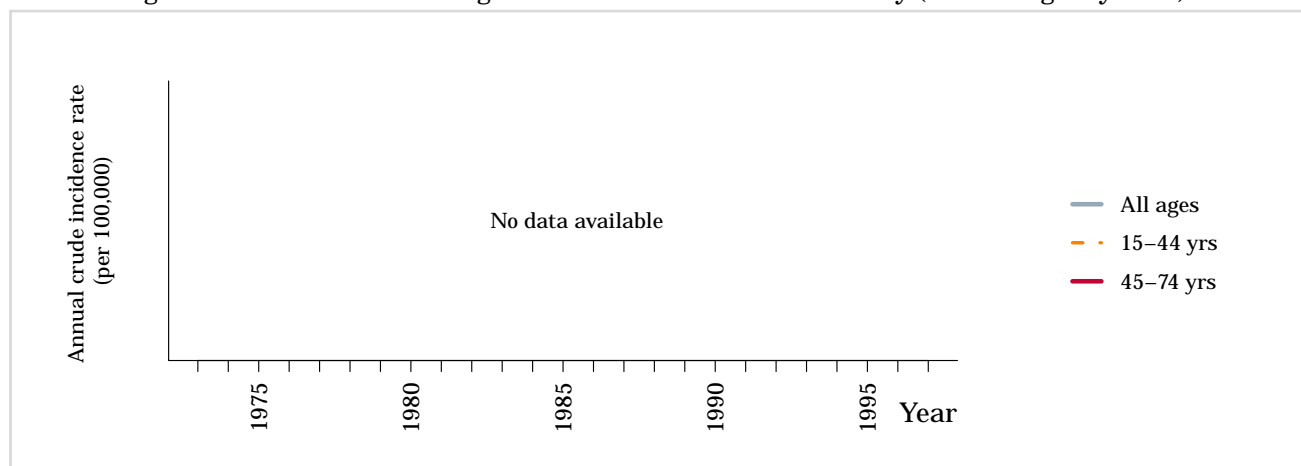
^aAccumulated number of cases during the period in the population covered by the corresponding registry.

^bRates per 100,000 women per year.

Data sources:

¹Bray F, Colombet M, Mery L, Piñeros M, Znaor A, Zanetti R and Ferlay J, editors (2017). Cancer Incidence in Five Continents, Vol. XI (electronic version). Lyon: International Agency for Research on Cancer. Available from: <http://ci5.iarc.fr>, accessed [05 October 2018].

Figure 20: Time trends in vaginal cancer incidence in Germany (cancer registry data)



Data accessed on 27 Apr 2015.

Data sources:

Ferlay J, Bray F, Steliarova-Foucher E and Forman D. Cancer Incidence in Five Continents, CI5plus: IARC CancerBase No. 9 [Internet]. Lyon, France: International Agency for Research on Cancer; 2014. Available from: <http://ci5.iarc.fr>

3.2.4 Penile cancer

The annual burden of penile cancer has been estimated to be 22,000 cases worldwide with incidence rates strongly correlating with those of cervical cancer (*de Martel C et al. Lancet Oncol 2012;13(6):607-15*). Penile cancer is rare and most commonly affects men aged 50-70 years. Incidence rates are higher in less developed countries than in more developed countries, accounting for up to 10% of male cancers in some parts of Africa, South America and Asia. Precursor cancerous penile lesions (PeIN) are rare.

Cancers of the penis are primarily of squamous cell carcinomas (SCC) (95%) and the most common penile SCC histologic sub-types are keratinising (49%), mixed warty-basaloid (17%), verrucous (8%) warty (6%), and basaloid (4%). HPV is most commonly detected in basaloid and warty tumours but is less common in keratinising and verrucous tumours. Approximately 60-100% of PeIN lesions are HPV DNA positive.

Table 11: Penile cancer incidence in Germany by cancer registry

Cancer registry	Period	N cases ^a	Crude rate ^b	ASR ^b
Bavaria	2008-2012	446	1.5	0.7
Bremen	2008-2012	45	2.8	1.4
Hamburg	2008-2012	77	1.8	1.0
Lower Saxony	2008-2012	412	2.1	1.0
Munich	2008-2012	157	1.4	0.7
North Rhine-Westphalia	2008-2012	806	1.9	0.9
Rhineland-Palatinate	2008-2012	184	1.9	0.9
Saarland	2008-2012	45	1.8	0.9
Schleswig-Holstein	2008-2012	142	2.1	1.0

Data accessed on 05 Oct 2018.

ASR: Age-standardized rate, Standardized rates have been estimated using the direct method and the World population as the reference;

Please refer to original source (available at <http://ci5.iarc.fr/CI5-XI/Default.aspx>)

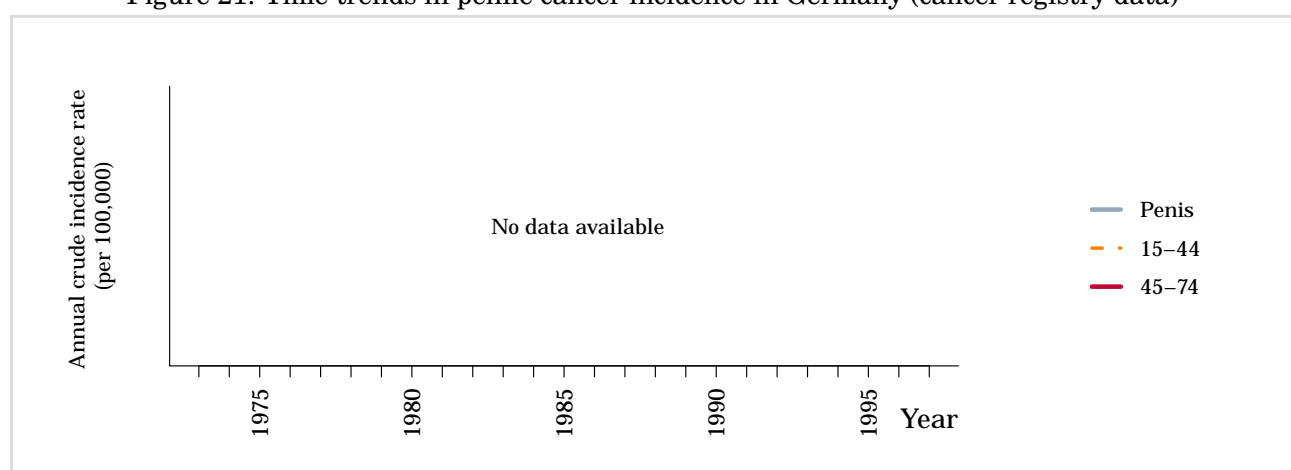
^aAccumulated number of cases during the period in the population covered by the corresponding registry.

^bRates per 100,000 men per year.

Data sources:

¹Bray F, Colombet M, Mery L, Piñeros M, Znaor A, Zanetti R and Ferlay J, editors (2017). Cancer Incidence in Five Continents, Vol. XI (electronic version). Lyon: International Agency for Research on Cancer. Available from: <http://ci5.iarc.fr>, accessed [05 October 2018].

Figure 21: Time trends in penile cancer incidence in Germany (cancer registry data)



Data accessed on 27 Apr 2015.

Data sources:

Ferlay J, Bray F, Steliarova-Foucher E and Forman D. Cancer Incidence in Five Continents, CI5plus: IARC CancerBase No. 9 [Internet]. Lyon, France: International Agency for Research on Cancer; 2014. Available from: <http://ci5.iarc.fr>

3.3 Head and neck cancers

The majority of head and neck cancers are associated with high tobacco and alcohol consumption. However, increasing trends in the incidence at specific sites suggest that other aetiological factors are involved, and infection by certain high-risk types of HPV (i.e. HPV16) have been reported to be associated with head and neck cancers, in particular with oropharyngeal cancer. Current evidence suggests that HPV16 is associated with tonsil cancer (including Waldeyer ring cancer), base of tongue cancer and other oropharyngeal cancer sites. Associations with other head and neck cancer sites such as oral cancer are neither strong nor consistent when compared to molecular-epidemiological data on HPV and oropharyngeal cancer. Association with laryngeal cancer is still unclear (*IARC Monograph Vol 100B*).

3.3.1 Oropharyngeal cancer

Table 12: Incidence and mortality of cancer of the oropharynx in Germany, Western Europe and the rest of the world by sex (estimates for 2018). Includes ICD-10 codes: C09-10

Indicator	MALE			FEMALE		
	Germany	Western Europe	World	Germany	Western Europe	World
INCIDENCE						
Annual number of new cancer cases	2,367	6,891	74,472	1,088	2,929	18,415
Crude incidence rate ^a	5.8	7.2	1.9	2.6	3.0	0.5
Age-standardized incidence rate ^a	2.9	4.0	1.8	1.2	1.6	0.4
Cumulative risk (%) at 75 years old ^b	0.4	0.5	0.2	0.2	0.2	0
MORTALITY						
Annual number of deaths	1,713	3,173	42,116	461	919	8,889
Crude mortality rate ^a	4.2	3.3	1.1	1.1	0.9	0.2
Age-standardized mortality rate ^a	2.1	1.7	1.0	0.5	0.4	0.2
Cumulative risk (%) at 75 years old ^c	0.3	0.2	0.1	0.1	0.1	0

Data accessed on 05 Oct 2018.

For more detailed methods of estimation please refer to <http://gco.iarc.fr/today/data-sources-methods>

^a Male: Rates per 100,000 men per year. Female: Rates per 100,000 women per year.

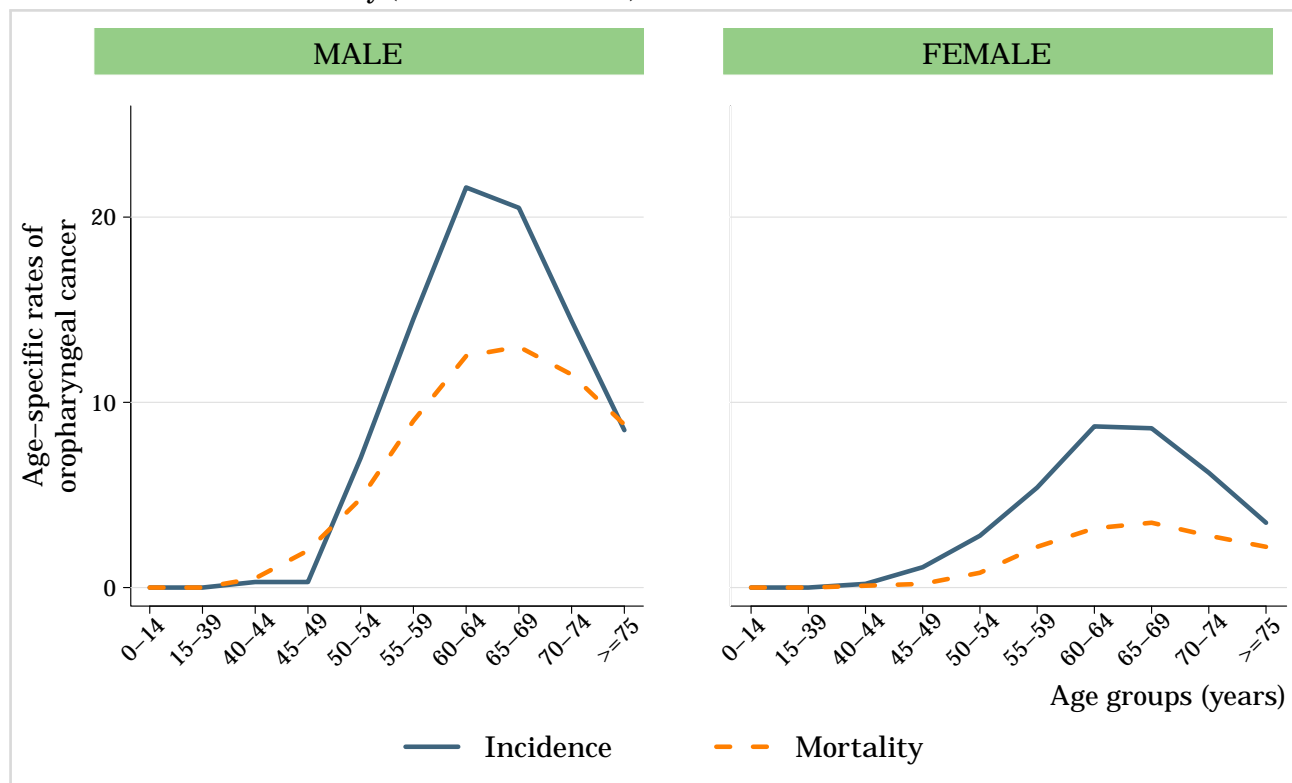
^b Cumulative risk (incidence) is the probability or risk of individuals getting from the disease during ages 0-74 years. For cancer, it is expressed as the % of new born children who would be expected to develop from a particular cancer before the age of 75 if they had the rates of cancer observed in the period in the absence of competing causes.

^c Cumulative risk (mortality) is the probability or risk of individuals dying from the disease during ages 0-74 years. For cancer, it is expressed as the % of new born children who would be expected to die from a particular cancer before the age of 75 if they had the rates of cancer observed in the period in the absence of competing causes.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

Figure 22: Comparison of incidence and mortality rates of the oropharynx by age group and sex in Germany (estimates for 2018). Includes ICD-10 codes: C09-10



Data accessed on 05 Oct 2018.

Male: Rates per 100,000 men per year. Female: Rates per 100,000 women per year.

Data sources:

Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F (2018). Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: <https://gco.iarc.fr/today>, accessed [05 October 2018].

Table 13: Incidence of oropharyngeal cancer in Germany by cancer registry and sex

Cancer registry ^{1,α}	Period ^α	MALE			FEMALE		
		N cases ^α	Crude rate ^b	ASR ^α	N cases ^α	Crude rate ^b	ASR ^b
Tongue (ICD-10 code: C01-02)							
Bavaria	2008-2012	1,351	4.4	2.6	607	1.9	1.0
Bremen	2008-2012	89	5.5	3.1	44	2.6	1.3
Hamburg	2008-2012	217	5.0	3.1	118	2.6	1.5
Lower Saxony	2008-2012	847	4.3	2.4	357	1.8	0.9
Munich	2008-2012	539	4.8	2.9	246	2.1	1.2
North Rhine-Westphalia	2008-2012	2,001	4.6	2.6	956	2.1	1.1
Rhineland-Palatinate	2008-2012	461	4.7	2.6	192	1.9	0.9
Saarland	2008-2012	118	4.8	2.7	59	2.3	1.1
Schleswig-Holstein	2008-2012	324	4.7	2.6	149	2.1	1.0
Tonsillar cancer (ICD-10 code: C09)							
Bavaria	2008-2012	1,023	3.3	2.0	345	1.1	0.6
Bremen	2008-2012	68	4.2	2.5	28	1.7	0.8
Hamburg	2008-2012	110	2.5	1.6	45	1.0	0.5
Lower Saxony	2008-2012	545	2.8	1.6	187	0.9	0.5
Munich	2008-2012	386	3.4	2.1	142	1.2	0.7
North Rhine-Westphalia	2008-2012	1,011	2.3	1.3	399	0.9	0.5
Rhineland-Palatinate	2008-2012	258	2.6	1.5	109	1.1	0.6
Saarland	2008-2012	75	3.0	1.8	24	0.9	0.5
Schleswig-Holstein	2008-2012	310	4.5	2.4	135	1.9	1.0
Cancer of the oropharynx (excludes tonsil) (ICD-10 code: C10)							
Bavaria	2008-2012	711	2.3	1.4	174	0.5	0.3
Bremen	2008-2012	30	1.9	1.0	9	0.5	0.2
Hamburg	2008-2012	193	4.5	2.8	83	1.8	1.1
Lower Saxony	2008-2012	471	2.4	1.4	114	0.6	0.3
Munich	2008-2012	168	1.5	0.9	50	0.4	0.2
North Rhine-Westphalia	2008-2012	1,163	2.7	1.6	371	0.8	0.4
Rhineland-Palatinate	2008-2012	252	2.6	1.4	86	0.8	0.5
Saarland	2008-2012	97	3.9	2.1	35	1.3	0.8
Schleswig-Holstein	2008-2012	169	2.5	1.4	84	1.2	0.6

Data accessed on 15 Oct 2018.

ASR: Age-standardised rate. Standardised rates have been estimated using the direct method and the World population as the reference.

^αAccumulated number of cases during the period in the population covered by the corresponding registry.

^bMale: Rates per 100,000 men per year. Female: Rates per 100,000 women per year.

^αPlease refer to original source (available at <http://ci5.iarc.fr/C15-XI/Default.aspx>)

Data sources:

¹Bray F, Colombet M, Mery L, Piñeros M, Znaor A, Zanetti R and Ferlay J, editors (2017). Cancer Incidence in Five Continents, Vol. XI (electronic version). Lyon: International Agency for Research on Cancer. Available from: <http://ci5.iarc.fr>, accessed [05 October 2018].

4 HPV related statistics

HPV infection is commonly found in the anogenital tract of men and women with and without clinical lesions. The aetiological role of HPV infection among women with cervical cancer is well-established, and there is growing evidence of its central role in other anogenital sites. HPV is also responsible for other diseases such as recurrent juvenile respiratory papillomatosis and genital warts, both mainly caused by HPV types 6 and 11 (*Lacey CJ, Vaccine 2006; 24(S3):35*). For this section, the methodologies used to compile the information on HPV burden are derived from systematic reviews and meta-analyses of the literature. Due to the limitations of HPV DNA detection methods and study designs used, these data should be interpreted with caution and used only as a guide to assess the burden of HPV infection within the population. (*Vaccine 2006, Vol. 24, Suppl 3; Vaccine 2008, Vol. 26, Suppl 10; Vaccine 2012, Vol. 30, Suppl 5; IARC Monographs 2007, Vol. 90*).

4.1 HPV burden in women with normal cervical cytology, cervical precancerous lesions or invasive cervical cancer

The statistics shown in this section focus on HPV infection in the cervix uteri. HPV cervical infection results in cervical morphological lesions ranging from normalcy (cytologically normal women) to different stages of precancerous lesions (CIN-1, CIN-2, CIN-3/CIS) and invasive cervical cancer. HPV infection is measured by HPV DNA detection in cervical cells (fresh tissue, paraffin embedded or exfoliated cells).

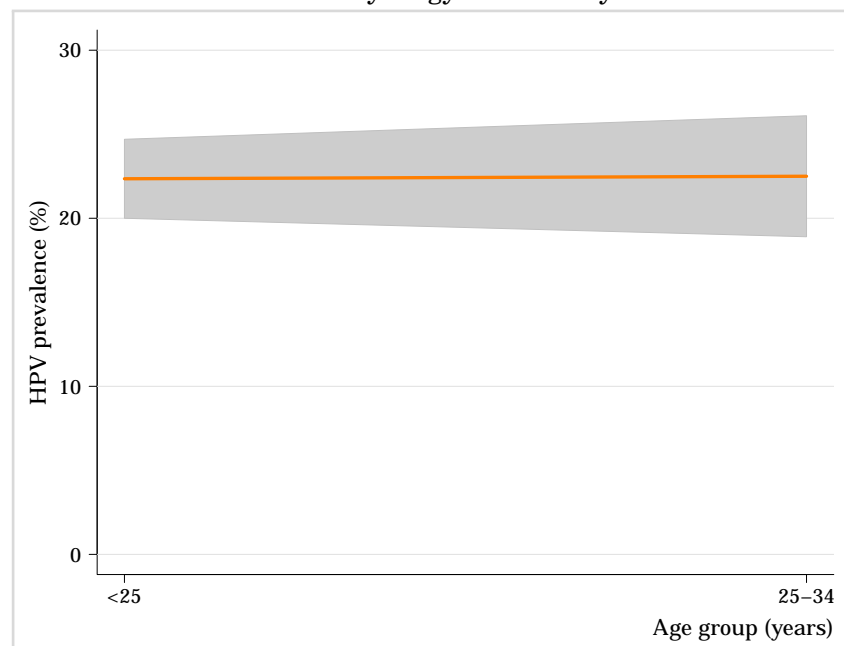
The prevalence of HPV increases with lesion severity. HPV causes virtually 100% of cervical cancer cases, and an underestimation of HPV prevalence in cervical cancer is most likely due to the limitations of study methodologies. Worldwide, HPV16 and 18 (the two vaccine-preventable types) contribute to over 70% of all cervical cancer cases, between 41% and 67% of high-grade cervical lesions and 16-32% of low-grade cervical lesions. After HPV16/18, the six most common HPV types are the same in all world regions, namely 31, 33, 35, 45, 52 and 58; these account for an additional 20% of cervical cancers worldwide (*Clifford G, Vaccine 2006;24(S3):26*).

