



# Human Papillomavirus and Related Cancers

Summary Report Update. September 15, 2010.

## INDIA

---



## Rights

### ©WHO/ICO Information Centre on HPV and Cervical Cancer (HPV Information Centre) 2010

All rights reserved. Publications of the WHO/ICO Information Centre on HPV and Cervical Cancer (HPV Information Centre) can be obtained from HPV Information Centre Secretariat, Institut Català d'Oncologia, Avda. Gran Via, s/n Km 2.7 08907 L'Hospitalet de Llobregat (Barcelona, Spain)(e-mail: [hpvcentre@iconcologia.net](mailto:hpvcentre@iconcologia.net)). Requests for permission to reproduce or translate HPV Information Centre publications - whether for sale or for noncommercial distribution - should be addressed to HPV Information Centre Secretariat, at the above address (e-mail: [hpvcentre@iconcologia.net](mailto:hpvcentre@iconcologia.net)).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the HPV Information Centre concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the HPV Information Centre in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the HPV Information Centre to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the HPV Information Centre be liable for damages arising from its use.

### Recommended citation:

*WHO/ICO Information Centre on HPV and Cervical Cancer (HPV Information Centre). Human Papillomavirus and Related Cancers in India. Summary Report 2010. [Date accessed]. Available at [www.who.int/hpvcentre](http://www.who.int/hpvcentre)*

## **Preface**

### **Preface to the third edition**

Since the first edition of the HPV Information Centre, GLOBOCAN, one of the landmark products of the International Agency for Research on Cancer (IARC), serves as the reference source of cancer statistics. GLOBOCAN is a resource that provides on a regular basis the most accurate assessment of global cancer burden in the world. On June 1st 2010, the new edition of GLOBOCAN, GLOBOCAN 2008, was launched and new cancer estimates for 2008 are currently available.

This third edition of the HPV Information Centre incorporates the new burden estimates for all HPV-related cancers. In addition to the publicly available GLOBOCAN 2008, IARC has kindly provided the HPV Information Centre with age-specific estimates for HPV-related cancers which are also presented in this report.

### **Preface to the second edition**

The available data on the epidemiology and prevention of HPV infection and HPV-related cancers at the country-specific level has grown substantially since the first edition of the HPV Information Centre in 2007.

This second edition reflects the continuous efforts to update our previous data and to expand the information to include new statistics. Thus, the user of the website ([www.who.int/hpvcentre](http://www.who.int/hpvcentre)) will be able to find and manage new indicators on the burden of other HPV-related cancers (such as that of the vulva, vagina, anus, penis, oral cavity and pharynx), HPV in anogenital cancers, HPV in men, sexual and reproductive behaviour practices, HPV preventive strategies of cervical screening, HPV vaccine licensure and introduction, and male circumcision.

The HPV Information Centre team hopes that this update will be a useful resource to help formulate recommendations and public health interventions towards the prevention of cervical cancer and HPV-related diseases in each country.

### **Preface to the first edition**

The main aim of this report is to summarize the information available on human papillomavirus (HPV) and cervical cancer at the country-specific level. The World Health Organization (WHO) in collaboration with the Institut Català d'Oncologia (ICO) have developed the WHO/ICO Information Centre on HPV and Cervical Cancer (HPV Information Centre) to evaluate the burden of disease in the country and to help facilitate stakeholders and relevant bodies of decision makers to formulate recommendations on cervical cancer prevention, including the implementation of the newly developed HPV vaccines.

Data aggregated are derived from data and official reports produced by the World Health Organization (WHO), International Agency for Research on Cancer (IARC), United Nations, The World Bank, and published literature. Indicators include relevant statistics on cancer, epidemiological determinants of cervical cancer such as demographics, socioeconomic factors and other risk factors, estimates on the burden of HPV infection, data on immunization and cervical cancer screening. These statistics are essential when planning and implementing cervical cancer prevention strategies. Therefore, we have integrated the most important information for each country into a report and on a website ([www.who.int/hpvcentre](http://www.who.int/hpvcentre)) to provide a user-friendly tool to assess the best available information in each country.

The information presented here is intended as a resource for all who are working towards the prevention of cervical cancer.

## **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) and head and neck cancers. HPV types 16 and 18 are responsible for about 70% of all cervical cancer cases worldwide. HPV vaccines that prevent against HPV 16 and 18 infection are now available and have the potential to reduce the incidence of cervical and other anogenital cancers.

This report provides key information for India 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 immunization indicators. The report is intended to strengthen the guidance for health policy implementation of primary and secondary cervical cancer prevention strategies in the country.

India has a population of 366.58 millions women ages 15 years and older who are at risk of developing cervical cancer. Current estimates indicate that every year 134420 women are diagnosed with cervical cancer and 72825 die from the disease. Cervical cancer ranks as the 1st most frequent cancer among women in India, and the 1st most frequent cancer among women between 15 and 44 years of age. About 7.9% of women in the general population are estimated to harbour cervical HPV infection at a given time., and 82.5% of invasive cervical cancers are attributed to HPVs 16 or 18.