Methods: Prevalence and type distribution of human papillomavirus in cervical carcinoma, low-grade cervical lesions, high-grade cervical lesions and normal cytology: systematic review and meta-analysis

A systematic review of the literature was conducted regarding the worldwide HPV-prevalence and type distribution for cervical carcinoma, low-grade cervical lesions, high-grade cervical lesions and normal cytology from 1990 to 'data as of' indicated in each section. The search terms for the review were 'HPV AND cerv*' using Pubmed. There were no limits in publication language. References cited in selected articles were also investigated. Inclusion criteria were: HPV DNA detection by means of PCR or HC2, a minimum of 20 cases for cervical carcinoma, 20 cases for low-grade cervical lesions, 20 cases for high-grade cervical lesions and 100 cases for normal cytology and a detailed description of HPV DNA detection and genotyping techniques used. The number of cases tested and HPV positive extracted for each study were pooled to estimate the prevalence of HPV DNA and the HPV type distribution globally and by geographical region. Binomial 95% confidence intervals were calculated for each HPV prevalence. For more details refer to the methods document.

4.1.1 HPV prevalence in women with normal cervical cytology

Figure 23: Crude age-specific HPV prevalence (%) and 95% confidence interval in women with normal cervical cytology in Germany

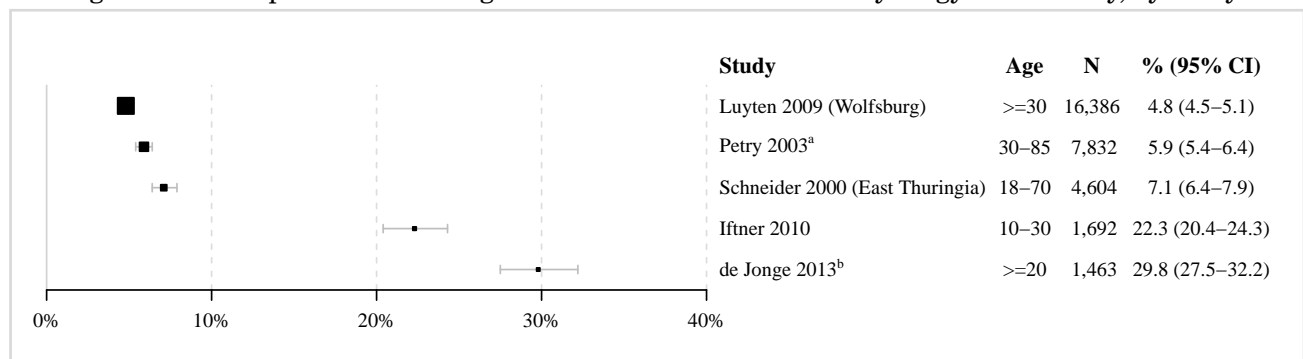


Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

Data sources:

Based on systematic reviews and meta-analysis performed by ICO. The ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Bruni L, J Infect Dis 2010; 202: 1789. 2) De Sanjosé S, Lancet Infect Dis 2007; 7: 453
Iftner T, J Med Virol 2010; 82: 1928

Figure 24: HPV prevalence among women with normal cervical cytology in Germany, by study



Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval; N: number of women tested;
The samples for HPV testing come from cervical specimens (fresh/fixed biopsies or exfoliated cells).

^aHannover and Tuebingen

^bNordrhein-Westfalen, Niedersachsen, Schleswig-Holstein, Bremen and Hamburg

Data sources:

Based on systematic reviews and meta-analysis performed by ICO. The ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Bruni L, J Infect Dis 2010; 202: 1789. 2) De Sanjosé S, Lancet Infect Dis 2007; 7: 453
de Jonge M, Acta Cytol 2013; 57: 591 | Iftner T, J Med Virol 2010; 82: 1928 | Luyten A, J Clin Virol 2009; 46 Suppl 3: S5 | Petry KU, Br J Cancer 2003; 88: 1570 | Schneider A, Int J Cancer 2000; 89: 529

4.1.2 HPV type distribution among women with normal cervical cytology, precancerous cervical lesions and cervical cancer

Table 14: Prevalence of HPV16 and HPV18 by cytology in Germany

	No. tested	HPV 16/18 Prevalence
		% (95% CI)
Normal cytology ^{1,2}	10,988	3.2 (2.9-3.5)
Low-grade lesions ^{3,4}	688	21.2 (18.3-24.4)
High-grade lesions ^{5,6}	819	50.5 (47.1-54.0)
Cervical cancer ^{7,8}	68	76.5 (65.1-85.0)

Data updated on 11 Jun 2019 (data as of 30 Jun 2015 / 30 Jun 2015).

95% CI: 95% Confidence Interval; High-grade lesions: CIN-2, CIN-3, CIS or HSIL; Low-grade lesions: LSIL or CIN-1;

The samples for HPV testing come from cervical specimens (fresh / fixed biopsies or exfoliated cells)

Data sources:

¹Based on systematic reviews and meta-analysis performed by ICO. The ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Bruni L, J Infect Dis 2010; 202: 1789. 2) De Sanjosé S, Lancet Infect Dis 2007; 7: 453

²de Jonge M, Acta Cytol 2013; 57: 591 | Iftner T, J Med Virol 2010; 82: 1928 | Klug SJ, J Med Virol 2007; 79: 616

³Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Guan P, Int J Cancer 2012;131:2349 2) Clifford GM, Cancer Epidemiol Biomarkers Prev 2005;14:1157

⁴Contributing studies: de Jonge M, Acta Cytol 2013; 57: 591 | Klug SJ, J Med Virol 2007; 79: 616 | Merkelbach-Bruse S, Diagn Mol Pathol 1999; 8: 32 | Meyer T, Int J Gynecol Cancer 2001; 11: 198 | Nindl I, J Clin Pathol 1999; 52: 17

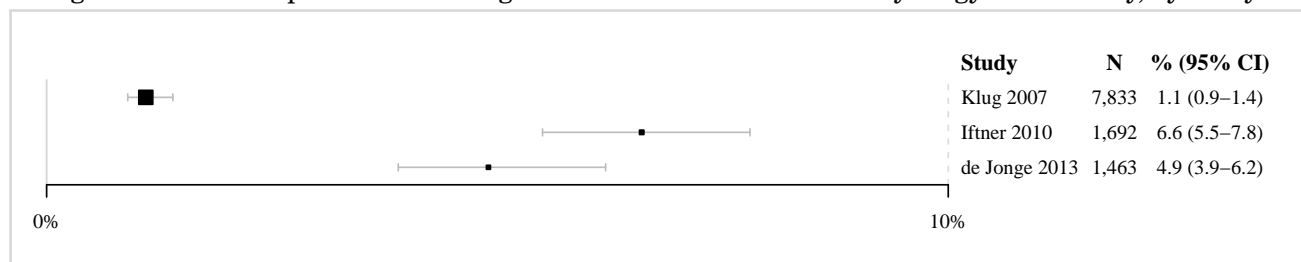
⁵Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Guan P, Int J Cancer 2012;131:2349 2) Smith JS, Int J Cancer 2007;121:621 3) Clifford GM, Br J Cancer 2003;89:101.

⁶Contributing studies: de Jonge M, Acta Cytol 2013; 57: 591 | Klug SJ, J Med Virol 2007; 79: 616 | Merkelbach-Bruse S, Diagn Mol Pathol 1999; 8: 32 | Meyer T, Int J Gynecol Cancer 2001; 11: 198 | Nindl I, Int J Gynecol Pathol 1997; 16: 197 | Nindl I, J Clin Pathol 1999; 52: 17

⁷Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Guan P, Int J Cancer 2012;131:2349 2) Li N, Int J Cancer 2011;128:927 3) Smith JS, Int J Cancer 2007;121:621 4) Clifford GM, Br J Cancer 2003;88:63 5) Clifford GM, Br J Cancer 2003;89:101.

⁸Contributing studies: Bosch FX, J Natl Cancer Inst 1995; 87: 796 | Milde-Langosch K, Int J Cancer 1995; 63: 639

Figure 25: HPV 16 prevalence among women with normal cervical cytology in Germany, by study



Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval; N: number of women tested;

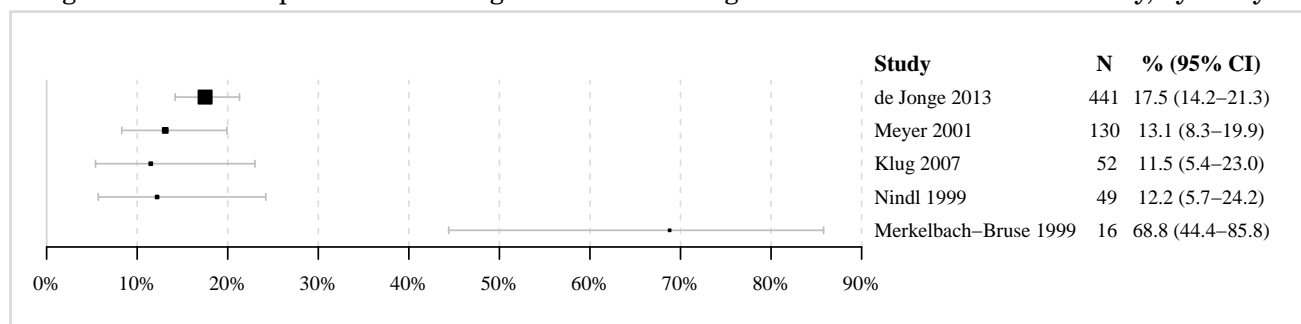
The samples for HPV testing come from cervical specimens (fresh/fixed biopsies or exfoliated cells).

Data sources:

Based on systematic reviews and meta-analysis performed by ICO. The ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Bruni L, J Infect Dis 2010; 202: 1789. 2) De Sanjosé S, Lancet Infect Dis 2007; 7: 453

de Jonge M, Acta Cytol 2013; 57: 591 | Iftner T, J Med Virol 2010; 82: 1928 | Klug SJ, J Med Virol 2007; 79: 616

Figure 26: HPV 16 prevalence among women with low-grade cervical lesions in Germany, by study



Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval; Low-grade lesions: LSIL or CIN-1; N: number of women tested;

The samples for HPV testing come from cervical specimens (fresh/fixed biopsies or exfoliated cells).

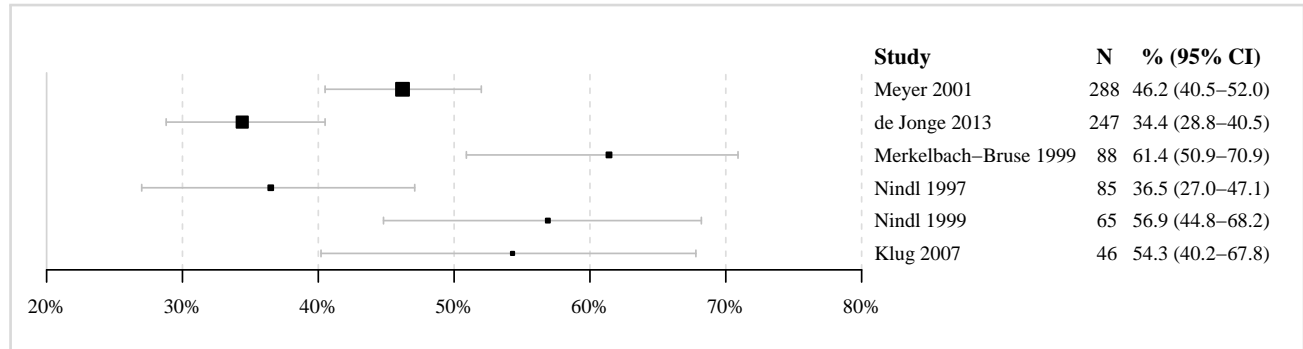
Data sources:

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(Figure 26 – continued from previous page)

Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Guan P, *Int J Cancer* 2012;131:2349 2) Clifford GM, *Cancer Epidemiol Biomarkers Prev* 2005;14:1157 de Jonge M, *Acta Cytol* 2013; 57: 591 | Klug SJ, *J Med Virol* 2007; 79: 616 | Merkelbach-Bruse S, *Diagn Mol Pathol* 1999; 8: 32 | Meyer T, *Int J Gynecol Cancer* 2001; 11: 198 | Nindl I, *J Clin Pathol* 1999; 52: 17

Figure 27: HPV 16 prevalence among women with high-grade cervical lesions in Germany, by study

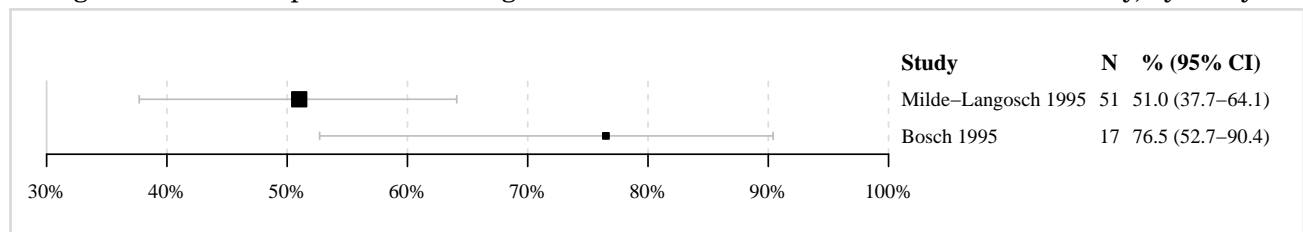
**Data updated on 11 Jun 2019 (data as of 30 Jun 2015).**

95% CI: 95% Confidence Interval; High-grade lesions: CIN-2, CIN-3, CIS or HSIL; N: number of women tested; The samples for HPV testing come from cervical specimens (fresh/fixed biopsies or exfoliated cells).

Data sources:

Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Guan P, *Int J Cancer* 2012;131:2349 2) Smith JS, *Int J Cancer* 2007;121:621 3) Clifford GM, *Br J Cancer* 2003;89:101. de Jonge M, *Acta Cytol* 2013; 57: 591 | Klug SJ, *J Med Virol* 2007; 79: 616 | Merkelbach-Bruse S, *Diagn Mol Pathol* 1999; 8: 32 | Meyer T, *Int J Gynecol Cancer* 2001; 11: 198 | Nindl I, *Int J Gynecol Pathol* 1997; 16: 197 | Nindl I, *J Clin Pathol* 1999; 52: 17

Figure 28: HPV 16 prevalence among women with invasive cervical cancer in Germany, by study

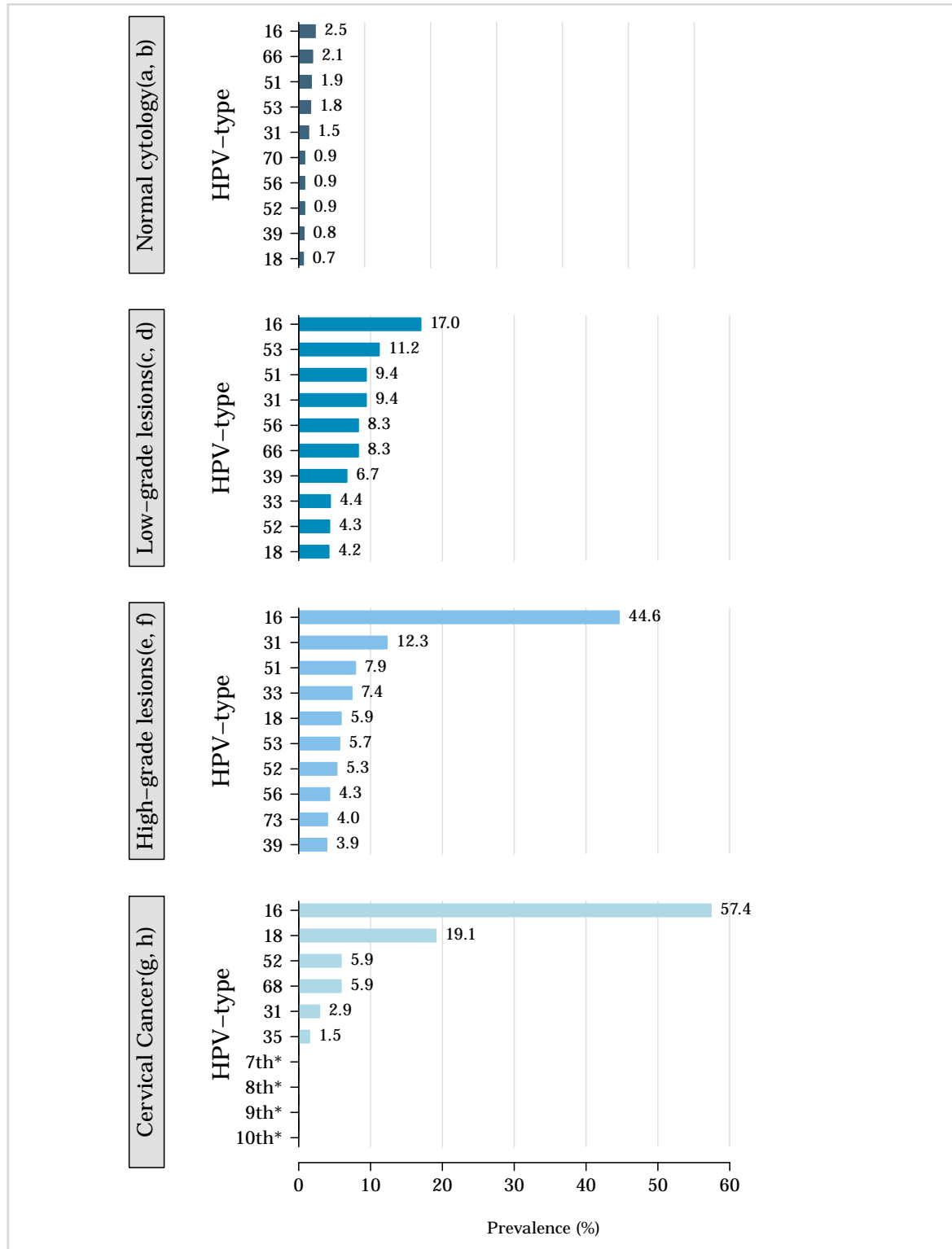
**Data updated on 11 Jun 2019 (data as of 30 Jun 2015).**

95% CI: 95% Confidence Interval; N: number of women tested; The samples for HPV testing come from cervical specimens (fresh/fixed biopsies or exfoliated cells).

Data sources:

Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Guan P, *Int J Cancer* 2012;131:2349 2) Li N, *Int J Cancer* 2011;128:927 3) Smith JS, *Int J Cancer* 2007;121:621 4) Clifford GM, *Br J Cancer* 2003;88:63 5) Clifford GM, *Br J Cancer* 2003;89:101. Bosch FX, *J Natl Cancer Inst* 1995; 87: 796 | Milde-Langosch K, *Int J Cancer* 1995; 63: 639

Figure 29: Comparison of the ten most frequent HPV oncogenic types in Germany among women with and without cervical lesions



*No data available. No more types than shown were tested or were positive.

Data updated on 11 Jun 2019 (data as of 30 Jun 2015 / 30 Jun 2015).

High-grade lesions: CIN-2, CIN-3, CIS or HSIL; Low-grade lesions: LSIL or CIN-1;

The samples for HPV testing come from cervical specimens (fresh / fixed biopsies or exfoliated cells).

Data sources:

^aBased on systematic reviews and meta-analysis performed by ICO. The ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Bruni L, J Infect Dis 2010; 202: 1789. 2) De Sanjosé S, Lancet Infect Dis 2007; 7: 453

^bde Jonge M, Acta Cytol 2013; 57: 591 | Ifner T, J Med Virol 2010; 82: 1928 | Klug SJ, J Med Virol 2007; 79: 616

^cBased on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Guan P, Int J Cancer 2012;131:2349 2) Clifford GM, Cancer Epidemiol Biomarkers Prev 2005;14:1157

^dContributing studies: de Jonge M, Acta Cytol 2013; 57: 591 | Klug SJ, J Med Virol 2007; 79: 616 | Merkelbach-Bruse S, Diagn Mol Pathol 1999; 8: 32 | Meyer T, Int J Gynecol Cancer 2001; 11: 198 | Nindl I, J Clin Pathol 1999; 52: 17

^eBased on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Guan P, Int J Cancer 2012;131:2349 2) Smith JS, Int J Cancer 2007;121:621 3) Clifford GM, Br J Cancer 2003;89:101.

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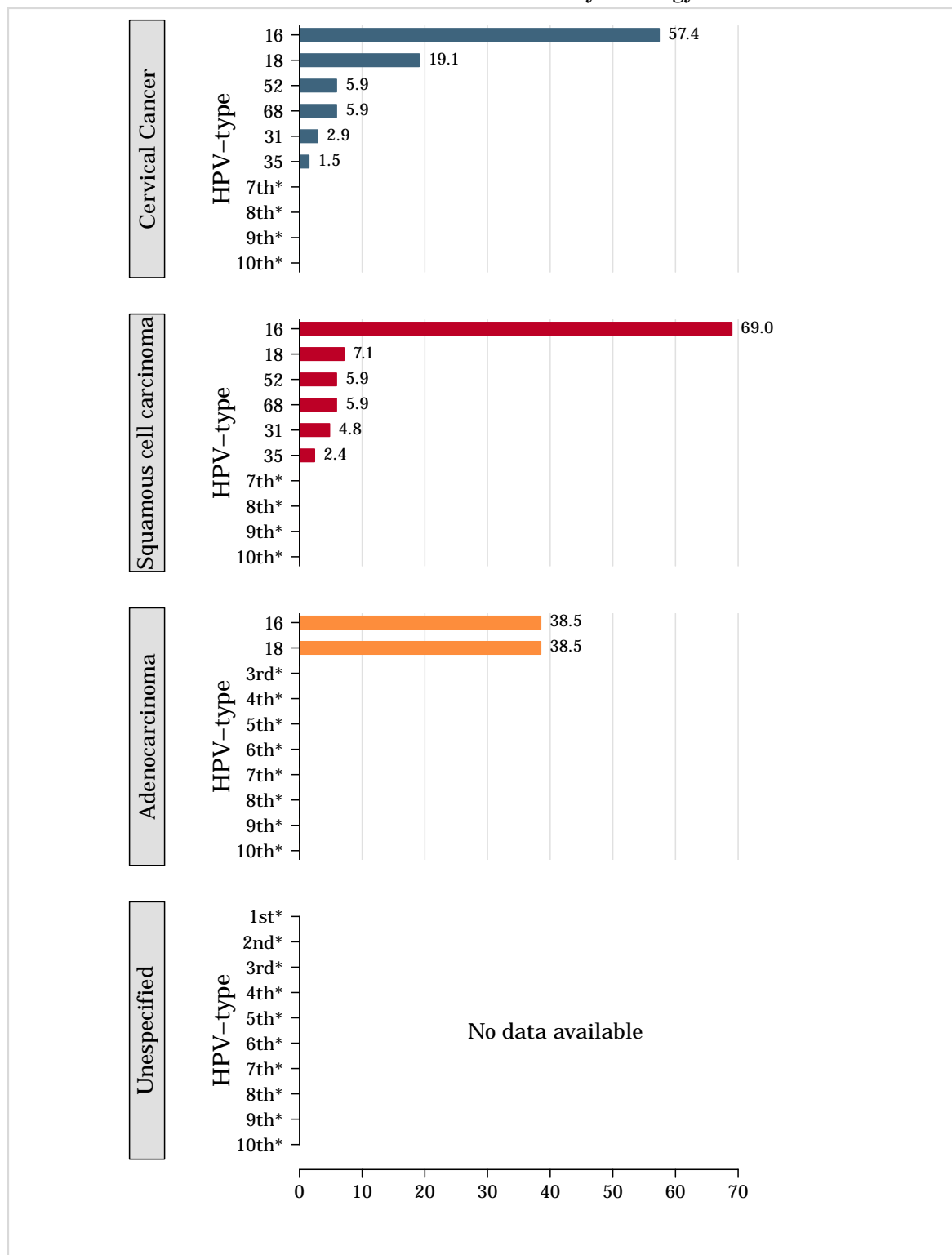
(Figure 29 – continued from previous page)

^f Contributing studies: de Jonge M, Acta Cytol 2013; 57: 591 | Klug SJ, J Med Virol 2007; 79: 616 | Merkelbach-Bruse S, Diagn Mol Pathol 1999; 8: 32 | Meyer T, Int J Gynecol Cancer 2001; 11: 198 | Nindl I, Int J Gynecol Pathol 1997; 16: 197 | Nindl I, J Clin Pathol 1999; 52: 17

^g Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Guan P, Int J Cancer 2012;131:2349 2) Li N, Int J Cancer 2011;128:927 3) Smith JS, Int J Cancer 2007;121:621 4) Clifford GM, Br J Cancer 2003;88:63 5) Clifford GM, Br J Cancer 2003;89:101.

^h Contributing studies: Bosch FX, J Natl Cancer Inst 1995; 87: 796 | Milde-Langosch K, Int J Cancer 1995; 63: 639

Figure 30: Comparison of the ten most frequent HPV oncogenic types in Germany among women with invasive cervical cancer by histology



*No data available. No more types than shown were tested or were positive.

Data updated on 19 May 2017 (data as of 30 Jun 2015).

(Continued on next page)

(Figure 30 – continued from previous page)

The samples for HPV testing come from cervical specimens (fresh / fixed biopsies or exfoliated cells). The ranking of the ten most frequent HPV types may present less than ten types because only a limited number of types were tested or were HPV-positive.

Data sources:

Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Guan P, Int J Cancer 2012;131:2349 2) Li N, Int J Cancer 2011;128:927 3) Smith JS, Int J Cancer 2007;121:621 4) Clifford GM, Br J Cancer 2003;88:63 5) Clifford GM, Br J Cancer 2003;89:101. Contributing studies: Bosch FX, J Natl Cancer Inst 1995; 87: 796 | Milde-Langosch K, Int J Cancer 1995; 63: 639

Table 15: Type-specific HPV prevalence in women with normal cervical cytology, precancerous cervical lesions and invasive cervical cancer in Germany

HPV Type	Normal cytology ^{1,2}		Low-grade lesions ^{3,4}		High-grade lesions ^{5,6}		Cervical cancer ^{7,8}	
	No. tested	HPV Prev % (95% CI)	No. tested	HPV Prev % (95% CI)	No. tested	HPV Prev % (95% CI)	No. tested	HPV Prev % (95% CI)
ONCOGENIC HPV TYPES								
High-risk HPV types								
16	10,988	2.5 (2.2-2.8)	688	17.0 (14.4-20.0)	819	44.6 (41.2-48.0)	68	57.4 (45.5-68.4)
18	10,988	0.7 (0.6-0.9)	688	4.2 (3.0-6.0)	819	5.9 (4.4-7.7)	68	19.1 (11.5-30.0)
31	10,988	1.5 (1.3-1.7)	688	9.4 (7.5-11.9)	819	12.3 (10.3-14.8)	68	2.9 (0.8-10.1)
33	10,988	0.5 (0.4-0.7)	688	4.4 (3.1-6.2)	819	7.4 (5.8-9.5)	68	0.0 (0.0-5.3)
35	10,988	0.1 (0.1-0.2)	672	1.8 (1.0-3.1)	646	2.8 (1.8-4.4)	68	1.5 (0.3-7.9)
39	10,988	0.8 (0.6-1.0)	672	6.7 (5.0-8.8)	646	3.9 (2.6-5.7)	17	0.0 (0.0-18.4)
45	10,988	0.6 (0.4-0.7)	672	1.9 (1.1-3.3)	646	3.3 (2.1-4.9)	17	0.0 (0.0-18.4)
51	10,988	1.9 (1.6-2.2)	672	9.4 (7.4-11.8)	646	7.9 (6.1-10.2)	17	0.0 (0.0-18.4)
52	10,988	0.9 (0.8-1.1)	672	4.3 (3.0-6.1)	646	5.3 (3.8-7.3)	17	5.9 (1.0-27.0)
56	10,988	0.9 (0.7-1.1)	672	8.3 (6.5-10.7)	646	4.3 (3.0-6.2)	17	0.0 (0.0-18.4)
58	10,988	0.6 (0.5-0.8)	672	3.4 (2.3-5.1)	646	3.4 (2.3-5.1)	17	0.0 (0.0-18.4)
59	10,988	0.5 (0.4-0.6)	672	4.0 (2.8-5.8)	646	2.2 (1.3-3.6)	17	0.0 (0.0-18.4)
Probable/possible carcinogen								
26	-	-	52	0.0 (0.0-6.9)	46	0.0 (0.0-7.7)	17	0.0 (0.0-18.4)
30	-	-	-	-	-	-	-	-
34	1,692	0.1 (0.0-0.4)	-	-	-	-	-	-
53	3,155	1.8 (1.4-2.4)	623	11.2 (9.0-14.0)	581	5.7 (4.1-7.9)	17	0.0 (0.0-18.4)
66	3,155	2.1 (1.6-2.6)	672	8.3 (6.5-10.7)	646	2.6 (1.6-4.2)	17	0.0 (0.0-18.4)
67	-	-	52	0.0 (0.0-6.9)	46	0.0 (0.0-7.7)	-	-
68	10,988	0.6 (0.5-0.8)	672	3.7 (2.5-5.4)	646	1.4 (0.7-2.6)	17	5.9 (1.0-27.0)
69	-	-	52	0.0 (0.0-6.9)	46	0.0 (0.0-7.7)	-	-
70	3,155	0.9 (0.6-1.3)	493	3.7 (2.3-5.7)	293	2.0 (0.9-4.4)	17	0.0 (0.0-18.4)
73	1,463	0.3 (0.1-0.7)	623	1.4 (0.8-2.7)	581	4.0 (2.7-5.9)	17	0.0 (0.0-18.4)
82	1,463	0.1 (0.0-0.5)	623	0.6 (0.2-1.6)	581	1.9 (1.1-3.4)	17	0.0 (0.0-18.4)
85	-	-	-	-	-	-	-	-
97	-	-	-	-	-	-	-	-
NON-ONCOGENIC HPV TYPES								
6	3,155	1.7 (1.3-2.2)	639	2.7 (1.7-4.2)	734	1.9 (1.1-3.2)	68	0.0 (0.0-5.3)
11	3,155	0.7 (0.4-1.0)	639	0.6 (0.2-1.6)	734	0.7 (0.3-1.6)	68	0.0 (0.0-5.3)
32	-	-	-	-	-	-	-	-
40	3,155	0.3 (0.2-0.6)	441	1.6 (0.8-3.2)	247	1.2 (0.4-3.5)	-	-
42	3,155	2.5 (2.0-3.1)	441	23.8 (20.1-28.0)	247	10.1 (7.0-14.5)	-	-
43	3,155	0.4 (0.2-0.7)	441	2.0 (1.1-3.8)	247	1.6 (0.6-4.1)	-	-
44	3,155	1.3 (1.0-1.8)	-	-	-	-	-	-
54	1,692	0.7 (0.4-1.2)	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-
61	-	-	-	-	-	-	-	-
62	-	-	-	-	-	-	-	-
64	-	-	-	-	-	-	-	-
71	-	-	-	-	-	-	-	-
72	-	-	-	-	-	-	-	-
74	1,692	0.5 (0.3-1.0)	-	-	-	-	-	-
81	-	-	-	-	-	-	-	-
83	-	-	-	-	-	-	-	-
84	-	-	-	-	-	-	-	-
86	-	-	-	-	-	-	-	-
87	-	-	-	-	-	-	-	-
89	-	-	-	-	-	-	-	-
90	-	-	-	-	-	-	-	-
91	-	-	-	-	-	-	-	-

Data updated on 11 Jun 2019 (data as of 30 Jun 2015 / 30 Jun 2015).

95% CI: 95% Confidence Interval; High-grade lesions: CIN-2, CIN-3, CIS or HSIL; Low-grade lesions: LSIL or CIN-1;

The samples for HPV testing come from cervical specimens (fresh / fixed biopsies or exfoliated cells).

Data sources:

¹Based on systematic reviews and meta-analysis performed by ICO. The ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Bruni L, J Infect Dis 2010; 202: 1789. 2) De Sanjosé S, Lancet Infect Dis 2007; 7: 453

²de Jonge M, Acta Cytol 2013; 57: 591 | Iftner T, J Med Virol 2010; 82: 1928 | Klug SJ, J Med Virol 2007; 79: 616

³Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Guan P, Int J Cancer 2012;131:2349 2) Clifford GM, Cancer Epidemiol Biomarkers Prev 2005;14:1157

⁴Contributing studies: de Jonge M, Acta Cytol 2013; 57: 591 | Klug SJ, J Med Virol 2007; 79: 616 | Merkelbach-Bruse S, Diagn Mol Pathol 1999; 8: 32 | Meyer T, Int J Gynecol Cancer 2001; 11: 198 | Nindl I, J Clin Pathol 1999; 52: 17

(Continued on next page)

(Table 15 – continued from previous page)

⁵Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Guan P, Int J Cancer 2012;131:2349 2) Smith JS, Int J Cancer 2007;121:621 3) Clifford GM, Br J Cancer 2003;89:101.

⁶Contributing studies: de Jonge M, Acta Cytol 2013; 57: 591 | Klug SJ, J Med Virol 2007; 79: 616 | Merkelbach-Bruse S, Diagn Mol Pathol 1999; 8: 32 | Meyer T, Int J Gynecol Cancer 2001; 11: 198 | Nindl I, Int J Gynecol Pathol 1997; 16: 197 | Nindl I, J Clin Pathol 1999; 52: 17

⁷Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Guan P, Int J Cancer 2012;131:2349 2) Li N, Int J Cancer 2011;128:927 3) Smith JS, Int J Cancer 2007;121:621 4) Clifford GM, Br J Cancer 2003;88:63 5) Clifford GM, Br J Cancer 2003;89:101.

⁸Contributing studies: Bosch FX, J Natl Cancer Inst 1995; 87: 796 | Milde-Langosch K, Int J Cancer 1995; 63: 639

Table 16: Type-specific HPV prevalence among invasive cervical cancer cases in Germany by histology

HPV Type	Any Histology		Squamous cell carcinoma		Adenocarcinoma		Unspecified	
	No. tested	HPV Prev % (95% CI)	No. tested	HPV Prev % (95% CI)	No. tested	HPV Prev % (95% CI)	No. tested	HPV Prev % (95% CI)
ONCOGENIC HPV TYPES								
High-risk HPV types								
16	68	57.4 (45.5-68.4)	42	69.0 (54.0-80.9)	26	38.5 (22.4-57.5)	-	-
18	68	19.1 (11.5-30.0)	42	7.1 (2.5-19.0)	26	38.5 (22.4-57.5)	-	-
31	68	2.9 (0.8-10.1)	42	4.8 (1.3-15.8)	26	0.0 (0.0-12.9)	-	-
33	68	0.0 (0.0-5.3)	42	0.0 (0.0-8.4)	26	0.0 (0.0-12.9)	-	-
35	68	1.5 (0.3-7.9)	42	2.4 (0.4-12.3)	26	0.0 (0.0-12.9)	-	-
39	17	0.0 (0.0-18.4)	17	0.0 (0.0-18.4)	-	-	-	-
45	17	0.0 (0.0-18.4)	17	0.0 (0.0-18.4)	-	-	-	-
51	17	0.0 (0.0-18.4)	17	0.0 (0.0-18.4)	-	-	-	-
52	17	5.9 (1.0-27.0)	17	5.9 (1.0-27.0)	-	-	-	-
56	17	0.0 (0.0-18.4)	17	0.0 (0.0-18.4)	-	-	-	-
58	17	0.0 (0.0-18.4)	17	0.0 (0.0-18.4)	-	-	-	-
59	17	0.0 (0.0-18.4)	17	0.0 (0.0-18.4)	-	-	-	-
Probable/possible carcinogen								
26	17	0.0 (0.0-18.4)	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-
34	-	-	-	-	-	-	-	-
53	17	0.0 (0.0-18.4)	-	-	-	-	-	-
66	17	0.0 (0.0-18.4)	17	0.0 (0.0-18.4)	-	-	-	-
67	-	-	-	-	-	-	-	-
68	17	5.9 (1.0-27.0)	17	5.9 (1.0-27.0)	-	-	-	-
69	-	-	-	-	-	-	-	-
70	17	0.0 (0.0-18.4)	-	-	-	-	-	-
73	17	0.0 (0.0-18.4)	-	-	-	-	-	-
82	17	0.0 (0.0-18.4)	17	0.0 (0.0-18.4)	-	-	-	-
85	-	-	-	-	-	-	-	-
97	-	-	-	-	-	-	-	-
NON-ONCOGENIC HPV TYPES								
6	68	0.0 (0.0-5.3)	-	-	-	-	-	-
11	68	0.0 (0.0-5.3)	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-
40	-	-	-	-	-	-	-	-
42	-	-	-	-	-	-	-	-
43	-	-	-	-	-	-	-	-
44	-	-	-	-	-	-	-	-
54	-	-	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-
60	-	-	-	-	-	-	-	-
61	-	-	-	-	-	-	-	-
62	-	-	-	-	-	-	-	-
64	-	-	-	-	-	-	-	-
71	-	-	-	-	-	-	-	-
72	-	-	-	-	-	-	-	-
74	-	-	-	-	-	-	-	-
76	-	-	-	-	-	-	-	-
81	-	-	-	-	-	-	-	-
83	-	-	-	-	-	-	-	-
84	-	-	-	-	-	-	-	-
86	-	-	-	-	-	-	-	-
87	-	-	-	-	-	-	-	-
89	-	-	-	-	-	-	-	-
90	-	-	-	-	-	-	-	-
91	-	-	-	-	-	-	-	-
No Data Available	-	--	-	--	-	--	-	--

Data updated on 19 May 2017 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval;

The samples for HPV testing come from cervical specimens (fresh / fixed biopsies or exfoliated cells).

Data sources:

Based on meta-analysis performed by IARC's Infections and Cancer Epidemiology Group up to November 2011, the ICO HPV Information Centre has updated data until June 2014. Reference publications: 1) Guan P, Int J Cancer 2012;131:2349 2) Li N, Int J Cancer 2011;128:927 3) Smith JS, Int J Cancer 2007;121:621 4) Clifford GM, Br J Cancer 2003;88:63 5) Clifford GM, Br J Cancer 2003;89:101.