Table 1: Key Statistics on India

<b>Population</b>		
Women at risk for cervical cancer (Female population aged >=15 yrs)		366.58 millions
<b>Burden of cervical cancer and other HPV-related cancers</b>		
Annual number of cervical cancer cases		134420
Annual number of cervical cancer deaths		72825
Projected number of new cervical cancer cases in 2025*		203757
Projected number of cervical cancer deaths in 2025*		115171
Crude incidence rates per 100,000 population and year:		
	Male	Female
Cervical cancer	-	23.5
Anal cancer	0.0-0.5†	0.1-0.4†
Vulva cancer	-	0.1-0.6†
Vaginal cancer	-	0.0-0.7†
Penile cancer	0.6-1.5†	-
Oral cavity	7.4	4.3
Pharynx (excluding nasopharynx)	6.0	1.5
<b>Burden of cervical HPV infection</b>		
HPV prevalence (%) in the general population (among women with normal cytology)		7.9
Prevalence (%) of HPV 16 and/or HPV 18 among women with:		
	Normal cytology	6.0
	Low-grade cervical lesions (LSIL/CIN-1)	29.4
	High-grade cervical lesions (HSIL/ CIN-2 / CIN-3 / CIS)	56.0
	Cervical cancer	82.5
<b>Other factors contributing to cervical cancer</b>		
Smoking prevalence (%), women		2.8
Total fertility rate (live births per women)		2.8
Oral contraceptive use (%)		3.1
HIV prevalence (%), adults (15-49 years)		0.3
<b>Sexual behaviour</b>		
Median age at first sexual intercourse among men (25-54 years) / women (25-49 years)		- / 17.6
% of young men/women (15-24 years) who had sex before the age of 15		- / -
<b>Cervical screening practices and recommendations</b>		
Cervical cancer screening coverage, % (age and screening interval, reference)	2.6% (All women aged 18-69 yrs screened every 3yrs; WHS India) 4.9% (Urban women aged 18-69 yrs screened every 3yrs; WHS India) 2.3% (Rural women aged 18-69 yrs screened every 3yrs; WHS India)	
Screening ages (years)		-
Screening interval (years) or frequency of screens		-
<b>HPV vaccine</b>		
HPV vaccine licensure		
	Bivalent Vaccine (Cervarix)	Yes
	Quadrivalent Vaccine (Gardasil/Silgard)	Yes
HPV vaccine introduction		
	HPV vaccine schedule	-
	Introduction in entire or part of the country	-
	Comment:	-
HPV vaccine recommendation		
	Recommendation for primary target population:	-
	Recommendation for "catch-up" population:	-
	Recommendation for vaccinating males:	-

\*Projected burden in 2025 is estimated by applying current population forecasts for the country and assuming that current incidence/mortality rates of cervical cancer are constant over time.

†Range of crude incidence rates of the following registries: Chennai, Karunagappally, Mumbai, Nagpur, New Delhi, Poona, Trivandrum

# Contents

<b>Executive summary</b>	<b>iv</b>
<b>1 Introduction</b>	<b>2</b>
<b>2 Demographic and socioeconomic factors</b>	<b>4</b>
<b>3 Burden of HPV related cancers</b>	<b>6</b>
3.1 Cervical cancer . . . . .	6
3.1.1 Incidence . . . . .	6
3.1.2 Mortality . . . . .	12
3.1.3 Comparison of incidence and mortality . . . . .	16
3.2 Anogenital cancers other than the cervix . . . . .	17
3.2.1 Anal cancer . . . . .	17
3.2.2 Vulvar Cancer . . . . .	19
3.2.3 Vaginal cancer . . . . .	20
3.2.4 Penile cancer . . . . .	21
3.3 Head and neck cancers . . . . .	22
3.3.1 Oral cavity . . . . .	22
3.3.2 Pharynx (excluding nasopharynx) . . . . .	24
<b>4 HPV related statistics</b>	<b>25</b>
4.1 HPV burden in women with normal cytology, precancerous cervical lesions or invasive cervical cancer . . . . .	25
4.1.1 Terminology . . . . .	26
4.1.2 HPV prevalence in women with normal cytology . . . . .	27
4.1.3 HPV type distribution among women with normal cytology, precancerous cervical lesions and cervical cancer . . . . .	28
4.2 HPV burden in anogenital cancers other than the cervix . . . . .	33
4.2.1 Anal cancer . . . . .	33
4.2.2 Vulvar cancer . . . . .	36
4.2.3 Vaginal cancer . . . . .	38
4.2.4 Penile cancer . . . . .	39
4.3 HPV burden in men . . . . .	41
<b>5 Factors contributing to cervical cancer</b>	<b>42</b>
<b>6 Sexual and reproductive health behaviour indicators</b>	<b>43</b>
<b>7 HPV preventive strategies</b>	<b>45</b>
7.1 Cervical cancer screening practices . . . . .	45
7.2 HPV vaccination . . . . .	48
7.2.1 HPV vaccine licensure and introduction . . . . .	48
7.2.2 Country recommendations on the inclusion of HPV vaccines in national immunization programmes . . . . .	48
7.3 Male circumcision and condom use . . . . .	49
<b>8 Indicators related to immunization practices other than HPV vaccines</b>	<b>50</b>
8.1 Immunization schedule . . . . .	50
8.2 Immunization coverage estimates . . . . .	51
8.3 Other immunization indicators . . . . .	53

## List of Figures

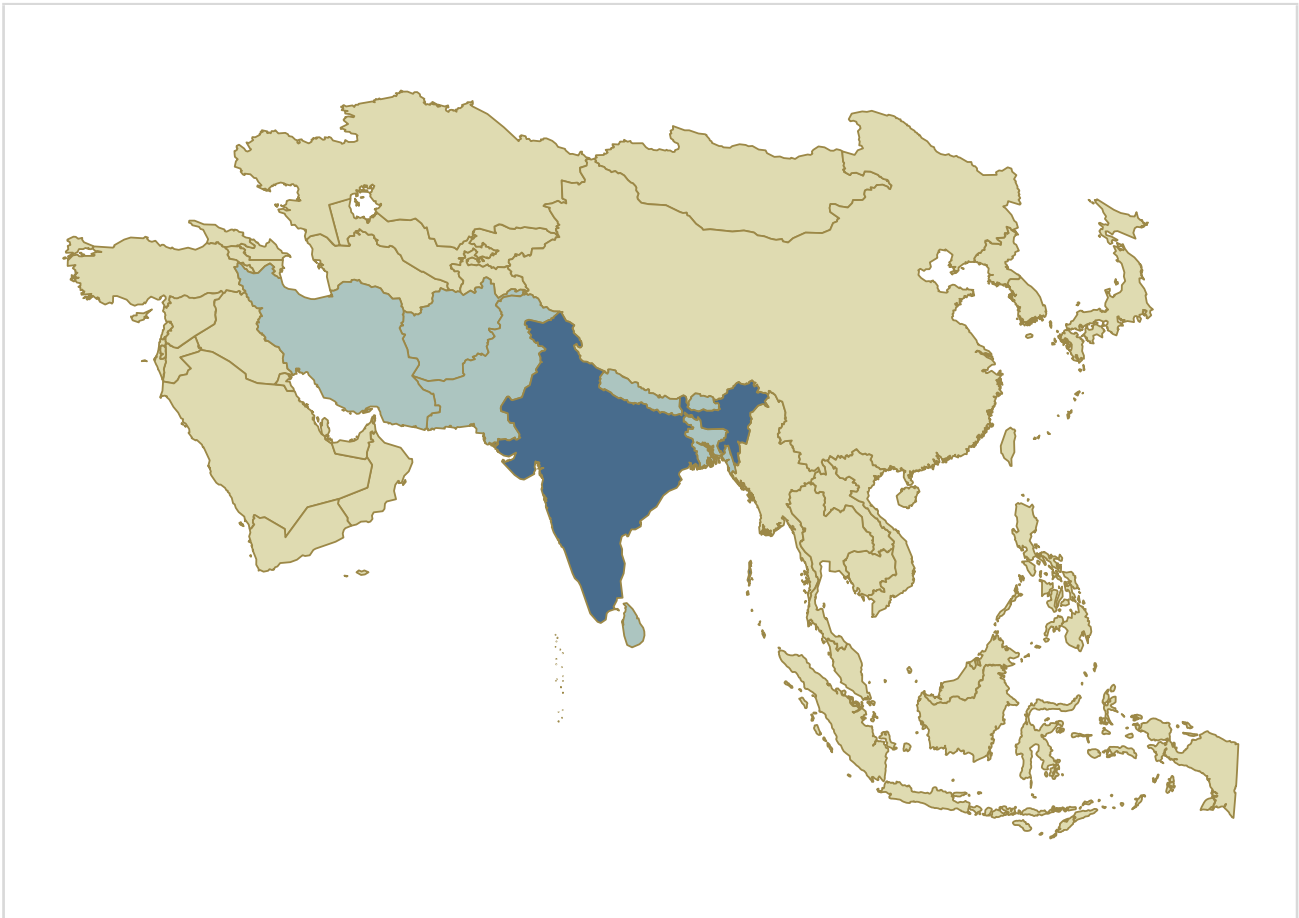
1	India in Southern Asia . . . . .	2
2	Population pyramid of India . . . . .	4
3	Population trends of four selected age groups in India . . . . .	4
4	Incidence of cervical cancer compared to other cancers in women of all ages in India . . . . .	7
5	Age-specific cervical cancer incidence compared to age-specific incidence of other cancers among women 15-44 years of age in India . . . . .	7
6	Age-standardized incidence rates (ASR) of cervical cancer in countries of Southern Asia . . . . .	8
7	Time trends of age-truncated (15-85 years) incidence rates of cervical cancer by histological type in India . . . . .	9
8	Age-specific incidence rates of cervical cancer in India compared to estimates in Southern Asia and the World . . . . .	10
9	Annual number of new cases of cervical cancer by age group in India and Southern Asia . . . . .	10
10	Estimated number of new cases of cervical cancer in India by age group, in 2008 and projected in 2025 . . . . .	11
11	Cervical cancer mortality compared to other cancers in women of all ages in India . . . . .	12
12	Age-specific mortality rates of cervical cancer compared to age-specific mortality rates of other cancers among women 15-44 years of age in India . . . . .	13
13	Age-standardized (ASR) mortality rates of cervical cancer in countries of Southern Asia . . . . .	13
14	Age-specific mortality rates of cervical cancer in India compared to estimates in Southern Asia and the World . . . . .	14
15	Annual number of deaths of cervical cancer by age group in India and Southern Asia . . . . .	14
16	Estimated number of deaths of cervical cancer in India by age group, in 2008 and projected in 2025 . . . . .	15
17	Comparison of age-specific incidence and mortality rates of cervical cancer in India . . . . .	16
18	Incidence rates of anal cancer by age group in India . . . . .	18
19	Incidence rates of vulvar cancer by age group in India . . . . .	19
20	Incidence rates of vaginal cancer by age group in India . . . . .	20
21	Incidence rates of penile cancer by age group in India . . . . .	21
22	Comparison of incidence and mortality rates of oral cavity cancer by age group in India . . . . .	23
23	Comparison of incidence and mortality rates of pharyngeal cancer by age group in India . . . . .	24
24	Crude age-specific HPV prevalence in women with normal cytology in India compared to Southern Asia and the World. . . . .	27
25	Ten most frequent HPV types among women with and without cervical lesions in India compared to Southern Asia and the World . . . . .	29
26	Ten most frequent HPV types among women with invasive cervical cancer in India compared to Southern Asia and the World, by histology . . . . .	30
27	Ten most frequent HPV types among cases of anal cancer in India compared to the World . . . . .	35
28	Ten most frequent HPV types among cases of vulvar cancer in India compared to the World . . . . .	37
29	Ten most frequent HPV types among vaginal cancer cases in India compared to the World . . . . .	38
30	Ten most frequent HPV types among cases of penile cancer in India compared to the World . . . . .	40
31	Estimated coverage of cervical cancer screening in India, by age and study . . . . .	46
32	DTP (Diphtheria, Tetanus and Pertussis) vaccine coverage (3rd dose completed) in India . . . . .	51
33	Hepatitis B vaccine coverage (3rd dose completed) in India . . . . .	51
34	Measles-containing vaccine coverage in India . . . . .	52
35	Polio vaccine coverage (3rd dose completed) in India . . . . .	52