Contributing studies: Bosch FX, J Natl Cancer Inst 1995; 87: 796 | Milde-Langosch K, Int J Cancer 1995; 63: 639

4.1.3 HPV type distribution among HIV+ women with normal cervical cytology

Table 17: Studies on HPV prevalence among HIV women with normal cytology in Germany

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPVs HPV type (%)
			%	(95% CI)	
Kuhler-Obbarius 1994 ¹	PCR-MY11/MY09, No genotyping	34	52.9	(35.1-70.2)	-
Weissenborn 2003 ²	PCR-GP5+/GP6+, TS (HPV 16, 18, 31, 33, 45, 56)	212	57.5	(50.6-64.3)	-

Data updated on 31 Jul 2013 (data as of 31 Dec 2011). Only for European countries.

95% CI: 95% Confidence Interval;

PCR: Polymerase Chain Reaction; TS: Type Specific;

Data sources:

Systematic review and meta-analysis were performed by the ICO HPV Information Centre up to December 2011. Selected studies had to include at least 20 HIV positive women who had both normal cervical cytology and HPV test results (PCR or HC2).

¹Kühler-Obbarius C, Virchows Arch 1994;425:157

²Weissenborn SJ, J Clin Microbiol 2003;41:2763

4.1.4 Terminology

Cytologically normal women

No abnormal cells are observed on the surface of their cervix upon cytology.

Cervical Intraepithelial Neoplasia (CIN) / Squamous Intraepithelial Lesions (SIL)

SIL and CIN are two commonly used terms to describe precancerous lesions or the abnormal growth of squamous cells observed in the cervix. SIL is an abnormal result derived from cervical cytological screening or Pap smear testing. CIN is a histological diagnosis made upon analysis of cervical tissue obtained by biopsy or surgical excision. The condition is graded as CIN 1, 2 or 3, according to the thickness of the abnormal epithelium (1/3, 2/3 or the entire thickness).

Low-grade cervical lesions (LSIL/CIN-1)

Low-grade cervical lesions are defined by early changes in size, shape, and number of abnormal cells formed on the surface of the cervix and may be referred to as mild dysplasia, LSIL, or CIN-1.

High-grade cervical lesions (HSIL/ CIN-2 / CIN-3 / CIS)

High-grade cervical lesions are defined by a large number of precancerous cells on the surface of the cervix that are distinctly different from normal cells. They have the potential to become cancerous cells and invade deeper tissues of the cervix. These lesions may be referred to as moderate or severe dysplasia, HSIL, CIN-2, CIN-3 or cervical carcinoma in situ (CIS).

Carcinoma in situ (CIS)

Preinvasive malignancy limited to the epithelium without invasion of the basement membrane. CIN 3 encompasses the squamous carcinoma in situ.

Invasive cervical cancer (ICC) / Cervical cancer

If the high-grade precancerous cells invade the basement membrane is called ICC. ICC stages range from stage I (cancer is in the cervix or uterus only) to stage IV (the cancer has spread to distant organs, such as the liver).

Invasive squamous cell carcinoma

Invasive carcinoma composed of cells resembling those of squamous epithelium.

Adenocarcinoma

Invasive tumour with glandular and squamous elements intermingled.

4.2 HPV burden in anogenital cancers other than cervix

Methods: Prevalence and type distribution of human papillomavirus in carcinoma of the vulva, vagina, anus and penis: systematic review and meta-analysis

A systematic review of the literature was conducted on the worldwide HPV-prevalence and type distribution for anogenital carcinomas other than cervix from January 1986 to 'data as of' indicated in each section. The search terms for the review were 'HPV' AND (anus OR anal) OR (penile) OR vagin* OR vulv* using Pubmed. There were no limits in publication language. References cited in selected articles were also investigated. Inclusion criteria were: HPV DNA detection by means of PCR, a minimum of 10 cases by lesion and a detailed description of HPV DNA detection and genotyping techniques used. The number of cases tested and HPV positive cases were extracted for each study to estimate the prevalence of HPV DNA and the HPV type distribution. Binomial 95% confidence intervals were calculated for each HPV prevalence.

4.2.1 Anal cancer and precancerous anal lesions

Anal cancer is similar to cervical cancer with respect to overall HPV DNA positivity, with approximately 88% of cases associated with HPV infection worldwide (*de Martel C et al. Lancet Oncol 2012;13(6):607-15*). HPV16 is the most common type detected, representing 73% of all HPV-positive tumours. HPV18 is the second most common type detected and is found in approximately 5% of cases. HPV DNA is also detected in the majority of precancerous anal lesions (AIN) (91.5% in AIN1 and 93.9% in AIN2/3) (*De Vuyst H et al. Int J Cancer 2009; 124: 1626-36*). In this section, the burden of HPV among cases of anal cancers and precancerous anal lesions in Germany are presented.

Table 18: Studies on HPV prevalence among anal cancer cases in Germany (male and female)

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPV types (%)
			%	(95% CI)	
Alemany 2015 ^a	PCR-SPF10, EIA, (HPV 6, 11, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 66, 67, 68, 69, 70, 73, 74, 82, 83, 87, 89, 91)	169	87.6	(81.8-91.7)	HPV 16 (73.4%) HPV 6 (3.6%) HPV 18 (3.6%) HPV 11 (3.0%) HPV 33 (2.4%)
Rödel 2015	PCR-SPF10, PCR- MULTIPLEX, (HPV 6, 11, 16, 18, 26, 31, 33, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 66, 68, 69, 70, 71, 73, 74, 81, 82)	91	100.0	(95.9-100.0)	HPV 16 (94.5%) HPV 11 (2.2%) HPV 31 (2.2%) HPV 35 (2.2%) HPV 18 (1.1%)
Varnai 2006	PCR-MY09/11, TS, Sequencing (HPV 6, 11, 16, 18, 31, 33, 45, 58)	47	83.0	(69.9-91.1)	HPV 16 (74.5%) HPV 33 (6.4%) HPV 18 (2.1%) HPV 31 (2.1%) HPV 45 (2.1%)

Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval;

EIA: Enzyme ImmunoAssay; PCR: Polymerase Chain Reaction; SPF: Short Primer Fragment; TS: Type Specific;

^aIncludes cases from Bosnia-Herzegovina, Czech Republic, France, Germany, Poland, Portugal, Slovenia, Spain and United Kingdom

Data sources:

Based on systematic reviews (up to 2008) performed by ICO for the IARC Monograph on the Evaluation of Carcinogenic Risks to Humans volume 100B and IARC's Infections and Cancer Epidemiology Group. The ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Bouvard V, Lancet Oncol 2009;10:321-2) De Vuyst H, Int J Cancer 2009;124:1626

Alemany L, Int J Cancer 2015; 136: 98 | Rödel F, Int J Cancer 2015; 136: 278 | Varnai AD, Int J Colorectal Dis 2006; 21: 135

Table 19: Studies on HPV prevalence among cases of AIN2/3 in Germany

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPV types (%)
			%	(95% CI)	
Alemaný 2015 ^a	PCR-SPF10, EIA, (HPV 6, 11, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 66, 67, 68, 69, 70, 73, 74, 82, 83, 87, 89, 91)	23	95.7	(79.0-99.2)	HPV 16 (65.2%) HPV 6 (8.7%) HPV 18 (8.7%) HPV 51 (8.7%) HPV 74 (8.7%)
Hampl 2006	, PCR-MY09/11, Sequencing (HPV 6, 11, 20, 21, 22, 23, 26, 30, 32)	16	87.5	(64.0-96.5)	-
Silling 2012 ^b	PCR- MULTIPLEX (HPV 6, 11, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 57, 58, 59, 61, 66, 67, 68, 70, 71, 72, 73, 81, 82, 83, 84, 89)	42	100.0	(91.6-100.0)	HPV 16 (69.0%) HPV 11 (23.8%) HPV 18 (23.8%) HPV 6 (19.0%) HPV 67 (19.0%)
Varnai 2006	, PCR-MY09/11, TS, Sequencing (HPV 6, 11, 16, 18, 31, 33, 45, 58)	24	95.8	(79.8-99.3)	HPV 16 (70.8%) HPV 11 (12.5%) HPV 6 (8.3%) HPV 58 (4.2%)
Wieland 2006 ^b	PCR, EIA (HPV 6, 11, 16, 18, 31, 33, 34, 35, 42, 44, 45, 52, 53, 54, 56, 58, 59, 66, 68, 70, 72, 73, 81, 82, 83, 84, 89)	18	100.0	(82.4-100.0)	HPV 16 (88.9%) HPV 18 (44.4%) HPV 83 (38.9%) HPV 52 (33.3%) HPV 58 (27.8%)

Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval; AIN 2/3: Anal intraepithelial neoplasia of grade 2/3;

EIA: Enzyme ImmunoAssay; PCR: Polymerase Chain Reaction; SPF: Short Primer Fragment; TS: Type Specific;

^aIncludes cases from Bosnia-Herzegovina, Czech Republic, France, Germany, Poland, Portugal, Slovenia, Spain and United Kingdom

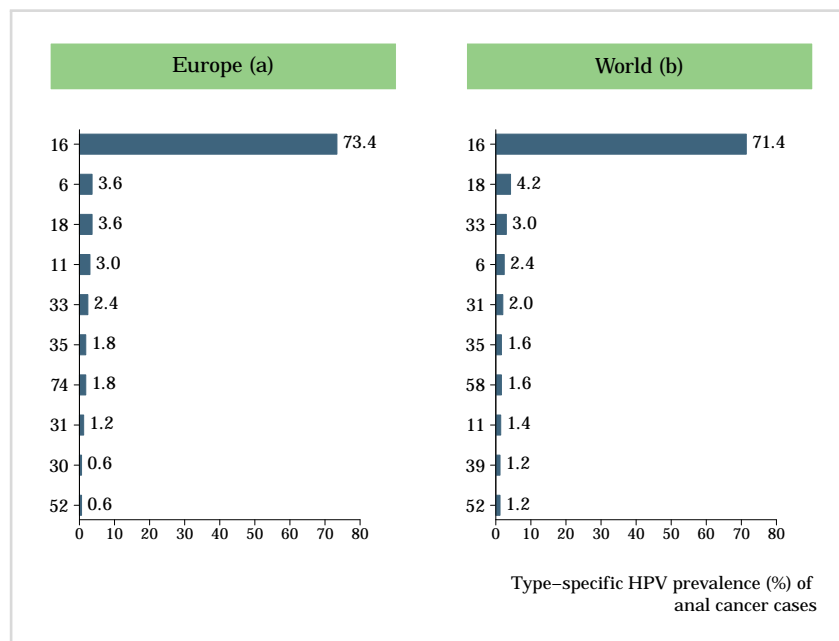
^bHIV positive cases

Data sources:

Based on systematic reviews (up to 2008) performed by ICO for the IARC Monograph on the Evaluation of Carcinogenic Risks to Humans volume 100B and IARC's Infections and Cancer Epidemiology Group. The ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Bouvard V, Lancet Oncol 2009;10:321 2) De Vuyst H, Int J Cancer 2009;124:1626

Alemaný L, Int J Cancer 2015; 136: 98 | Hampl M, Obstet Gynecol 2006; 108: 1361 | Silling S, J Clin Virol 2012; 53: 325 | Varnai AD, Int J Colorectal Dis 2006; 21: 135 | Wieland U, Arch Dermatol 2006; 142: 1438

Figure 31: Comparison of the ten most frequent HPV types in anal cancer cases in Europe and the World



Data updated on 09 Feb 2017 (data as of 30 Jun 2014).

^aIncludes cases from Bosnia-Herzegovina, Czech Republic, France, Germany, Poland, Portugal, Slovenia, Spain and United Kingdom.

^bIncludes cases from Europe (Bosnia-Herzegovina, Czech Republic, France, Germany, Poland, Portugal, Slovenia, Spain and United Kingdom); America (Chile, Colombia, Ecuador, Guatemala, Honduras, Mexico, Paraguay and United States); Africa (Mali, Nigeria and Senegal); Asia (Bangladesh, India and South Korea)

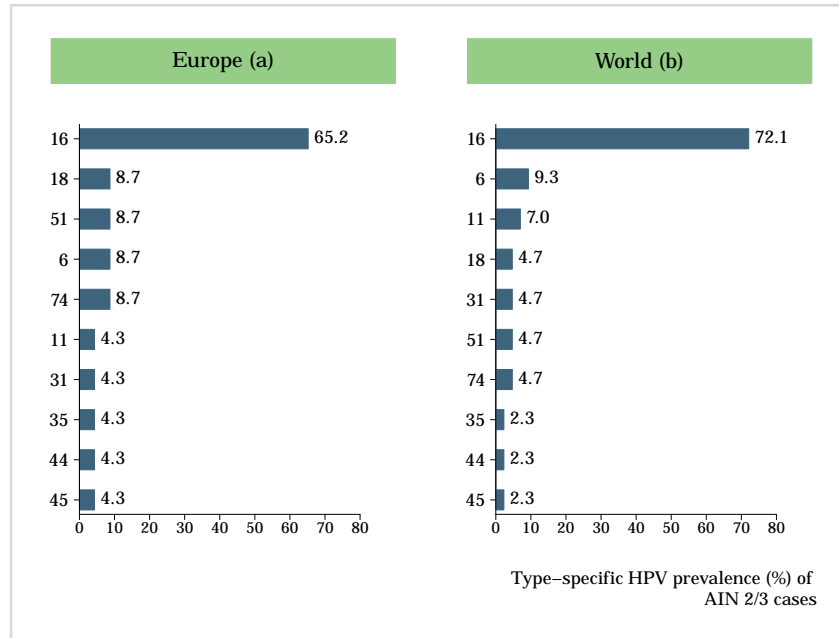
(Continued on next page)

(Figure 31 – continued from previous page)

Data sources:

Data from Alemany L, Int J Cancer 2015; 136: 98. This study has gathered the largest international series of anal cancer cases and precancerous lesions worldwide using a standard protocol with a highly sensitive HPV DNA detection assay.

Figure 32: Comparison of the ten most frequent HPV types in AIN 2/3 cases in Europe and the World

**Data updated on 09 Feb 2017 (data as of 30 Jun 2014).**

AIN 2/3: Anal intraepithelial neoplasia of grade 2/3;

^aIncludes cases from Bosnia-Herzegovina, Czech Republic, France, Germany, Poland, Portugal, Slovenia, Spain and United Kingdom

^bIncludes cases from Europe (Bosnia-Herzegovina, Czech Republic, France, Germany, Poland, Portugal, Slovenia, Spain and United Kingdom); America (Chile, Colombia, Ecuador, Guatemala, Honduras, Mexico, Paraguay)

Data sources:

Data from Alemany L, Int J Cancer 2015; 136: 98. This study has gathered the largest international series of anal cancer cases and precancerous lesions worldwide using a standard protocol with a highly sensitive HPV DNA detection assay.

4.2.2 Vulvar cancer and precancerous vulvar lesions

HPV attribution for vulvar cancer is 43% worldwide (*de Martel C et al. Lancet Oncol 2012;13(6):607-15*). Vulvar cancer has two distinct histological patterns with two different risk factor profiles: (1) basaloid/warty types (2) keratinising types. Basaloid/warty lesions are more common in young women, are frequently found adjacent to VIN, are very often associated with HPV DNA detection (86%), and have a similar risk factor profile as cervical cancer. Keratinising vulvar carcinomas represent the majority of the vulvar lesions (>60%). These lesions develop from non HPV-related chronic vulvar dermatoses, especially lichen sclerosus and/or squamous hyperplasia, their immediate cancer precursor lesion is differentiated VIN, they occur more often in older women, and are rarely associated with HPV (6%) or with any of the other risk factors typical of cervical cancer. HPV prevalence is frequently detected among cases of high-grade VIN (VIN2/3) (85.3%). HPV 16 is the most common type detected followed by HPV 33 (*De Vuyst H et al. Int J Cancer 2009; 124: 1626-36*). In this section, the HPV burden among cases of vulvar cancer cases and precancerous vulvar lesions in Germany are presented.

Table 20: Studies on HPV prevalence among vulvar cancer cases in Germany

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPV types (%)
			%	(95% CI)	
Choschzick 2011	PCR-MY09/11, Sequencing (HPV 6, 11, 16, 18, 33)	39	46.2	(31.6-61.4)	HPV 16 (43.6%) HPV 33 (2.6%)
de Sanjosé 2013 ^a	PCR-SPF10, EIA, (HPV 6, 11, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 66, 67, 68, 69, 70, 73, 74, 82, 83, 87, 89, 91)	903	19.3	(16.8-22.0)	HPV 16 (13.8%) HPV 33 (1.2%) HPV 18 (0.6%) HPV 31 (0.6%) HPV 44 (0.4%)
Hampl 2006	PCR-MY09/11, Sequencing (HPV 16, 18, 20, 21, 22, 23, 26, 30, 31, 32, 33, 35, 42, 44, 45, 51, 52, 56, 58, 61, 67, 73, 91)	48	60.4	(46.3-73.0)	HPV 16 (39.6%) HPV 33 (8.3%) HPV 31 (4.2%) HPV 18 (2.1%)
Milde-Langosch 1995	PCR-MY09/11, TS (HPV 6, 11, 16, 18, 31, 33, 35)	40	27.5	(16.1-42.8)	HPV 16 (25.0%)
Reuschenbach 2013	PCR- MULTIPLEX (HPV 6, 11, 16, 18, 31, 33, 35, 39, 42, 43, 44, 45, 51, 52, 56, 58, 59, 68, 70, 71, 73, 82)	183	43.7	(36.7-51.0)	HPV 16 (36.1%) HPV 18 (2.7%) HPV 33 (1.1%) HPV 6 (0.5%) HPV 11 (0.5%)
Riethdorf 2004 ^b	PCR L1-Consensus primer, TS (HPV 16)	71	87.3	(77.6-93.2)	HPV 16 (87.3%)

Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval;

EIA: Enzyme ImmunoAssay; PCR: Polymerase Chain Reaction; SPF: Short Primer Fragment; TS: Type Specific;

^aIncludes cases from Austria, Belarus, Bosnia-Herzegovina, Czech Republic, France, Germany, Greece, Italy, Poland, Portugal, Spain and United Kingdom

^bIncludes cases from Germany and United States of America

Data sources:

Based on systematic reviews (up to 2008) performed by ICO for the IARC Monograph on the Evaluation of Carcinogenic Risks to Humans volume 100B and IARC's Infections and Cancer Epidemiology Group. The ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Bouvard V, Lancet Oncol 2009;10:321 2) De Vuyst H, Int J Cancer 2009;124:1626

Choschzick M, Int J Gynecol Pathol 2011; 30: 497 | de Sanjosé S, Eur J Cancer 2013; 49: 3450 | Hampl M, Obstet Gynecol 2006; 108: 1361 | Milde-Langosch K, Int J Cancer 1995; 63: 639 | Reuschenbach M, J Low Genit Tract Dis 2013; 17: 289 | Riethdorf S, Hum Pathol 2004; 35: 1477

Table 21: Studies on HPV prevalence among VIN 2/3 cases in Germany

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPV types (%)
			%	(95% CI)	
de Sanjosé 2013 ^a	PCR-SPF10, EIA, (HPV 6, 11, 16, 18, 26, 30, 31, 33, 34, 35, 39, 40, 42, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 61, 66, 67, 68, 69, 70, 73, 74, 82, 83, 87, 89, 91)	312	86.9	(82.7-90.2)	HPV 16 (69.6%) HPV 33 (11.2%) HPV 18 (2.2%) HPV 6 (1.6%) HPV 52 (1.3%)

(Continued on next page)

(Table 21 – continued from previous page)