## List of Tables

1	Key Statistics on India	v
2	Sociodemographic indicators in India	5
3	Incidence of cervical cancer in India, Southern Asia and the World	6
4	Incidence of cervical cancer in India by cancer registry	6
5	Age-standardized incidence rates of cervical cancer by histological type and cancer registry in India	8
6	Percentage distribution of microscopically verified cases of cervical cancer by histological type and cancer registry in India	9
7	Mortality of cervical cancer in India, Southern Asia and the World	12
8	Incidence of anal cancer by cancer registry and sex in India	17
9	Incidence of vulvar cancer by cancer registry in India	19
10	Incidence of vaginal cancer by cancer registry in India	20
11	Incidence of penile cancer by cancer registry in India	21
12	Incidence and mortality of cancer of the oral cavity by sex in India, Southern Asia and the World	22
13	Incidence and mortality of cancer of the pharynx (excluding nasopharynx) by sex in India, Southern Asia and the World	24
14	Prevalence of HPV among women with normal cytology	27
15	Prevalence of HPV-16 and HPV-18 by cytology in India, Southern Asia and the World	28
16	Type-specific HPV prevalence in women with normal cytology, precancerous cervical lesions and invasive cervical cancer in India	31
17	Type-specific HPV prevalence among invasive cervical cancer cases in India, by histology	32
18	Studies on HPV prevalence among cases of anal cancer in India	33
19	Pooled estimate of HPV prevalence among cases of anal cancer by sex in India	34
20	Pooled estimate of HPV prevalence among men who have sex with men (MSM) and non-MSM with anal cancer in India	34
21	Pooled estimate of HPV prevalence among cases of anal cancer by histology in India	34
22	Studies on HPV prevalence among cases of vulvar cancer in India	36
23	Pooled estimate of HPV prevalence among cases of vulvar cancer by histology in India	37
24	Studies on HPV prevalence among cases of vaginal cancer in India	38
25	Studies on HPV prevalence among cases of penile cancer in India	39
26	Pooled estimate of HPV prevalence among cases of penile cancer by histology in India	40
27	Studies on HPV prevalence among men in India	41
28	Studies on high-risk HPV Prevalence among men in India	41
29	Factors contributing to cervical carcinogenesis (cofactors) in India	42
30	Time of sexual intercourse and high-risk sexual behaviour in India, for females and males	43
31	Reproductive health indicators in India	44
32	Main characteristics of cervical cancer screening in India	45
33	Estimated coverage of cervical cancer screening in India	46
34	Estimated coverage of cervical cancer screening in India, by region	47
35	Licensure status of current HPV vaccines in India	48
36	HPV vaccine introduction in India	48
37	Summary of national HPV vaccine recommendations and programmatic aspects in India	48
38	Prevalence of male circumcision in India	49
39	Prevalence of condom use in India	49
40	General immunization schedule in India	50
41	Relevant indicators of vaccine implementation in India.	53

# 1 Introduction

Figure 1: India in Southern Asia



The WHO/ICO Information Centre on HPV and Cervical Cancer (HPV Information Centre) aims to compile and centralize updated data and statistics on human papillomavirus (HPV) and related cancers. This report aims to summarize the data available to fully evaluate the burden of disease in India 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 immunization. The report is structured into the following sections:

**Section 2** summarizes the socio-demographic profile of the country. For analytical purposes, India is classified in the geographical region of Southern Asia (Figure 1, lighter blue), which is composed of the following countries:\* Afghanistan, Bangladesh, Bhutan, India, Iran, Islamic Republic of, Maldives, Nepal, Pakistan and Sri Lanka. Throughout the report, India estimates will be complemented with corresponding estimates in the Southern Asia region to provide the regional situation. When data are not available for India only regional estimates are shown.

**Section 3** describes the current burden of invasive cervical cancer and other HPV-related cancers in India and the Southern Asia region with estimates of prevalence, incidence and mortality rates.

**Section 4** reports on the prevalence of HPV and HPV type-specific distribution in women with normal cytology, pre-cancerous lesions and invasive cervical cancer. In addition, the burden of HPV in other anogenital cancers (anal, vulva, vagina and penis) and men are presented.

\*See <http://unstats.un.org/unsd/methods/m49/m49regin.htm> for more information.

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

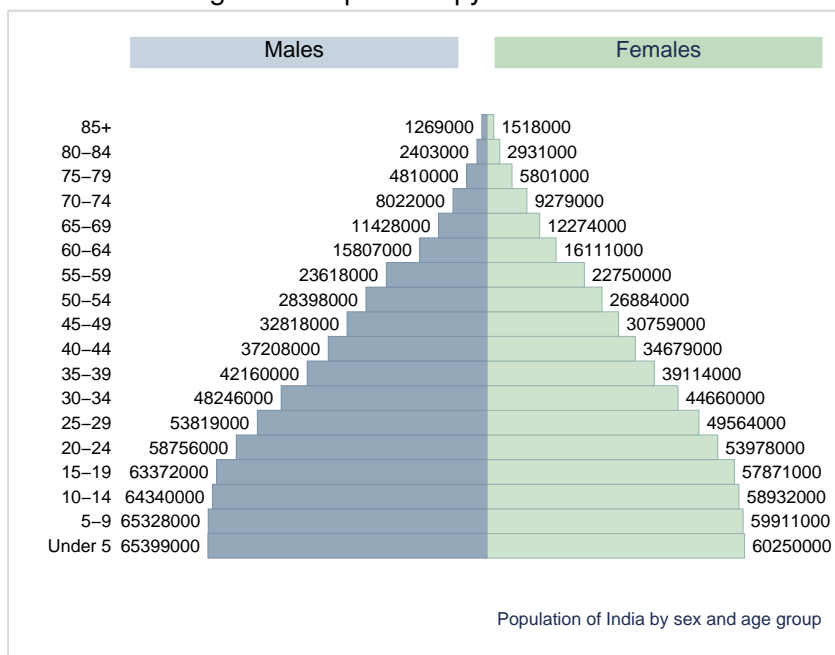
**Section 6** describes sexual and reproductive health behaviour indicators that may be used as proxy measures of risk for HPV infection and anogenital cancers.

**Section 7** presents preventive strategies that include basic characteristics and performance of cervical cancer screening status, status of HPV vaccine licensure introduction, and recommendations in national immunization programs and the prevalence of male circumcision and condom use.

**Section 8** presents data on immunization 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 immunization surveillance, assessment and monitoring website. ([http://www.who.int/immunization\\_monitoring/en/](http://www.who.int/immunization_monitoring/en/)).

## 2 Demographic and socioeconomic factors

Figure 2: Population pyramid of India

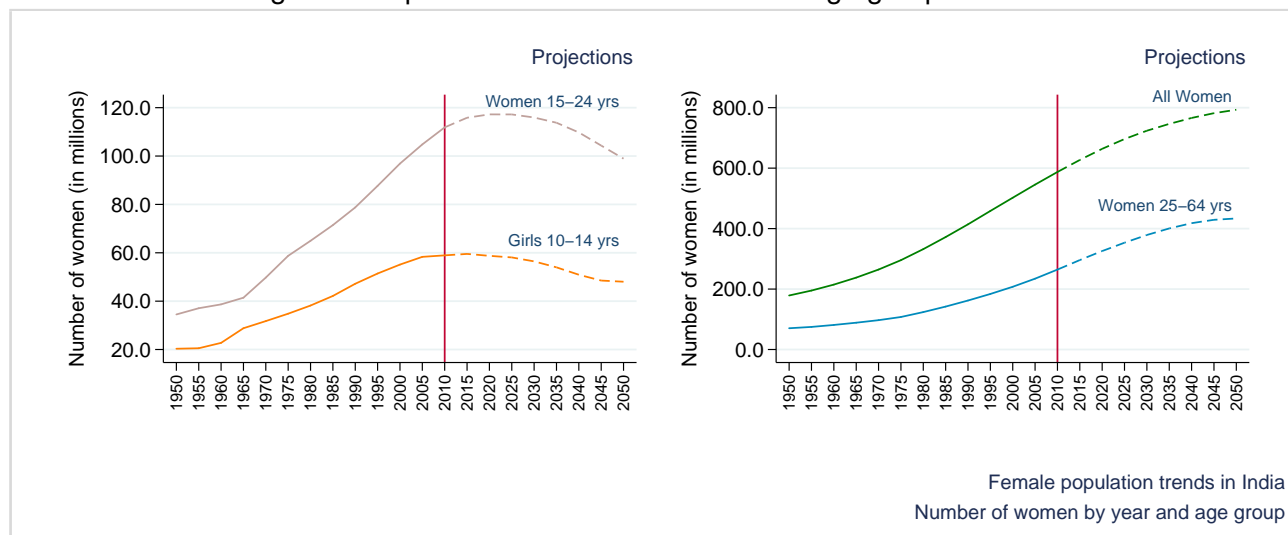


Datapoint year 2010.

Data sources:

World population prospects: the 2008 revision. New York, Population Division, Department of Economic and Social Affairs, United Nations Secretariat, 2009.

Figure 3: Population trends of four selected age groups in India



Population in thousands. Data sources:

World population prospects: the 2008 revision. New York, Population Division, Department of Economic and Social Affairs, United Nations Secretariat, 2009.