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPVs HPV type (%)
			%	(95% CI)	
Hampl 2006	PCR-MY09/11, Sequencing (HPV 6, 11, 16, 18, 20, 21, 22, 23, 26, 30, 31, 32, 33, 35, 42, 44, 45, 51, 52, 56, 58, 61, 67, 73, 74, 91)	168	100.0	(97.8-100.0)	HPV 16 (79.8%) HPV 33 (10.7%) HPV 31 (4.2%) HPV 18 (3.0%)
Riethdorf 2004 ^b	PCR L1-Consensus primer, TS (HPV 16)	60	68.3	(55.8-78.7)	HPV 16 (68.3%)

Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval; VIN 2/3: Vulvar intraepithelial neoplasia of grade 2/3;

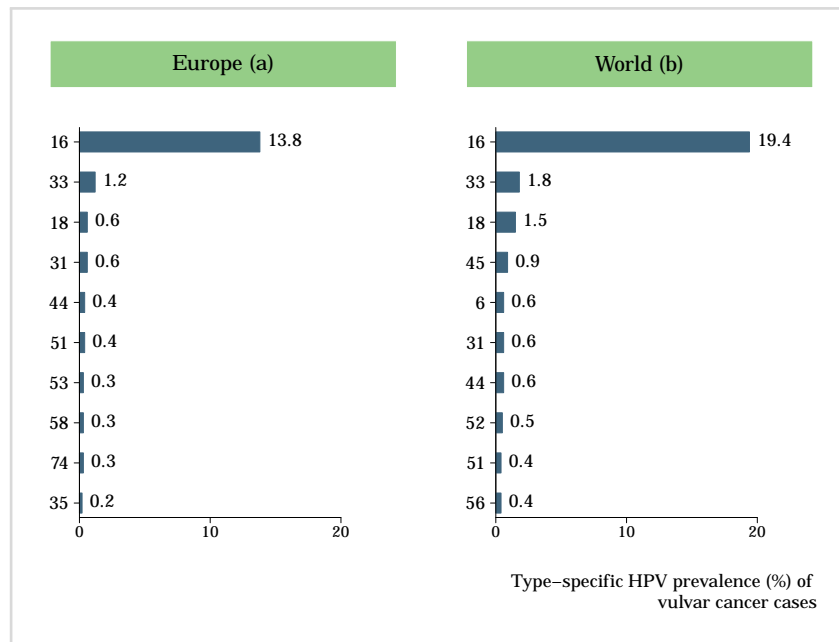
EIA: Enzyme ImmunoAssay; PCR: Polymerase Chain Reaction; SPF: Short Primer Fragment; TS: Type Specific;

^aIncludes cases from Austria, Belarus, Bosnia-Herzegovina, Czech Republic, France, Germany, Greece, Italy, Poland, Portugal, Spain and United Kingdom^bIncludes cases from Germany and United States of America**Data sources:**

Based on systematic reviews (up to 2008) performed by ICO for the IARC Monograph on the Evaluation of Carcinogenic Risks to Humans volume 100B and IARC's Infections and Cancer Epidemiology Group. The ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Bouvard V, Lancet Oncol 2009;10:321 2) De Vuyst H, Int J Cancer 2009;124:1626

de Sanjosé S, Eur J Cancer 2013; 49: 3450 | Hampl M, Obstet Gynecol 2006; 108: 1361 | Riethdorf S, Hum Pathol 2004; 35: 1477

Figure 33: Comparison of the ten most frequent HPV types in cases of vulvar cancer in Europe and the World



Data updated on 09 Feb 2017 (data as of 30 Jun 2014).

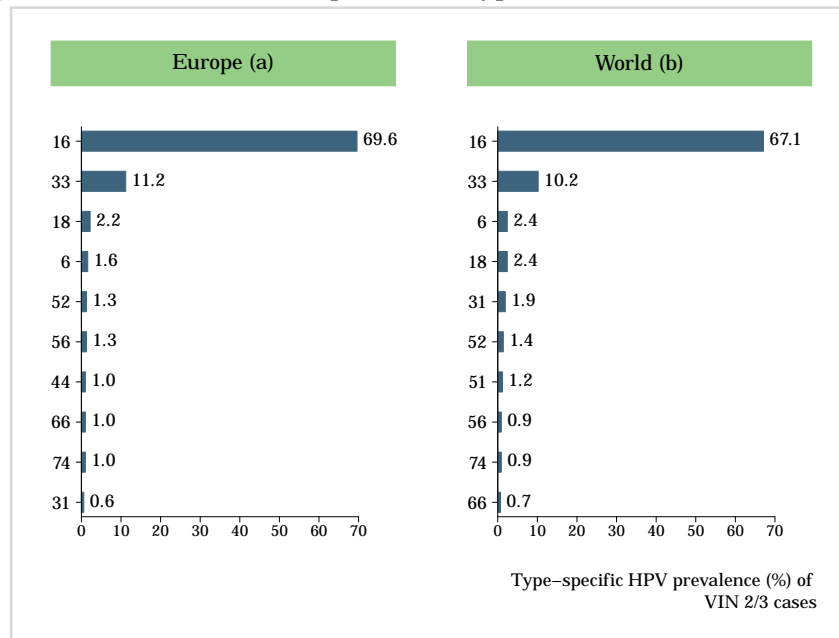
^aIncludes cases from Austria, Belarus, Bosnia-Herzegovina, Czech Republic, France, Germany, Greece, Italy, Poland, Portugal, Spain and United Kingdom.

^bIncludes cases from America (Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala, Honduras, Mexico, Paraguay, Uruguay, United States of America and Venezuela); Africa (Mali, Mozambique, Nigeria, and Senegal); Oceania (Australia and New Zealand); Europe (Austria, Belarus, Bosnia-Herzegovina, Czech Republic, France, Germany, Greece, Italy, Poland, Portugal, Spain and United Kingdom); and in Asia (Bangladesh, India, Israel, South Korea, Kuwait, Lebanon, Philippines, Taiwan and Turkey)

Data sources:

Data from de Sanjosé S, Eur J Cancer 2013; 49: 3450. This study has gathered the largest international series of vulva cancer cases and precancerous lesions worldwide using a standard protocol with a highly sensitive HPV DNA detection assay.

Figure 34: Comparison of the ten most frequent HPV types in VIN 2/3 cases in Europe and the World



Data updated on 09 Feb 2017 (data as of 30 Jun 2014).

^aIncludes cases from Austria, Belarus, Bosnia-Herzegovina, Czech Republic, France, Germany, Greece, Italy, Poland, Portugal, Spain and United Kingdom.

^bIncludes cases from America (Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala, Honduras, Mexico, Paraguay, Uruguay and Venezuela); Oceania (Australia and New Zealand); Europe (Austria, Belarus, Bosnia-Herzegovina, Czech Republic, France, Germany, Greece, Italy, Poland, Portugal, Spain and United Kingdom); and in Asia (Bangladesh, India, Israel, South Korea, Kuwait, Lebanon, Philippines, Taiwan and Turkey)

Data sources:

Data from de Sanjosé S, Eur J Cancer 2013; 49: 3450. This study has gathered the largest international series of vulva cancer cases and precancerous lesions worldwide using a standard protocol with a highly sensitive HPV DNA detection assay.

4.2.3 Vaginal cancer and precancerous vaginal lesions

Vaginal and cervical cancers share similar risk factors and it is generally accepted that both carcinomas share the same aetiology of HPV infection although there is limited evidence available. Women with vaginal cancer are more likely to have a history of other ano-genital cancers, particularly of the cervix, and these two carcinomas are frequently diagnosed simultaneously. HPV DNA is detected among 70% of invasive vaginal carcinomas and 91% of high-grade vaginal neoplasias (VaIN2/3). HPV16 is the most common type in high-grade vaginal neoplasias and it is detected in at least 70% of HPV-positive carcinomas (*de Martel C et al. Lancet Oncol 2012;13(6):607-15; De Vuyst H et al. Int J Cancer 2009; 124:1626-36*). In this section, the HPV burden among cases of vaginal cancer cases and precancerous vaginal lesions in Germany are presented.

Table 22: Studies on HPV prevalence among vaginal cancer cases in Germany

Study ^a	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPV types (%)
			%	(95% CI)	
Alemaný 2014	PCR-SPF10, EIA, (HPV 6, 11, 16, 18, 26, 30, 31, 33, 35, 39, 42, 45, 51, 52, 53, 56, 58, 59, 66, 67, 68, 69, 73, 82)	152	71.1	(63.4-77.7)	HPV 16 (47.4%) HPV 18 (3.3%) HPV 73 (3.3%) HPV 33 (2.6%) HPV 56 (2.6%)

Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval;

EIA: Enzyme ImmunoAssay; PCR: Polymerase Chain Reaction; SPF: Short Primer Fragment;

^aIncludes cases from Austria, Belarus, Czech Republic, France, Germany, Greece, Poland, Spain and United Kingdom

Data sources:

Based on systematic reviews (up to 2008) performed by ICO for the IARC Monograph on the Evaluation of Carcinogenic Risks to Humans volume 100B and IARC's Infections and Cancer Epidemiology Group. The ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Bouvard V, Lancet Oncol 2009;10:321 2) De Vuyst H, Int J Cancer 2009;124:1626

Alemaný L, Eur J Cancer 2014; 50: 2846

Table 23: Studies on HPV prevalence among VaIN 2/3 cases in Germany

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPV types (%)
			%	(95% CI)	
Alemaný 2014	PCR-SPF10, EIA, (HPV 6, 11, 16, 18, 26, 30, 31, 33, 35, 39, 42, 45, 51, 52, 53, 56, 58, 59, 66, 67, 68, 69, 73, 82)	96	97.9	(92.7-99.4)	HPV 16 (65.6%) HPV 33 (7.3%) HPV 18 (5.2%) HPV 52 (3.1%) HPV 73 (3.1%)
Hampf 2006	PCR-MY09/11, Sequencing (HPV 6, 11, 16, 18, 20, 21, 22, 23, 26, 30, 31, 32, 33, 35, 40, 44, 52, 56, 58)	11	90.9	(62.3-98.4)	HPV 16 (63.6%)

Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval; VaIN 2/3: Vaginal intraepithelial neoplasia of grade 2/3;

EIA: Enzyme ImmunoAssay; PCR: Polymerase Chain Reaction; SPF: Short Primer Fragment;

Based on systematic reviews (up to 2008) performed by ICO for the IARC Monograph on the Evaluation of Carcinogenic Risks to Humans volume 100B and IARC's Infections and Cancer Epidemiology Group. The ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Bouvard V, Lancet Oncol 2009;10:321 2) De Vuyst H, Int J Cancer 2009;124:1626

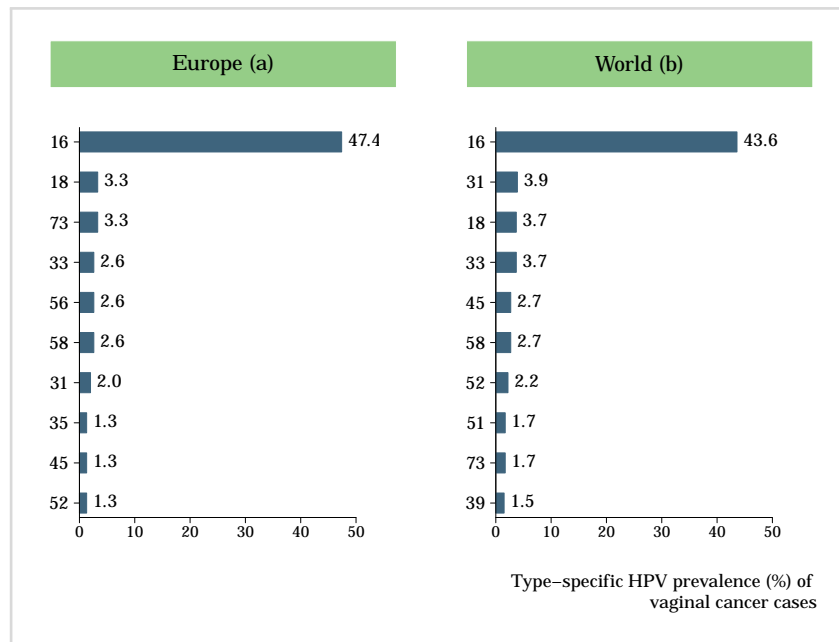
Alemaný L, Eur J Cancer 2014; 50: 2846 | Hampf M, Obstet Gynecol 2006; 108: 1361

Data sources:

Based on systematic reviews (up to 2008) performed by ICO for the IARC Monograph on the Evaluation of Carcinogenic Risks to Humans volume 100B and IARC's Infections and Cancer Epidemiology Group. The ICO HPV Information Centre has updated data until June 2015. Reference publications: 1) Bouvard V, Lancet Oncol 2009;10:321 2) De Vuyst H, Int J Cancer 2009;124:1626

Alemaný L, Eur J Cancer 2014; 50: 2846 | Hampf M, Obstet Gynecol 2006; 108: 1361

Figure 35: Comparison of the ten most frequent HPV types in cases of vaginal cancer in Europe and the World



Data updated on 09 Feb 2017 (data as of 30 Jun 2014).

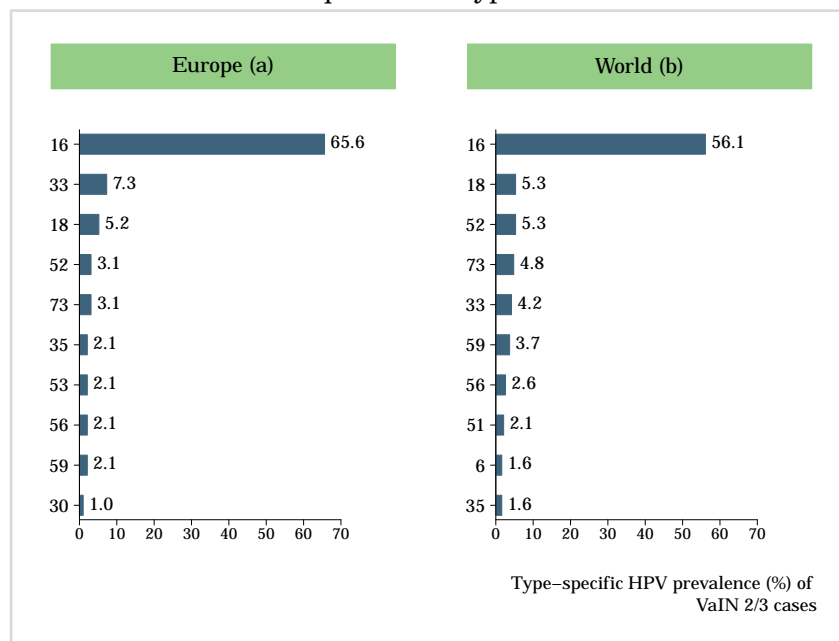
^aIncludes cases from Austria, Belarus, Czech Republic, France, Germany, Greece, Poland, Spain and United Kingdom.

^bIncludes cases from Europe (Austria, Belarus, Czech Republic, France, Germany, Greece, Poland, Spain and United Kingdom); America (Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala, Mexico, Paraguay, Uruguay, United states of America and Venezuela); Africa (Mozambique, Nigeria); Asia (Bangladesh, India, Israel, South Korea, Kuwait, Philippines, Taiwan and Turkey); and Oceania (Australia)

Data sources:

Data from Alemany L, Eur J Cancer 2014; 50: 2846. This study has gathered the largest international series of vaginal cancer cases and precancerous lesions worldwide using a standard protocol with a highly sensitive HPV DNA detection assay.

Figure 36: Comparison of the ten most frequent HPV types in VaIN 2/3 cases in Europe and the World



Data updated on 09 Feb 2017 (data as of 30 Jun 2014).

VAIN 2/3: Vaginal intraepithelial neoplasia of grade 2/3;

^aIncludes cases from Austria, Belarus, Czech Republic, France, Germany, Greece, Poland, Spain and United Kingdom.

^bIncludes cases from Europe (Austria, Belarus, Czech Republic, France, Germany, Greece, Poland, Spain and United Kingdom); America (Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala, Mexico, Paraguay, Uruguay, United states of America and Venezuela); Asia (Bangladesh, India, Israel, South Korea, Kuwait, Philippines, Taiwan and Turkey); and Oceania (Australia)

Data sources:

Data from Alemany L, Eur J Cancer 2014; 50: 2846. This study has gathered the largest international series of vaginal cancer cases and precancerous lesions worldwide using a standard protocol with a highly sensitive HPV DNA detection assay.

4.2.4 Penile cancer and precancerous penile lesions

HPV DNA is detectable in approximately 50% of all penile cancers (*de Martel C et al. Lancet Oncol 2012;13(6):607-15*). Among HPV-related penile tumours, HPV16 is the most common type detected, followed by HPV18 and HPV types 6/11 (*Miralles C et al. J Clin Pathol 2009;62:870-8*). Over 95% of invasive penile cancers are SCC and the most common penile SCC histologic sub-types are keratinising (49%), mixed warty-basaloid (17%), verrucous (8%), warty (6%), and basaloid (4%). HPV is commonly detected in basaloid and warty tumours but is less common in keratinising and verrucous tumours. In this section, the HPV burden among cases of penile cancer cases and precancerous penile lesions in Germany are presented.

Table 24: Studies on HPV prevalence among penile cancer cases in Germany

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPVs HPV type (%)
			%	(95% CI)	
Poetsch 2011	PCR- MULTIPLEX, TS (HPV 06/11, 16, 18)	52	38.5	(26.5-52.0)	HPV 16 (32.7%) HPV 6/11 (3.8%) HPV 18 (1.9%)

Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval;

PCR: Polymerase Chain Reaction; TS: Type Specific;

Data sources:

The ICO HPV Information Centre has updated data until June 2015. Reference publications (up to 2008): 1) Bouvard V, Lancet Oncol 2009;10:321 2) Miralles-Guri C, J Clin Pathol 2009;62:870

Poetsch M, Virchows Arch 2011; 458: 221

Table 25: Studies on HPV prevalence among PeIN 2/3 cases in Germany

Study	HPV detection method and targeted Method	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPVs HPV type (%)
			%	(95% CI)	
No Data Available	-	-	-	-	-

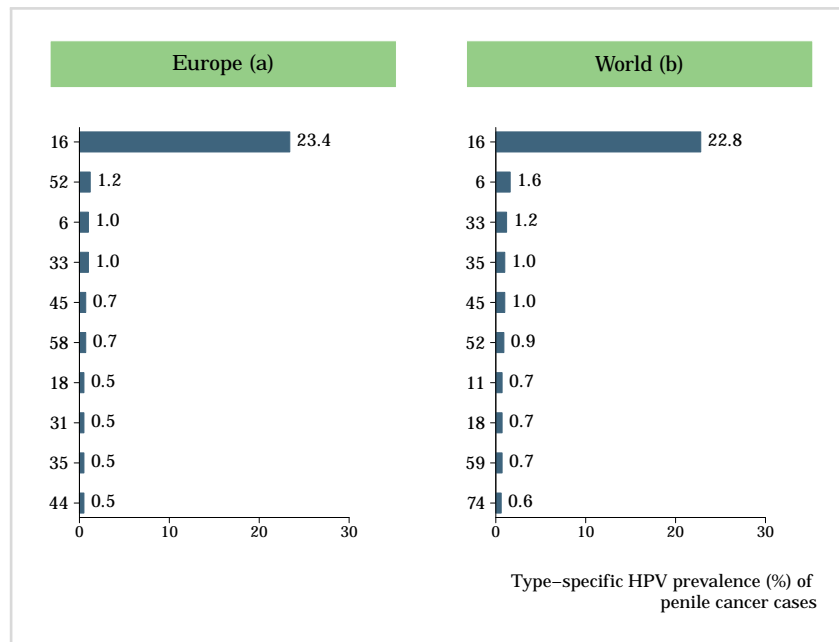
Data updated on 11 Jun 2019 (data as of 30 Jun 2015).