Table 2: Sociodemographic indicators in India

Indicator	Male	Female	Total
Population in 1000s <sup>1</sup>	585075 <sup>a</sup>	545543 <sup>a</sup>	1130618 <sup>a</sup>
Population growth rate (%) <sup>1</sup>	-	-	1.43 <sup>b</sup>
Median age (years) <sup>1</sup>	-	-	23.7 <sup>a</sup>
Population living in urban areas (%) <sup>2</sup>	-	-	29 <sup>c</sup>
Crude birth rate (births per 1000 population) <sup>1</sup>	-	-	23 <sup>b</sup>
Crude death rate (deaths per 1000 population) <sup>1</sup>	-	-	8.5 <sup>b</sup>
Life expectancy at birth (years): <sup>3</sup>	62 <sup>c</sup>	64 <sup>c</sup>	63 <sup>c</sup>
Adult mortality rate: <sup>3</sup>	276 <sup>c</sup>	203 <sup>c</sup>	241 <sup>c</sup>
Infant mortality rate (per 1000 live births): <sup>3</sup>	57 <sup>c</sup>	58 <sup>c</sup>	57 <sup>c</sup>
Maternal mortality ratio (per 100,000 live births) <sup>4</sup>	-	-	450 <sup>a</sup>
Neonatal mortality rate (per 1000 live births) <sup>5</sup>	-	-	39 <sup>d</sup>
Under 5 mortality rate (per 1000 live births): <sup>3</sup>	72 <sup>c</sup>	81 <sup>c</sup>	76 <sup>c</sup>
Gross national income per capita (PPP int \$) <sup>6</sup>	-	-	3800 <sup>c</sup>
Population living <\$1 a day (%: PPP int \$) <sup>7</sup>	-	-	34.3 <sup>e</sup>
General government expenditure on health as % of total government expenditure <sup>8</sup>	-	-	3.5 <sup>a</sup>
General government expenditure on health as % of total expenditure on health <sup>8</sup>	-	-	19.0 <sup>a</sup>
Total expenditure on health as % of gross domestic product <sup>8</sup>	-	-	5.0 <sup>a</sup>
Per capita total expenditure on health at average exchange rate (US\$) <sup>8</sup>	-	-	36.0 <sup>a</sup>
Per capita government expenditure on health at average exchange rate (US\$) <sup>8</sup>	-	-	7.0 <sup>a</sup>
Private expenditure on health as % of total expenditure on health <sup>8</sup>	-	-	81.0 <sup>a</sup>
Density of physicians (per 10,000 population) <sup>9</sup>	-	-	6 <sup>e</sup>
Number of physicians <sup>9</sup>	-	-	645825 <sup>e</sup>
Adult (15 years and over) literacy rate (%) <sup>10</sup>	-	-	61.0 <sup>f</sup>
Youth (15-24 years) literacy rate (%): <sup>10</sup>	86.7 <sup>g</sup>	77.1 <sup>g</sup>	82.1 <sup>g</sup>
Net primary school enrollment ratio: <sup>10</sup>	90 <sup>e</sup>	87 <sup>e</sup>	-
Net secondary school enrollment ratio: <sup>10</sup>	-	-	-

Year of estimation: <sup>a</sup> 2005; <sup>b</sup> 2005-2010; <sup>c</sup> 2006; <sup>d</sup> 2004; <sup>e</sup> 2000-2006; <sup>f</sup> 2000-2005; <sup>g</sup> 2007;

Data notes and sources:

<sup>1</sup> World population prospects: the 2008 revision. New York, Population Division, Department of Economic and Social Affairs, United Nations Secretariat, 2009.

<sup>2</sup> World population prospects: the 2006 revision. New York, Population Division, Department of Economic and Social Affairs, United Nations Secretariat, 2007.

<sup>3</sup> Life tables for WHO Member States. Geneva, World Health Organization, 2006 ([http://www.who.int/whosis/database/life\\_tables/life\\_tables.cfm](http://www.who.int/whosis/database/life_tables/life_tables.cfm), accessed 18 March 2008).

<sup>4</sup> Maternal mortality in 2005: estimates developed by WHO, UNICEF, UNFPA and the World Bank. Geneva, World Health Organization, 2007 ([http://www.who.int/reproductive-health/publications/maternal\\_mortality\\_2005/mme\\_2005.pdf](http://www.who.int/reproductive-health/publications/maternal_mortality_2005/mme_2005.pdf), accessed 18 March 2008).

<sup>5</sup> Neonatal and perinatal mortality: country, regional and global estimates 2004. Geneva, World Health Organization, 2007. ([http://whqlibdoc.who.int/publications/2007/9789241596145\\_eng.pdf](http://whqlibdoc.who.int/publications/2007/9789241596145_eng.pdf), accessed 18 March 2008).

<sup>6</sup> PPP int. \$, purchasing power parity at international dollar rate.

<sup>7</sup> GNI per capita 2007, atlas method and PPP. Washington, DC, World Bank, 2007.

<sup>8</sup> PPP int. \$, purchasing power parity at international dollar rate.

World development indicators 2007. Washington, DC, International Bank for Reconstruction World Bank, 2007.

<sup>9</sup> National health accounts: country information. Geneva, World Health Organization, 2007 (<http://www.who.int/nha/country/en/index.html>, accessed 17 March 2008).

<sup>10</sup> Global atlas of the health workforce [online database]. Geneva, World Health Organization, 2008 ([http://www.who.int/globalatlas/autologin/hrh\\_login.asp](http://www.who.int/globalatlas/autologin/hrh_login.asp), accessed 17 March 2008).