95% CI: 95% Confidence Interval; PeIN 2/3: Penile intraepithelial neoplasia of grade 2/3;

Data sources:

The ICO HPV Information Centre has updated data until June 2014. Reference publication (up to 2008): Bouvard V, Lancet Oncol 2009;10:321

Figure 37: Comparison of the ten most frequent HPV types in cases of penile cancer in Europe and the World



Data updated on 09 Feb 2017 (data as of 30 Jun 2015).

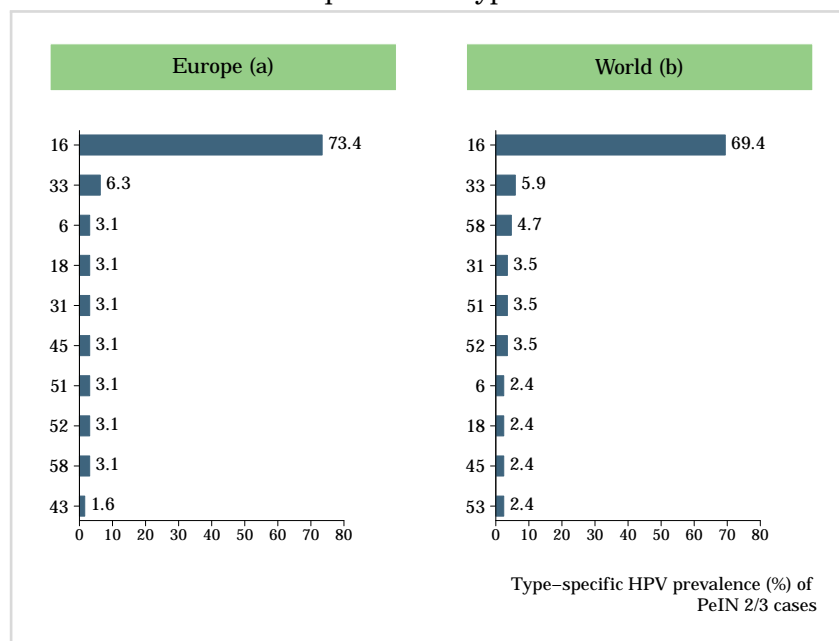
^aIncludes cases from Czech Republic, France, Greece, Poland, Portugal, Spain and United Kingdom

^bIncludes cases from Australia, Bangladesh, India, South Korea, Lebanon, Philippines, Chile, Colombia, Ecuador, Guatemala, Honduras, Mexico, Paraguay, Venezuela and United States, Mozambique, Nigeria, Senegal, Czech Republic, France, Greece, Poland, Portugal, Spain and United Kingdom.

Data sources:

Alemanly L, Eur Urol 2016; 69: 953

Figure 38: Comparison of the ten most frequent HPV types in PeIN 2/3 cases in Europe and the World



Data updated on 09 Feb 2017 (data as of 30 Jun 2015).

^aIncludes cases from Czech Republic, France, Greece, Poland, Portugal, Spain and United Kingdom

^bIncludes cases from Australia, Bangladesh, India, South Korea, Lebanon, Philippines, Chile, Colombia, Ecuador, Guatemala, Honduras, Mexico, Paraguay, Venezuela, Mozambique, Nigeria, Senegal, Czech Republic, France, Greece, Poland, Portugal, Spain and United Kingdom.

Data sources:

Alemanly L, Eur Urol 2016; 69: 953

4.3 HPV burden in men

The information to date regarding anogenital HPV infection is primarily derived from cross-sectional studies of selected populations such as general population, university students, military recruits, and studies that examined husbands of control women, as well as from prospective studies. Special subgroups include mainly studies that examined STD (sexually transmitted diseases) clinic attendees, MSM (men who have sex with men), HIV positive men, and partners of women with HPV lesions, CIN (cervical intraepithelial neoplasia), cervical cancer or cervical carcinoma in situ. Globally, prevalence of external genital HPV infection in men is higher than cervical HPV infection in women, but persistence is less likely. As with genital HPV prevalence, high numbers of sexual partners increase the acquisition of oncogenic HPV infections (Vaccine 2012, Vol. 30, Suppl 5). In this section, the HPV burden among men in Germany is presented.

Methods

HPV burden in men was based on published systematic reviews and meta-analyses (Dunne EF, J Infect Dis 2006; 194: 1044, Smith JS, J Adolesc Health 2011; 48: 540, Olesen TB, Sex Transm Infect 2014; 90: 455, and Hebnes JB, J Sex Med 2014; 11: 2630) up to October 31, 2015. The search terms for the review were human papillomavirus, men, polymerase chain reaction (PCR), hybrid capture (HC), and viral DNA. References cited in selected articles were also investigated. Inclusion criteria were: HPV DNA detection by means of PCR or HC (ISH if data are not available for the country), and a detailed description of HPV DNA detection and genotyping techniques used. The number of cases tested and HPV positive cases were extracted for each study to estimate the anogenital prevalence of HPV DNA. Binomial 95% confidence intervals were calculated for each anogenital HPV prevalence.

Table 26: Studies on HPV prevalence among men in Germany

Study	Anatomic sites samples	HPV detection method	Population	Age (years)	HPV prevalence		
					No	%	(95% CI)
Grussendorf-Conen 1987	Coronal sulcus and glans	ISH	Blood donors or patients from department of dermatology	16-79	530	5.8	(4.0-8.2)
Vardas 2011 ^a	Penis	RT-PCR-Multiplex or Biplex	Heterosexual men enrolled in a HPV vaccine trial	Median 20 (15-24)	3132	21.2	(19.8-22.7)

Data updated on 11 Jun 2019 (data as of 31 Oct 2015).

95% CI: 95% Confidence Interval;

ISH: In Situ Hybridization; PCR: Polymerase Chain Reaction; RT-PCR: Real Time Polymerase Chain Reaction;

^aIncludes cases from Australia, Brazil, Canada, Croatia, Germany, Mexico, Spain, and USA.

Data sources:

Based on published systematic reviews, the ICO HPV Information Centre has updated data until October 2015. Reference publications: 1) Dunne EF, J Infect Dis 2006; 194: 1044 2) Smith JS, J Adolesc Health 2011; 48: 540 3) Olesen TB, Sex Transm Infect 2014; 90: 455 4) Hebnes JB, J Sex Med 2014; 11: 2630. Grussendorf-Conen EI, Arch Dermatol Res 1987; 279 Suppl: S73 | Vardas E, J Infect Dis 2011; 203: 58

Table 27: Studies on HPV prevalence among men from special subgroups in Germany

Study	Anatomic sites samples	HPV detection method	Population	Age (years)	HPV prevalence		
					No	%	(95% CI)
Goldstone 2011	Penis	RT-PCR-Multiplex or Biplex	HIV- MSM	Median 22 (16-27)	602	18.4	(15.4-21.8)

(Table 27 – continued from previous page)

(Table 27 – continued from previous page)

Study	Anatomic sites samples	HPV detection method	Population	Age (years)	HPV prevalence		
					No	%	(95% CI)
Goldstone 2011	Anus	RT-PCR- Multiplex or Biplex	HIV- MSM	Median 22 (16-27)	602	42.4	(38.4-46.4)
Schneider 1988	Glans, prepuce, fossa navicularis, shaft	Filter hybridization DNA/DNA	Sexual partners of women with HPV associated lesions of the cervix	Mean 36.5	156	39.1	(31.4-47.2)
Wieland 2015	Anus	PCR-Multiplex and hybridization	HIV+ MSM	18-80	801	91.5	(89.4-93.3)

Data updated on 11 Jun 2019 (data as of 31 Oct 2015).

95% CI: 95% Confidence Interval;

PCR: Polymerase Chain Reaction; RT-PCR: Real Time Polymerase Chain Reaction;

Data sources:

Based on published systematic reviews, the ICO HPV Information Centre has updated data until October 2015. Reference publications: 1) Dunne EF, J Infect Dis 2006; 194: 1044 2) Smith JS, J Adolesc Health 2011; 48: 540 3) Olesen TB, Sex Transm Infect 2014; 90: 455 4) Hebnes JB, J Sex Med 2014; 11: 2630.

Goldstone S, J Infect Dis 2011; 203: 66 | Schneider A, J Urol 1988; 140: 1431 | Wieland U, Int J Med Microbiol 2015; 305: 689

4.4 HPV burden in the head and neck

The last evaluation of the International Agency for Research in Cancer (IARC) on the carcinogenicity of HPV in humans concluded that (a) there is enough evidence for the carcinogenicity of HPV type 16 in the oral cavity, oropharynx (including tonsil cancer, base of tongue cancer and other oropharyngeal cancer sites), and (b) limited evidence for laryngeal cancer (*IARC Monograph Vol 100B*). There is increasing evidence that HPV-related oropharyngeal cancers constitute an epidemiological, molecular and clinical distinct form as compared to non HPV-related ones. Some studies indicate that the most likely explanation for the origin of this distinct form of head and neck cancers associated with HPV is a sexually acquired oral HPV infection that is not cleared, persists and evolves into a neoplastic lesion. The most recent figures estimate that 25.6% of all oropharyngeal cancers are attributable to HPV infection with HPV16 being the most frequent type (*de Martel C. Lancet Oncol. 2012;13(6):607*). In this section, the HPV burden in the head and neck in Germany is presented..

4.4.1 Burden of oral HPV infection in healthy population

Table 28: Studies on oral HPV prevalence among healthy in Germany

Study	Method specimen collection and anatomic site	HPV detection method and targeted HPV types	Population	Age (years)	No. Tested	HPV prevalence		Prev. of 5 most frequent HPV types (%)
						%	(95% CI)	
MEN								
No Data Available	-	-	-	-	-	-	-	-
WOMEN								
No Data Available	-	-	-	-	-	-	-	-
BOTH OR UNSPECIFIED								
No Data Available	-	-	-	-	-	-	-	-

Data as of 29 Feb 2012. Only for European countries.

95% CI: 95% Confidence Interval;

Data sources:

Systematic review and meta-analysis was performed by ICO HPV Information Centre until July 2012. Pubmed was searched using the keywords oral and papillomavirus. Inclusion criteria: studies reporting oral HPV prevalence in healthy population in Europe; n > 50. Exclusion criteria: focused only in children or immunosuppressed population; not written in English; case-control studies; commentaries and systematic reviews and studies that did not use HPV DNA detection methods.

4.4.2 HPV burden in head and neck cancers

Table 29: Studies on HPV prevalence among cases of oral cavity cancer in Germany

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPV types (%)
			%	(95% CI)	
MEN					
Krüger 2014	PCR L1-Consensus primer, PCR-SPF10, LiPA (HPV 6, 11, 16, 18, 16/18, 26, 31, 33, 35, 39, 40, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 66, 68, 69, 70, 71, 73, 74, 81)	56	8.9	(3.9-19.3)	-
WOMEN					
Krüger 2014	PCR L1-Consensus primer, PCR-SPF10, LiPA (HPV 6, 11, 16, 18, 16/18, 26, 31, 33, 35, 39, 40, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 66, 68, 69, 70, 71, 73, 74, 81)	32	0.0	-	-
BOTH OR UNSPECIFIED					

(Continued on next page)

(Table 29 – continued from previous page)

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPV types (%)
			%	(95% CI)	
Klussmann 2001	A10/A5-A6/A8 (L1) and CP62/70-CP65/69a (L1) Sequencing	22	18.2	(7.3-38.5)	HPV 16 (13.6%) HPV 19 (4.5%)
Krüger 2014	PCR L1-Consensus primer, PCR-SPF10, LiPA (HPV 6, 11, 16, 18, 16/18, 26, 31, 33, 35, 39, 40, 43, 44, 45, 51, 52, 53, 54, 56, 58, 59, 66, 68, 69, 70, 71, 73, 74, 81)	88	5.7	(2.5-12.6)	-
Ostwald 2003	TS-PCR E6 for 6/11/16/18 Hybridization with TS probes (6/11, 16, 18)	118	43.2	(34.6-52.2)	HPV 16 (29.7%) HPV 18 (13.6%)
Weiss 2011	RT-PCR E6/E7 for 16 Hybridization with TS probes (16)	34	2.9	(0.5-14.9)	HPV 16 (2.9%)

Data as of 31 Dec 2015. Only for European countries.

95% CI: 95% Confidence Interval;

LiPA: Line Probe Assay; PCR: Polymerase Chain Reaction; RT-PCR: Real Time Polymerase Chain Reaction; SPF: Short Primer Fragment; TS: Type Specific;

Data sources:

Based on systematic reviews and meta-analysis performed by ICO. Reference publications: 1) Ndiaye C, Lancet Oncol 2014; 15: 1319 2) Kreimer AR, Cancer Epidemiol Biomarkers Prev 2005; 14: 467

Klussmann JP, Cancer 2001; 92: 2875 | Krüger M, J Craniomaxillofac Surg 2014; 42: 1506 | Ostwald C, Med Microbiol Immunol 2003; 192: 145 | Weiss D, Head Neck 2011; 33: 856

Table 30: Studies on HPV prevalence among cases of oropharyngeal cancer in Germany

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPV types (%)
			%	(95% CI)	
MEN					
Hoffmann 2010	GP5+/GP6+ (L1). MY09/MY11 (L1) and TS-PCR for 6/11/16/18 Hybridization with TS probes - Multiplex luminex*	31	54.8	(37.8-70.8)	HPV 16 (51.6%) HPV 35 (6.5%)
Krupar 2014	PCR-E6, PCR-E7, PCR-MULTIPLEX (HPV 11, 16, 18, 31, 33, 35, 39, 42, 43, 44, 45, 51, 52, 56, 58, 59, 66, 68)	34	50.0	(34.1-65.9)	HPV 16 (50.0%)
Reimers 2007	A10/A5-A6/A8 (L1) and CP62/70-CP65/69a (L1) Sequencing	83	25.3	(17.2-35.6)	-
WOMEN					
Hoffmann 2010	GP5+/GP6+ (L1). MY09/MY11 (L1) and TS-PCR for 6/11/16/18 Hybridization with TS probes - Multiplex luminex*	8	50.0	(21.5-78.5)	HPV 16 (50.0%)
Reimers 2007	A10/A5-A6/A8 (L1) and CP62/70-CP65/69a (L1) Sequencing	23	39.1	(22.2-59.2)	-
BOTH OR UNSPECIFIED					
Andl 1998	TS-PCR for 6/11/16/18 Hybridization with TS probes (6, 11, 16, 18) and cycle sequencing system of BRL	21	52.4	(32.4-71.7)	HPV 16 (38.1%) HPV 33 (4.8%)
Hoffmann 1998	MY09/MY11 (L1) and TS-PCR for 6/11/16/18/33 SBH (6, 11, 16, 18, 31, 33, 45)	23	26.1	(12.5-46.5)	HPV 16 (8.7%) HPV 45 (8.7%) HPV 6 (4.3%)

(Continued on next page)

(Table 30 – continued from previous page)

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPV types (%)
			%	(95% CI)	
Hoffmann 2010	GP5+/GP6+ (L1). MY09/MY11 (L1) and TS-PCR for 6/11/16/18 Hybridization with TS probes - Multiplex luminex*	39	53.8	(38.6-68.4)	HPV 16 (51.3%) HPV 35 (5.1%)
Holzinger 2012	PCR-GP5+/6+, PCR L1-Consensus primer, PCR-MULTIPLEX (HPV 16, 18, 33, 35)	199	50.3	(43.4-57.1)	HPV 16 (48.7%) HPV 18 (0.5%) HPV 33 (0.5%) HPV 35 (0.5%)
Klussmann 2001	A10/A5-A6/A8 (L1) and CP62/70-CP65/69a (L1) Sequencing	33	45.5	(29.8-62.0)	HPV 16 (42.4%) HPV 5 (3.0%) HPV 33 (3.0%) HPV 96 (3.0%)
Krupar 2014	PCR-E6, PCR-E7, PCR-MULTIPLEX (HPV 11, 16, 18, 31, 33, 35, 39, 42, 43, 44, 45, 51, 52, 56, 58, 59, 66, 68)	34	50.0	(34.1-65.9)	HPV 16 (50.0%)
Reimers 2007	A10/A5-A6/A8 (L1) and CP62/70-CP65/69a (L1) Sequencing	106	28.3	(20.6-37.5)	HPV 16 (27.4%) HPV 33 (0.9%)
Weiss 2011	RT-PCR E6/E7 for 16 Hybridization with TS probes (16)	86	38.4	(28.8-48.9)	HPV 16 (38.4%)
Wittekindt 2005	A10/A5-A6/A8 (L1) and (L1) Sequencing	34	52.9	(36.7-68.5)	HPV 16 (50.0%) HPV 33 (2.9%)

Data as of 31 Dec 2015. Only for European countries.

95% CI: 95% Confidence Interval;

PCR: Polymerase Chain Reaction; RT-PCR: Real Time Polymerase Chain Reaction; SBH: Southern Blot Hybridization; TS: Type Specific;

Data sources:

Based on systematic reviews and meta-analysis performed by ICO. Reference publications: 1) Ndiaye C, Lancet Oncol 2014; 15: 1319 2) Kreimer AR, Cancer Epidemiol Biomarkers Prev 2005; 14: 467

Andl T, Cancer Res 1998; 58: 5 | Hoffmann M, Acta Otolaryngol 1998; 118: 138 | Hoffmann M, Int J Cancer 2010; 127: 1595 | Holzinger D, Cancer Res 2012; 72: 4993 | Klussmann JP, Cancer 2001; 92: 2875 | Krupar R, Eur Arch Otorhinolaryngol 2014; 271: 1737 | Reimers N, Int J Cancer 2007; 120: 1731 | Weiss D, Head Neck 2011; 33: 856 | Wittekindt C, Adv Otorhinolaryngol 2005; 62: 72

Table 31: Studies on HPV prevalence among cases of hypopharyngeal or laryngeal cancer in Germany

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPV types (%)
			%	(95% CI)	
MEN					
Hoffmann 2006	MY09/MY11 (L1) and TS-PCR for 6/11/16/18/33 Hybridization with TS and consensus probes and further confirmation by SBH with TS and consensus probes (6. 11. 16. 18. 31. 33. 45)	17	23.5	(9.6-47.3)	HPV 16 (23.5%)
Hoffmann 2009	MY09/MY11 (L1) and TS-PCR for 6/11/16/18 Hybridization with TS and consensus probes and further confirmation by SBH with TS and consensus probes (6. 11. 16. 18. 31. 33. 45)	21	33.3	(17.2-54.6)	HPV 16 (19.0%)
WOMEN					

(Continued on next page)

(Table 31 – continued from previous page)

Study	HPV detection method and targeted HPV types	No. Tested	HPV prevalence		Prevalence of 5 most frequent HPVs HPV type (%)
			%	(95% CI)	
Hoffmann 2006	MY09/MY11 (L1) and TS-PCR for 6/11/16/18/33 Hybridization with TS and consensus probes and further confirmation by SBH with TS and consensus probes (6. 11. 16. 18. 31. 33. 45)	3	33.3	(6.1-79.2)	HPV 16 (33.3%)
Hoffmann 2009	MY09/MY11 (L1) and TS-PCR for 6/11/16/18 Hybridization with TS and consensus probes and further confirmation by SBH with TS and consensus probes (6. 11. 16. 18. 31. 33. 45)	6	16.7	(3.0-56.4)	-
BOTH OR UNSPECIFIED					
Fischer 2003	L1-CP65F. 66F. 69F. 70F Sequencing	47	34.0	(22.2-48.3)	HPV 73 (4.3%) HPV 21 (2.1%) HPV 22 (2.1%) HPV 38 (2.1%) HPV 41 (2.1%)
Hoffmann 1998	MY09/MY11 (L1) and TS-PCR for 6/11/16/18/33 SBH (6. 11. 16. 18. 31. 33. 45)	51	21.6	(12.5-34.6)	HPV 16 (3.9%) HPV 18 (2.0%) HPV 45 (2.0%)
Hoffmann 2006	MY09/MY11 (L1) and TS-PCR for 6/11/16/18/33 Hybridization with TS and consensus probes and further confirmation by SBH with TS and consensus probes (6. 11. 16. 18. 31. 33. 45)	20	25.0	(11.2-46.9)	HPV 16 (25.0%)
Hoffmann 2009	MY09/MY11 (L1) and TS-PCR for 6/11/16/18 Hybridization with TS and consensus probes and further confirmation by SBH with TS and consensus probes (6. 11. 16. 18. 31. 33. 45)	27	29.6	(15.9-48.5)	HPV 16 (14.8%)
Kleist 2000	MY09/MY11 (L1) Amplification with TS primers (16. 18)	35	20.0	(10.0-35.9)	HPV 16 (8.6%) HPV 18 (8.6%)
Klussmann 2001	A10/A5-A6/A8 (L1) and CP62/70-CP65/69a (L1) Sequencing	30	16.7	(7.3-33.6)	HPV 16 (13.3%) HPV 19 (3.3%)
Krupar 2014	PCR-E6, PCR-E7, PCR-MULTIPLY (HPV 11, 16, 18, 31, 33, 35, 39, 42, 43, 44, 45, 51, 52, 56, 58, 59, 66, 68)	49	0.0	-	-

Data as of 31 Dec 2015. Only for European countries.

95% CI: 95% Confidence Interval;

PCR: Polymerase Chain Reaction; SBH: Southern Blot Hybridization; TS: Type Specific;

Data sources:

Based on systematic reviews and meta-analysis performed by ICO. Reference publications: 1) Ndiaye C, Lancet Oncol 2014; 15: 1319 2) Kreimer AR, Cancer Epidemiol Biomarkers Prev 2005; 14: 467

Fischer M, Acta Otolaryngol 2003; 123: 752 | Hoffmann M, Acta Otolaryngol 1998; 118: 138 | Hoffmann M, Anticancer Res 2006; 26: 663 | Hoffmann M, Oncol Rep 2009; 21: 809 | Kleist B, J Oral Pathol Med 2000; 29: 432 | Klussmann JP, Cancer 2001; 92: 2875 | Krupar R, Eur Arch Otorhinolaryngol 2014; 271: 1737

5 Factors contributing to cervical cancer

HPV is a necessary cause of cervical cancer, but it is not a sufficient cause. Other cofactors are necessary for progression from cervical HPV infection to cancer. Tobacco smoking, high parity, long-term hormonal contraceptive use, and co-infection with HIV have been identified as established cofactors. Co-infection with Chlamydia trachomatis and herpes simplex virus type-2, immunosuppression, and certain dietary deficiencies are other probable cofactors. Genetic and immunological host factors and viral factors other than type, such as variants of type, viral load and viral integration, are likely to be important but have not been clearly identified. (Muñoz N, Vaccine 2006; 24(S3): 1-10). In this section, the prevalence of smoking, parity (fertility), oral contraceptive use, and HIV in Germany are presented.

Table 32: Factors contributing to cervical carcinogenesis (cofactors) in Germany

INDICATOR ^a		MALE	FEMALE	TOTAL
Smoking				
Smoking of any tobacco adjusted prevalence (%) [95% CI]	Current ^{1,b,c,±}	33.1 [27.3-40.1]	28.5 [23.0-34.4]	30.7 [25.1-37.2]
	Daily ^{1,b,d,±}	27.6 [22.4-33.2]	21.0 [16.7-25.0]	24.2 [19.5-29.0]
Cigarette smoking adjusted prevalence (%) [95% CI]	Current ^{1,b,c,±}	30.4 [23.3-36.8]	26.4 [20.3-32.4]	28.3 [21.8-34.5]
	Daily ^{1,b,d,±}	25.9 [20.5-31.5]	20.4 [16.1-24.6]	23.1 [18.2-28.0]
Parity				
Total fertility rate per woman ^{2,e,±}		-	1.4	-
Age-specific fertility rate (per 1000 women)	15-19 years ^{3,e,*}	-	7.8	-
	20-24 years ^{3,e,*}	-	37.5	-
	25-29 years ^{3,e,*}	-	76.4	-
	30-34 years ^{3,e,*}	-	97.2	-
	35-39 years ^{3,e,*}	-	52.4	-
	40-44 years ^{3,e,*}	-	9.0	-
45-49 years ^{3,e,*}		-	0.4	-
Hormonal contraception				
Oral contraceptive use (%) among women 18-49yrs who are married or in union ^{4,f,*}		-	37.2	-
Hormonal contraception use (%) (pill, injectable or implant), among women 18-49yrs who are married or in union ^{4,f,g,*}		-	38.2	-
HIV				
Estimated percent of adults aged 15-49 who are living with HIV [low estimate - high estimate] ^{5,h}		-	-	-
Estimated percent of young adults aged 15-24 who are living with HIV [low estimate - high estimate] ^{5,h}		-	-	-
HIV prevalence (%) among female sex workers in the capital city ^{5,i}		-	-	-
HIV prevalence (%) among men who have sex with men in the capital city ^{5,±}		5.2	-	-
Estimated number of adults (15+ years) living with HIV [low estimate - high estimate] ^{5,j}		-	-	-
Estimated number of adults and children living with HIV [low estimate - high estimate] ^{5,j}		-	-	-
Estimated number of AIDS deaths in adults and children [low estimate - high estimate] ^{5,h}		-	-	-

Data accessed on 22 Mar 2017.

^aPlease refer to original source for methods of estimation of the following indicators.

^bAdjusted and age-standardized prevalence estimates of tobacco use by country, for the year 2013. These rates are constructed solely for the purpose of comparing tobacco use prevalence estimates across countries, and should not be used to estimate the number of smokers in the population.

^c"Current" means smoking at the time of the survey, including daily and non-daily smoking. "Tobacco smoking" means smoking any form of tobacco, including cigarettes, cigars, pipes, hookah, shisha, water-pipe, etc. and excluding smokeless tobacco.

^d"Daily" means smoking every day at the time of the survey. "Tobacco smoking" means smoking any form of tobacco, including cigarettes, cigars, pipes, hookah, shisha, water-pipe, etc. and excluding smokeless tobacco.

^eThe number of women by age is estimated by the United Nations Population Division and published in World Population Prospects: the 2015 Revision.

^fData pertain to women with co-resident male partner.

^gProportion (%) of women using hormonal contraception (pill, injectable or implant), among those of reproductive age who are married or in union.

^hEstimates include all people with HIV infection, regardless of whether they have developed symptoms of AIDS.

ⁱData on key populations at higher risk from country progress reports typically derive from surveys in capital cities and are not representative of the entire country. In particular, surveys in capital cities are likely to overestimate national HIV prevalence and service coverage.

^jThe number of people with HIV infection, whether or not they have developed symptoms of AIDS, estimated to be alive at the end of a specific year.

^kThe estimated number of adults and children that have died due to HIV/AIDS in a specific year.

Year of estimate: ± 2013; ± 2015; * 2012; * 2005;

Data sources:

¹WHO report on the global tobacco epidemic, 2015: The MPOWER package. Geneva, World Health Organization, 2015. Available at http://www.who.int/tobacco/global_report/2015/en/index.html

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(Table 32 – continued from previous page)

²Eurostat - Statistical office of the European Commission [web site]. Luxembourg: European Commission; 2015. Available at: <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tsdde220&plugin=1>. [Accessed on March 22, 2017].

³United Nations, Department of Economic and Social Affairs, Population Division (2015). World Fertility Data 2015 (POP/DB/Fert/Rev2015). Available at: <http://www.un.org/en/development/desa/population/publications/dataset/fertility/wfd2015.shtml>. [Accessed on March 22, 2017].

⁴United Nations, Department of Economic and Social Affairs, Population Division (2016). World Contraceptive Use 2016 (POP/DB/CP/Rev2016). <http://www.un.org/en/development/desa/population/publications/dataset/contraception/wcu2016.shtml>. Available at: [Accessed on March 22, 2017].

⁵UNAIDS database [internet]. Available at: <http://aidsinfo.unaids.org/> [Accessed on March 22, 2017]

6 Sexual and reproductive health behaviour indicators

Sexual intercourse is the primary route of transmission of genital HPV infection. Information about sexual and reproductive health behaviours is essential to the design of effective preventive strategies against anogenital cancers. In this section, we describe sexual and reproductive health indicators that may be used as proxy measures of risk for HPV infection and anogenital cancers. Several studies have reported that earlier sexual debut is a risk factor for HPV infection, although the reason for this relationship is still unclear. In this section, information on sexual and reproductive health behaviour in Germany are presented.

Table 33: Percentage of 15-year-olds who have had sexual intercourse in Germany

Indicator	Male	Female
Percentage of 15-year-old subjects who report sexual intercourse	22	19

Data accessed on 16 Mar 2017.

Fifteen-year-olds teenagers only were asked whether they had ever had sexual intercourse.

Year of estimation: 2013-2014

Please refer to original source for methods of estimation

Data sources:

Growing up unequal: gender and socioeconomic differences in young people's health and well-being. Health Behaviour in School-aged Children (HBSC) study: international report from the 2013/2014 survey. Inchley J, Currie D, Young T, et al. Copenhagen, WHO Regional Office for Europe, 2016 (Health Policy for Children and Adolescents, No. 7). Available at: http://www.euro.who.int/_data/assets/pdf_file/0003/303438/HBSC-No.7-Growing-up-unequal-Full-Report.pdf?ua=1

Table 34: Median age at first sex in Germany

Study	Year/period	Birth cohort	MALE		FEMALE		TOTAL	
			N	Median age at first sex	N	Median age at first sex	N	Median age at first sex
Griesinger 2007 ¹	2004	1984-1990 ^{a,b}	-	-	521	15.2	-	-
Hubert 1998 ²	1990	1922-1931 ^{c,d}	125	20.2	161	20.9	-	-
		1932-1941 ^{c,d}	203	19.0	237	19.7	-	-
		1942-1951 ^{c,d}	263	18.4	325	18.6	-	-
		1952-1961 ^{c,d}	362	18.0	454	17.5	-	-
		1962-1966 ^{c,d}	263	17.7	241	17.6	-	-
		1967-1971 ^{c,d}	182	17.7	198	17.7	-	-

Data accessed on 16 Mar 2017.

N: number of subjects;

^aData pertain to women attending a sample of gynaecologists in Berlin.

^bMean age at first sex.

^cData from the Survey performed in the Federal Republic of Germany (before reunification).

^dNot specified if estimations are among sexually active or surveyed.

Data sources:

¹Griesinger G, Gille G, Klapp C, von Otte S, Diedrich K. Sexual behaviour and Chlamydia trachomatis infections in German female urban adolescents, 2004. Clin. Microbiol. Infect. 2007 abr;13(4):436-9.

²Hubert M, Bajos N, Sandfort T. Sexual behaviour and HIV/AIDS in Europe: comparisons of national surveys. London: UCL Press; 1998.

Table 35: Marriage patterns in Germany

Indicator	Male	Female	
Average age at first marriage ¹	34.2	32	
Age-specific % of ever married ²	15-19 years	0.04	0.29
	20-24 years	2.29	6.51
	25-29 years	14.5	26.9
	30-34 years	36.3	51.5
	35-39 years	53.5	65.5
	40-44 years	63.1	73.5
45-49 years	72.2	81.4	

Data accessed on 16 Mar 2017.

Year of estimate: 2013;

Please refer to original source for methods of estimation.

Data sources:

¹The world bank: health nutrition and population statistics. Updated 16-Dec-2016. Accessed on March 16 2017. Available at <http://data.worldbank.org/data-catalog/health-nutrition-and-population-statistics>

²United Nations, Department of Economic and Social Affairs, Population Division (2015). World Marriage Data 2015 (POP/DB/Marr/Rev2015). Available at: <http://www.un.org/en/development/desa/population/theme/marriage-unions/WMD2015.shtml> Accessed on April 3, 2017.

Table 36: Average number of sexual partners in Germany

Study	Period of estimate	Year/Period	Birth cohort	Male	Female	Total
				Mean(N)	Mean(N)	Mean(N)
Griesinger 2007 ^{1,a}	Lifetime	2004	(1984-1990)	-(-)	3.5(521)	-(-)
Hubert 1998 ^{2,b,c}	Last year	1990	(1941-1972)	1.4(927)	1.1(1,056)	-(-)

Data accessed on 08 Aug 2013.

N: number of subjects sexually active;

^aData pertain to women attending a sample of gynecologists in Berlin.^bData from the Survey performed in the Federal Republic of Germany (before reunification).^cData from "every man/woman who presents herself as heterosexual"; all partners are included.**Data sources:**¹Griesinger G, Gille G, Klapp C, von Otte S, Diedrich K. Sexual behaviour and Chlamydia trachomatis infections in German female urban adolescents, 2004. Clin. Microbiol. Infect. 2007 abr;13(4):436-9.²Hubert M, Bajos N, Sandfort T. Sexual behaviour and HIV/AIDS in Europe: comparisons of national surveys. London: UCL Press; 1998.

Table 37: Lifetime prevalence of anal intercourse among women in Germany

Study ^{a,b}	Year/Period	Birth cohort	FEMALE		
			N surveyed	N sexual active	% among sexually active
Hubbert 1998	1990	(1921-1972)	-	856	15.5

Data accessed on 08 Aug 2013.

N: number of subjects.

^aData from the Survey performed in the Federal Republic of Germany (before reunification).^bData pertain to women in current steady heterosexual relationship.**Data sources:**

Hubert M, Bajos N, Sandfort T. Sexual behaviour and HIV/AIDS in Europe: comparisons of national surveys. London: UCL Press; 1998.

7 HPV preventive strategies

It is established that well-organised cervical screening programmes or widespread good quality cytology can reduce cervical cancer incidence and mortality. The introduction of HPV vaccination could also effectively reduce the burden of cervical cancer in the coming decades. This section presents indicators on basic characteristics and performance of cervical cancer screening, status of HPV vaccine licensure and introduction in Germany.

7.1 Cervical cancer screening practices

Screening strategies differ between countries. Some countries have population-based programmes, where in each round of screening women in the target population are individually identified and invited to attend screening. This type of programme can be implemented nationwide or only in specific regions of the country. In opportunistic screening, invitations depend on the individual's decision or on encounters with health-care providers. The most frequent method for cervical cancer screening is cytology, and there are alternative methods such as HPV DNA tests and visual inspection with acetic acid (VIA). VIA is an alternative to cytology-based screening in low-resource settings (the 'see and treat' approach). HPV DNA testing is being introduced into some countries as an adjunct to cytology screening ('co-testing') or as the primary screening test to be followed by a secondary, more specific test, such as cytology.

Table 38: Main characteristics of cervical cancer screening in Germany

Availability of a cervical cancer screening programme ^α	Yes
Quality assurance structure and mandate to supervise and to monitor the screening process ^β	No
Active invitation to screening ^γ	No
Main screening test used for primary screening	Cytology
Undergoing demonstration projects	HPV test
Screening ages (years)	Above 20
Screening interval or frequency of screenings	1 year

Data accessed on 31 Dec 2016.

^αPublic national cervical cancer screening program in place (Cytology/VIA/HPV testing). Countries may have clinical guidelines or protocols, and cervical cancer screening services in a private sector but without a public national program. Publicly mandat

^βSelf-reported quality assurance: Organised programmes provide for a national or regional team responsible for implementation and require providers to follow guidelines, rules, or standard operating procedures. They also define a quality assurance structur

^γSelf-reported active invitation or recruitment, as organised population-based programmes, identify and personally invite each eligible person in the target population to attend a given round of screening.

Data sources:

Cervical cancer screening in Europe: Quality assurance and organisation of programmes. Elfström KM, Arnheim-Dahlström L, von Karsa L, Dillner J. Eur J Cancer. 2015 May;51(8):950-68. doi: 10.1016/j.ejca.2015.03.008. Epub 2015 Mar 25. PMID: 25817010

Cervical cancer burden and prevention activities in Europe. Kesic V, Poljak M, Rogovskaya S. Cancer Epidemiol Biomarkers Prev. 2012 Sep;21(9):1423-33. doi: 10.1158/1055-9965.EPI-12-0181. Review. PMID: 22956728

Table 39: Estimated coverage of cervical cancer screening in Germany

Reference	Year	Population	Urban vs rural or both (all)	N Women	Age range	Within the last year(s)	Coverage (%) ^b
EUROSTAT Germany ^{1,a}	2002	National screening programme	All	-	-	-	55.9
	2009	General female population	All	-	20-69	3y	78.7
	2012	General female population	All	-	20-69	3y	52.8
OECD Health Data 2007 ^{2,a}	2002	General female population	-	-	20-49	5y	55.9
Staker 2013 ^{3,e}	2008-2011	General female population	All	2,242	20-79	1y	52.8
WHS Germany ^{4,f}	2003	2002-2003 General female population	All	478	25-64	3y	74.1

Data accessed on 31 Dec 2016.

^aSurvey data. European Health Interview Survey data

^bProportion of women in the total sample of the mentioned age range in the country or region that reported having a Pap smear during a given time period (e.g., last year, last 2, 3, 5 years or ever).

^cProgramme data. Gesetzliche Krankenversicherung, GKV, national health insurance data (Gesetzliche Krankenversicherung, GKV).

^dSurvey data. The German Health Interview and Examination Survey for Adults (DEGS1) is part of the health monitoring of the Robert Koch Institute (RKI) and is designed as a combined cross-sectional and longitudinal survey. The aim of the study is to repeatedly provide nationally representative data on the health status of the adult general population (18-79 years) in Germany. A total of 8,152 persons participated.

^eThe German Health Interview and Examination Survey for Adults (DEGS1) is part of the health monitoring of the Robert Koch Institute (RKI) and is designed as a combined cross-sectional and longitudinal survey. The aim of the study is to repeatedly provide nationally representative data on the health status of the adult general population (18-79 years) in Germany. A total of 8,152 persons participated.

^fWHO Household Surveys with multistage cluster sampling. Screening coverage among women aged 18-69. World Health Surveys. Geneva: World Health Organization (WHO); 2003.

^aData from the Gesetzliche Krankenversicherung. Insurance data from GKV includes information from a combined screening system involving various cancer sites for different ages offered in an unorganized form to all women with health insurance. Zentralinstitut

Data sources:

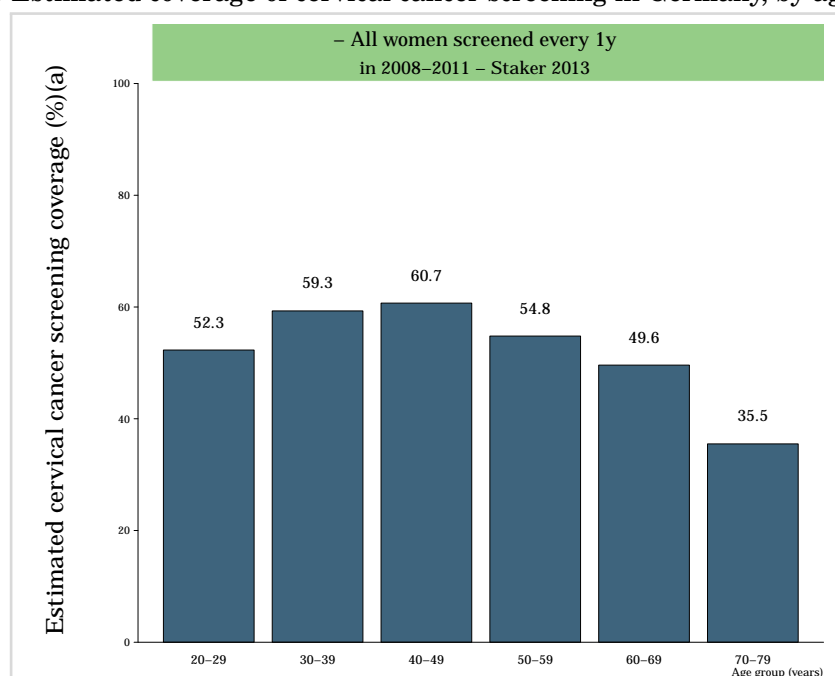
¹European Commission (2015). EUROSTAT, the statistical office of the European Union (internet). Luxembourg. Available at: <http://ec.europa.eu/eurostat/web/main/home> [accessed by October 2015]

²Garcia Armesto S., Gil Lapetra M.L., Wei L., Kelleyand E., and the Members of the HCQI Expert Group. Health Care Quality Indicators Project 2006 Data Collection Update Report. Paris; France: Organisation for Economic Co-operation and Development (OECD); 2007. Report No.: DELSA/HEA/WD/HWP(2007)4; OECD HEALTH WORKING PAPERS NO. 29.

³Starker A. Inanspruchnahme von Krebsfrüherkennungsuntersuchungen. Ergebnisse der Studie zur Gesundheit Erwachsener in Deutschland (DEGS1) [Participation in cancer screening in Germany: results of the German Health Interview and Examination Survey for Adults (DEGS1)]. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz. 2013 May;56(5-6):858-67. doi: 10.1007/s00103-012-1655-4.

⁴World Health Organization (WHO). Germany-World Health Survey 2003 (DEU_2003_WHS_v01_M). Available at: <http://apps.who.int/healthinfo/systems/surveydata/index.php/catalog/123> [Accessed by October 2015]

Figure 39: Estimated coverage of cervical cancer screening in Germany, by age and study

**Data accessed on 31 Dec 2016.**

^aProportion of women in the total sample of the mentioned age range in the country or region that reported having a Pap smear during a given time period (e.g., last year, last 2, 3, 5 years or ever).

^bThe German Health Interview and Examination Survey for Adults (DEGS1) is part of the health monitoring of the Robert Koch Institute (RKI) and is designed as a combined cross-sectional and longitudinal survey. The aim of the study is to repeatedly provide nationally representative data on the health status of the adult general population (18-79 years) in Germany. A total of 8,152 persons participated.

Data sources:

ICO Information Centre on HPV and Cancer. Country-specific references identified in each country-specific report as general recommendation from relevant scientific organizations and/or publications.

¹Starker A. Inanspruchnahme von Krebsfrüherkennungsuntersuchungen. Ergebnisse der Studie zur Gesundheit Erwachsener in Deutschland (DEGS1) [Participation in cancer screening in Germany: results of the German Health Interview and Examination Survey for Adults (DEGS1)]. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz. 2013 May;56(5-6):858-67. doi: 10.1007/s00103-012-1655-4.

Table 40: Estimated coverage of cervical cancer screening in Germany , by region

Region	N Women	Age range	LY ^a	Population	Coverage (%) ^b	Year(s) studied	Reference ^{1,α}
Bielefeld	532	25-75	2y	General female population	86.7	2000	Klug 2005
	532	25-75	Ever	General female population	94.2	2000	Klug 2005

Data accessed on 31 Dec 2016.^aLY: Within the last year(s).^bProportion of women in the total sample of the mentioned age range in the country or region that reported having a Pap smear during a given time period (e.g., last year, last 2, 3, 5 years or ever).^αSample of 1,500 randomly selected women aged 25-75 years living in Bielefeld were mailed a questionnaire with reply of 540 and analysis of 532 questionnaires. Klug SJ, Hetzer M, Blettner M. Screening for breast and cervical cancer in a large German city:

Data sources:

¹Klug SJ, Hetzer M, Blettner M. Screening for breast and cervical cancer in a large German city: participation, motivation and knowledge of risk factors. Eur J Public Health 2005 Feb;15(1):70-7.

7.2 HPV vaccination

Table 41: National HPV Immunization programme in Germany

	Female	Male
Year of introduction	2007	-
Primary target age (years)	9-14	-
Organized catch-up age (years)	-	-
Opportunistic catch-up age (years)	<18	-
Strategy	Health C.	-
Schedule ^{a,b}	2-doses <14/15 (since mid-2014) 3-doses standard the rest	-

Since 2007 to 2014, the German routine immunization schedule offered free vaccination to 12-17 year-old girls. In 2014 the calendar has changed targeting primarily 9-14 aged girls with a 2-dose schedule (0-6m), complemented by a catch-up vaccination of g

Data updated on 11 Jul 2017 (data as of 31 Dec 2016)

^a 2 doses: 0-6m if not otherwise stated. Since 2014, based on clinical trials results several agencies responsible for the scientific evaluation of medicines, like the European Medicines Agency, approved a two-dose schedule for girls aged less than 15 or 14 depending on the vaccine (Cervarix or Gardasil).

^b 3-doses standard: administration of three doses following the standard vaccination schedule as 0-2-6 months for the quadrivalent vaccine or 0-1-6 months for the bivalent vaccine.

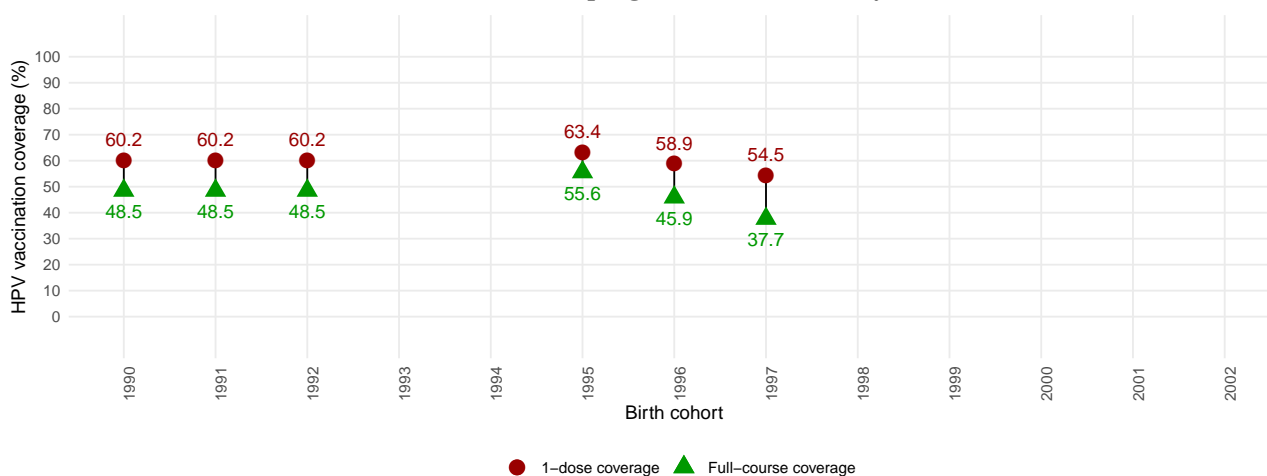
Data sources:

¹ Adapted from Bruni et al 2016 Lancet Global Health (data up to October 2014).

Specifically, data from Germany was extracted from:

² Robert Koch Institut. Humane Papillomaviren (HPV). Empfehlungen der Ständigen Impfkommission [Recommendations of the Standing Committee on Vaccination] [Internet]. Available from: http://www.rki.de/DE/Content/Infekt/Impfen/ImpfungenAZ/HPV/HPV.html;jsessionid=BA438FF3F430A7D0E5B4B5CE790535B0_2_cid372

Figure 40: Reported HPV vaccination coverage in females by birth cohort in National HPV Immunization programme in Germany



Data updated on 11 Jul 2017 (data as of 31 Oct 2014)

Data sources:

¹ Adapted from Bruni et al 2016 Lancet Global Health (data up to October 2014).

² Poethko-Müller C, Buttman-Schweiger N, KiGGS Study Group. [HPV vaccination coverage in German girls?: Results of the KiGGS study: first follow-up (KiGGS Wave 1)]. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz. 2014 Jul;57(7):869-77.

³ Deléré Y, Böhmer MM, Walter D, Wichmann O. HPV vaccination coverage among women aged 18-20 years in Germany three years after recommendation of HPV vaccination for adolescent girls: Results from a cross-sectional survey. Hum Vaccin Immunother. 2013 Aug 1;9(8):1706-11.

8 Protective factors for cervical cancer

Male circumcision and the use of condoms have shown a significant protective effect against HPV transmission.

Table 42: Prevalence of male circumcision in Germany

Reference	Prevalence % (95% CI)	Methods
Hoschke 2013	6.7	N=10,000: General population
WHO 2007	<20	Data from Demographic and Health Surveys (DHS) and other publications to categorize the country-wide prevalence of male circumcision as <20%, 20-80%, or >80%.

Data accessed on 31 Aug 2015.

95% CI: 95% Confidence Interval;

Please refer to country-specific reference(s) for full methodologies.

Data sources:

Based on systematic reviews and meta-analysis performed by ICO. The ICO HPV Information Centre has updated data until August 2015. Reference publication: Albero G, Sex Transm Dis. 2012 Feb;39(2):104-13.

Hoschke B, Urologe A 2013; 52: 562 | WHO 2007: Male circumcision: Global trends and determinants of prevalence, safety and acceptability

Table 43: Prevalence of condom use in Germany

Indicator	Year of estimate	Prevalence % ^a
Condom use	2005	6.2

Data accessed on 21 Mar 2017.

Please refer to original source for methods of estimation.

^a Condom use: Proportion of male partners who are using condoms with their female partners of reproductive age (15-49 years) to whom they are married or in union by country.**Data sources:**United Nations, Department of Economic and Social Affairs, Population Division (2016). World Contraceptive Use 2016 (POP/DB/CP/Rev2016). <http://www.un.org/en/development/desa/population/publications/dataset/contraception/wcu2016.shtml>. Available at: [Accessed on March 22, 2017].

Germany 2005 Generations and Gender Survey

9 Indicators related to immunisation practices other than HPV vaccines

This section presents data on immunisation coverage and practices for selected vaccines. This information will be relevant for assessing the country's capacity to introduce and implement the new HPV vaccines. The data are periodically updated and posted on the WHO Immunisation surveillance, assessment and monitoring website at http://who.int/immunization_monitoring/en/.

9.1 Immunisation schedule

Table 44: General immunization schedule in Germany

Vaccine	Schedule	Coverage ^a	Comment
Diphtheria and tetanus toxoid with acellular pertussis vaccine	2, 3, 4, 11-14 months;	entire	-
Hexavalent diphtheria, tetanus toxoid with acellular pertussis, Hib, hepatitis B and IPV vaccine	2, 3, 4, 11-14 months;	entire	-
Diphtheria and tetanus toxoid with acellular pertussis, Hib and IPV vaccine	2, 3, 4, 11-14 months;	entire	-
Hepatitis B pediatric dose vaccine	2, 4, 11-14 months;	entire	-
Human Papillomavirus vaccine	9-14 years x2;	entire	females - catch up for Y14-Y17 (x3 doses)
Influenza adult dose vaccine	> 60 years;	entire	elderly, pregnant women, health care workers, adults with chronic disease and other risk groups
Influenza pediatric dose vaccine	-	entire	children with chronic disease
Meningococcal C conjugate vaccine	11-23 months;	entire	-
Measles mumps and rubella vaccine	11-14, 15-23 months;	entire	And adults born after 1970
Measles, mumps, rubella and varicella vaccine	15-23 months;	entire	-
Pneumococcal conjugate vaccine	2, 4, 11-14 months;	entire	-
Pneumococcal polysaccharide vaccine	>=60 years;	entire	-
Rotavirus vaccine	6, 10, 14 weeks;	entire	3rd dose depending on vaccine presentation
Tick borne encephalitis vaccine	> 2 years;	part	population in defined high risk regions
Tetanus and diphtheria toxoids and acellular pertussis vaccine	5-6 years;	entire	every 10 years
Tetanus and diphtheria toxoid with acellular pertussis and IPV vaccines	9-17 years;	entire	-
Varicella vaccine	11-14, 15-23 months;	entire	-

Data accessed on 27 Jan 2017.

The schedules are the country official reported figures

^aEntire:introduced in the entire country. Part:partially introduced.

Data sources:

Annual WHO/UNICEF Joint Reporting Form (Update of 2015/July/15). Geneva, Immunization, Vaccines and Biologicals (IVB), World Health Organization. Available at: http://www.who.int/immunization/monitoring_surveillance/en/

9.2 Immunisation coverage estimates

Table 45: Immunization coverage estimates in Germany

Indicator	Year of estimation	Coverage (%)
Third dose of diphtheria toxoid, tetanus toxoid and pertussis vaccine	2015	-
Third dose of hepatitis B vaccine administered to infants	2015	88
Third dose of Haemophilus influenzae type B vaccine	2015	94
Measles-containing vaccine	2015	97
Third dose of polio vaccine	2015	95

Data accessed on 27 Jan 2017.

The coverage figures (%) are the country official reported figures. Immunization coverage levels are presented as a percentage of a target population that has been vaccinated.

Data sources:

Annual WHO/UNICEF Joint Reporting Form and WHO Regional offices reports (Update of 2015/July/16). Geneva, Immunization, Vaccines and Biologicals (IVB), World Health Organization. Available at: http://www.who.int/immunization/monitoring_surveillance/en/

10 Glossary

Table 46: Glossary

Term	Definition
Incidence	Incidence is the number of new cases arising in a given period in a specified population. This information is collected routinely by cancer registries. It can be expressed as an absolute number of cases per year or as a rate per 100,000 persons per year (see Crude rate and ASR below). The rate provides an approximation of the average risk of developing a cancer.
Mortality	Mortality is the number of deaths occurring in a given period in a specified population. It can be expressed as an absolute number of deaths per year or as a rate per 100,000 persons per year.
Prevalence	The prevalence of a particular cancer can be defined as the number of persons in a defined population who have been diagnosed with that type of cancer, and who are still alive at the end of a given year, the survivors. Complete prevalence represents the number of persons alive at certain point in time who previously had a diagnosis of the disease, regardless of how long ago the diagnosis was, or if the patient is still under treatment or is considered cured. Partial prevalence, which limits the number of patients to those diagnosed during a fixed time in the past, is a particularly useful measure of cancer burden. Prevalence of cancers based on cases diagnosed within one, three and five years are presented as they are likely to be of relevance to the different stages of cancer therapy, namely, initial treatment (one year), clinical follow-up (three years) and cure (five years). Patients who are still alive five years after diagnosis are usually considered cured since the death rates of such patients are similar to those in the general population. There are exceptions, particularly breast cancer. Prevalence is presented for the adult population only (ages 15 and over), and is available both as numbers and as proportions per 100,000 persons.
Crude rate	Data on incidence or mortality are often presented as rates. For a specific tumour and population, a crude rate is calculated simply by dividing the number of new cancers or cancer deaths observed during a given time period by the corresponding number of person years in the population at risk. For cancer, the result is usually expressed as an annual rate per 100,000 persons at risk.
ASR (age-standardised rate)	An age-standardised rate (ASR) is a summary measure of the rate that a population would have if it had a standard age structure. Standardization is necessary when comparing several populations that differ with respect to age because age has a powerful influence on the risk of cancer. The ASR is a weighted mean of the age-specific rates; the weights are taken from population distribution of the standard population. The most frequently used standard population is the World Standard Population. The calculated incidence or mortality rate is then called age-standardised incidence or mortality rate (world). It is also expressed per 100,000. The world standard population used in GLOBOCAN is as proposed by Segi [1] and modified by Doll and al. [2]. The age-standardised rate is calculated using 10 age-groups. The result may be slightly different from that computed using the same data categorised using the traditional 5 year age bands.
Cumulative risk	Cumulative incidence/mortality is the probability or risk of individuals getting/dying from the disease during a specified period. For cancer, it is expressed as the number of new born children (out of 100, or 1000) who would be expected to develop/die from a particular cancer before the age of 75 if they had the rates of cancer observed in the period in the absence of competing causes.
Cytologically normal women	No abnormal cells are observed on the surface of their cervix upon cytology.

(Continued)

Table 46 – Continued

Term	Definition
Cervical Intraepithelial Neoplasia (CIN) / Squamous Intraepithelial Lesions (SIL)	SIL and CIN are two commonly used terms to describe precancerous lesions or the abnormal growth of squamous cells observed in the cervix. SIL is an abnormal result derived from cervical cytological screening or Pap smear testing. CIN is a histological diagnosis made upon analysis of cervical tissue obtained by biopsy or surgical excision. The condition is graded as CIN 1, 2 or 3, according to the thickness of the abnormal epithelium (1/3, 2/3 or the entire thickness).
Low-grade cervical lesions (LSIL/CIN-1)	Low-grade cervical lesions are defined by early changes in size, shape, and number of ab-normal cells formed on the surface of the cervix and may be referred to as mild dysplasia, LSIL, or CIN-1.
High-grade cervical lesions (HSIL / CIN-2 / CIN-3 / CIS)	High-grade cervical lesions are defined by a large number of precancerous cells on the sur-face of the cervix that are distinctly different from normal cells. They have the potential to become cancerous cells and invade deeper tissues of the cervix. These lesions may be referred to as moderate or severe dysplasia, HSIL, CIN-2, CIN-3 or cervical carcinoma in situ (CIS).
Carcinoma in situ (CIS)	Preinvasive malignancy limited to the epithelium without invasion of the basement membrane. CIN 3 encompasses the squamous carcinoma in situ.
Invasive cervical cancer (ICC) / Cervical cancer	If the high-grade precancerous cells invade the basement membrane is called ICC. ICC stages range from stage I (cancer is in the cervix or uterus only) to stage IV (the cancer has spread to distant organs, such as the liver).
Invasive squamous cell carcinoma	Invasive carcinoma composed of cells resembling those of squamous epithelium
Adenocarcinoma	Invasive tumour with glandular and squamous elements intermingled.
Eastern Europe	References included in Belarus, Bulgaria, Czech Republic, Hungary, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia, and Ukraine.
Northern Europe	References included in Denmark, Estonia, Finland, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, and United Kingdom of Great Britain and Northern Ireland.
Southern Europe	References included in Albania, Bosnia and Herzegovina, Croatia, Greece, Italy, Malta, Montenegro, Portugal, Serbia, Slovenia, Spain, The former Yugoslav Republic of Macedonia.
Western Europe	References included in Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Netherlands, and Switzerland.
Europe PREHDICT	References included in Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, The former Yugoslav Republic of Macedonia, Turkey, Ukraine, and United Kingdom of Great Britain and Northern Ireland.

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Institut Català d'Oncologia (ICO), in alphabetic order

Albero G, Barrionuevo-Rosas L, Bosch FX, Bruni L, de Sanjosé S, Gómez D, Mena M, Muñoz J, Serrano B.

7th Framework Programme grant PREHDICT project: health-economic modelling of PREvention strategies for Hpv-related Diseases in European CounTries. Coordinated by Drs. Johannes Berkhof and Chris Meijer at VUMC, Vereniging Voor Christelijk Hoger Onderwijs Wetenschappelijk Onderzoek En Patientenzorg, the Netherlands.

(http://cordis.europa.eu/projects/rcn/94423_en.html)

7th Framework Programme grant HPV AHEAD project: Role of human papillomavirus infection and other co-factors in the aetiology of head and neck cancer in India and Europe. Coordinated by Dr. Massimo Tommasino at IARC, International Agency of Research on Cancer, Lyon, France.

(http://cordis.europa.eu/project/rcn/100268_en.html)

International Agency for Research on Cancer (IARC)

Note to the reader

Anyone who is aware of relevant published data that may not have been included in the present report is encouraged to contact the HPV Information Centre for potential contributions.

Although efforts have been made by the HPV Information Centre to prepare and include as accurately as possible the data presented, mistakes may occur. Readers are requested to communicate any errors to the HPV Information Centre, so that corrections can be made in future volumes.

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