<sup>10</sup> UNESCO Institute for Statistics Data Centre [online database]. Montreal, UNESCO Institute for Statistics, 2007 (<http://stats.uis.unesco.org>, accessed 16 March 2008).

### 3 Burden of HPV related cancers

#### 3.1 Cervical cancer

Cancer of the cervix uteri is the second most common cancer among women worldwide, with an estimated 529,409 new cases and 274,883 deaths in 2008. About 86% of the cases occur in developing countries, representing 13% of female cancers. Worldwide, mortality rates of cervical cancer are substantially lower than incidence with a ratio of mortality to incidence to 52% (*IARC, GLOBOCAN 2008*). The majority of cases are squamous cell carcinoma and adenocarcinomas are less common. (*Vaccine 2006, Vol. 24, Supl 3; Vaccine 2008, Vol. 26, Supl 10; IARC Monographs 2007, Vol. 90*)

This section describes the current burden of invasive cervical cancer in India and the Southern Asia region with estimates of annual number of new cases, deaths, and incidence and mortality rates.

##### 3.1.1 Incidence

Table 3: Incidence of cervical cancer in India, Southern Asia and the World

Indicator	India	Southern Asia	World
Crude incidence rate <sup>1</sup>	23.5	21.0	15.8
Age-standardized incidence rate <sup>1</sup>	27.0	25.0	15.3
Cumulative risk (%). Ages 0-74 years <sup>1</sup>	2.8	2.7	1.6
Annual number of new cancer cases	134420	169854	529828

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

<sup>1</sup> Rates per 100,000 women per year.

Data sources:

IARC, Globocan 2008. (Specific methodology for India: . For further details refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp) and <http://globocan.iarc.fr/method/method.asp?country=356>.)

Table 4: Incidence of cervical cancer in India by cancer registry

Cancer registry	Period	N cases <sup>1</sup>	Crude rate <sup>2</sup>	ASR <sup>2</sup>
Chennai	1998-2002	2550	24.2	28.0
Karunagappally	1998-2002	93	8.9	10.6
Mumbai	1998-2002	3121	11.8	14.5
Nagpur <sup>a</sup>	1998-2002	741	15.2	18.4
New Delhi <sup>a</sup>	1998-2002	3653	12.9	19.5
Poona <sup>a</sup>	1998-2002	1138	13.5	17.3
Trivandrum <sup>a</sup>	1998-2002	284	9.6	9.4

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

<sup>1</sup> Accumulated number of cases during the period

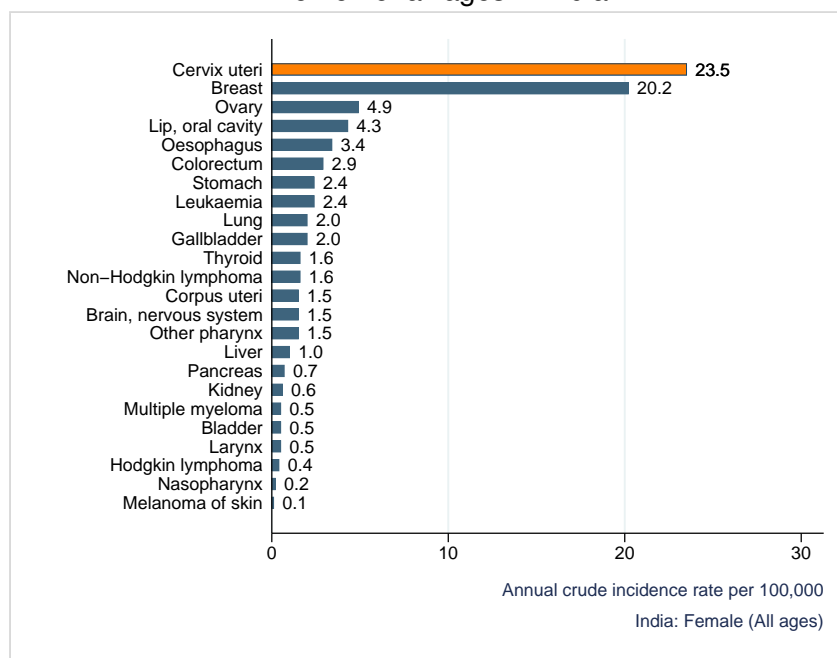
<sup>2</sup> Rates per 100,000 women per year.

Data sources:

IARC, Cancer Incidence in 5 Continents, Vol IX

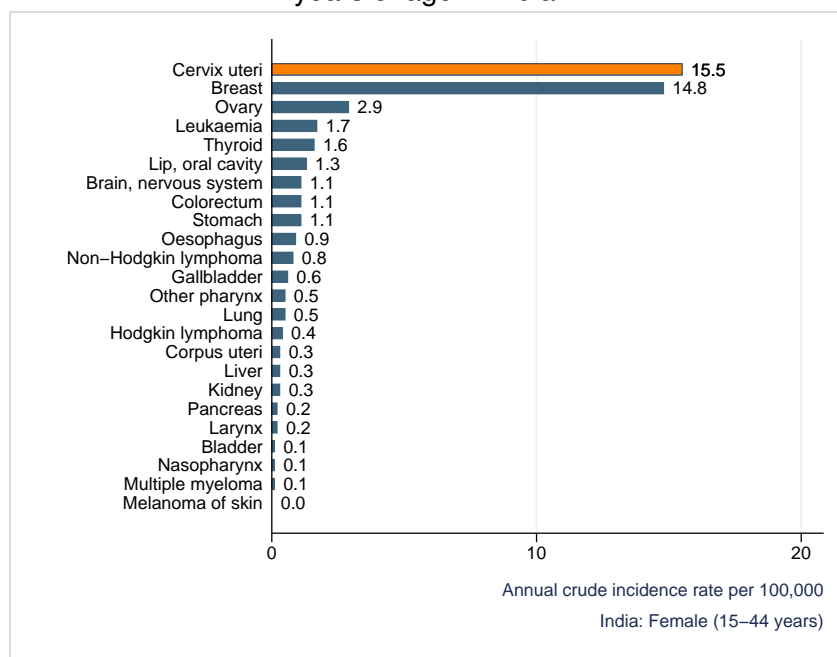
<sup>a</sup> Care should be taken in interpreting the estimates. Some limitations were present in determining the number of cases or the population at risk that could affect the ability to make direct comparisons with other registry datasets.

Figure 4: Incidence of cervical cancer compared to other cancers in women of all ages in India



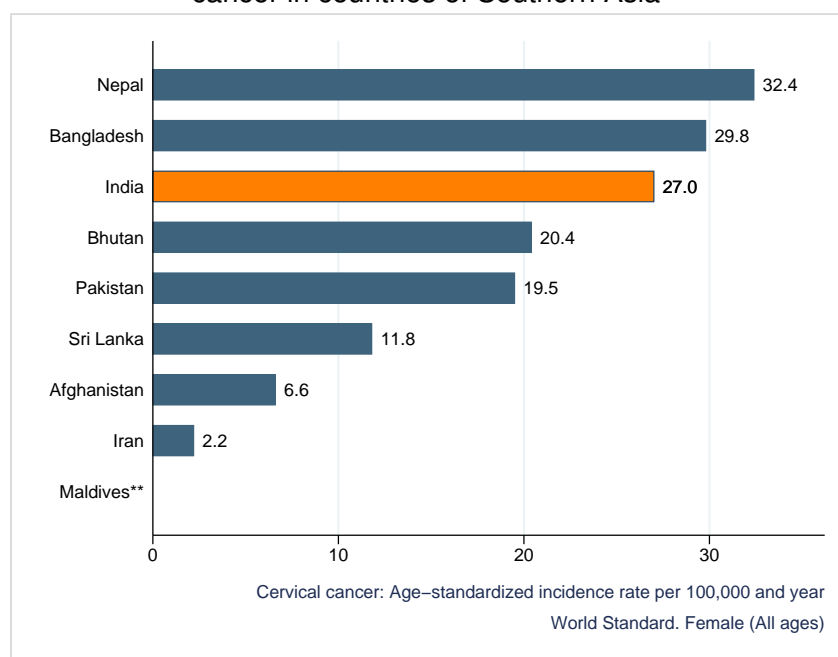
Data sources: IARC, Globocan 2008. For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

Figure 5: Age-specific cervical cancer incidence compared to age-specific incidence of other cancers among women 15-44 years of age in India



Data sources: IARC, Globocan 2008. Age-specific data from GLOBOCAN 2008 were obtained from IARC, personal communication. For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

Figure 6: Age-standardized incidence rates (ASR) of cervical cancer in countries of Southern Asia



Rates per 100,000 women per year. \*\* No rates are available

Data sources:

IARC, Globocan 2008. Age-specific data from GLOBOCAN 2008 were obtained from IARC, personal communication. For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

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

Cancer registry	Period	Carcinoma			
		Squamous	Adeno	Other	Unspec.
Chennai	1998-2002	22.9	0.7	0.3	0.7
Karunagappally	1998-2002	8.3	0.6	0.1	0.1
Mumbai	1998-2002	11.1	1.1	0.1	0.2
Nagpur <sup>a</sup>	1998-2002	16.8	0.8	-	0.1
New Delhi <sup>a</sup>	1998-2002	10.4	0.9	-	4.6
Poona <sup>a</sup>	1998-2002	-	-	-	-
Trivandrum <sup>a</sup>	1998-2002	7.6	0.5	0.2	0.2

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

Rates per 100,000 women per year.

Data sources:

IARC, Cancer Incidence in 5 Continents, Vol IX

<sup>a</sup> Care should be taken in interpreting the estimates. Some limitations were present in determining the number of cases or the population at risk that could affect the ability to make direct comparisons with other registry datasets.

Table 6: Percentage distribution of microscopically verified cases of cervical cancer by histological type and cancer registry in India

Cancer registry	Period	Histology				Number of cases	
		Squamous	Adeno	Other	Unspec.	MV cases	Total cases
Chennai	1998-2002	92.6	2.8	1.2	2.6	2253	2550
Karunagappally	1998-2002	91.3	6.3	1.3	1.3	80	93
Mumbai	1998-2002	88.0	8.9	1.2	1.6	2731	3121
Nagpur <sup>a</sup>	1998-2002	93.1	4.7	-	0.3	722	741
New Delhi <sup>a</sup>	1998-2002	65.8	5.4	-	28.6	2965	3653
Poona <sup>a</sup>	1998-2002	-	-	-	-	1010	1138
Trivandrum <sup>a</sup>	1998-2002	87.4	6.1	2.3	2.7	261	284

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

Accumulated number of cases during the period.

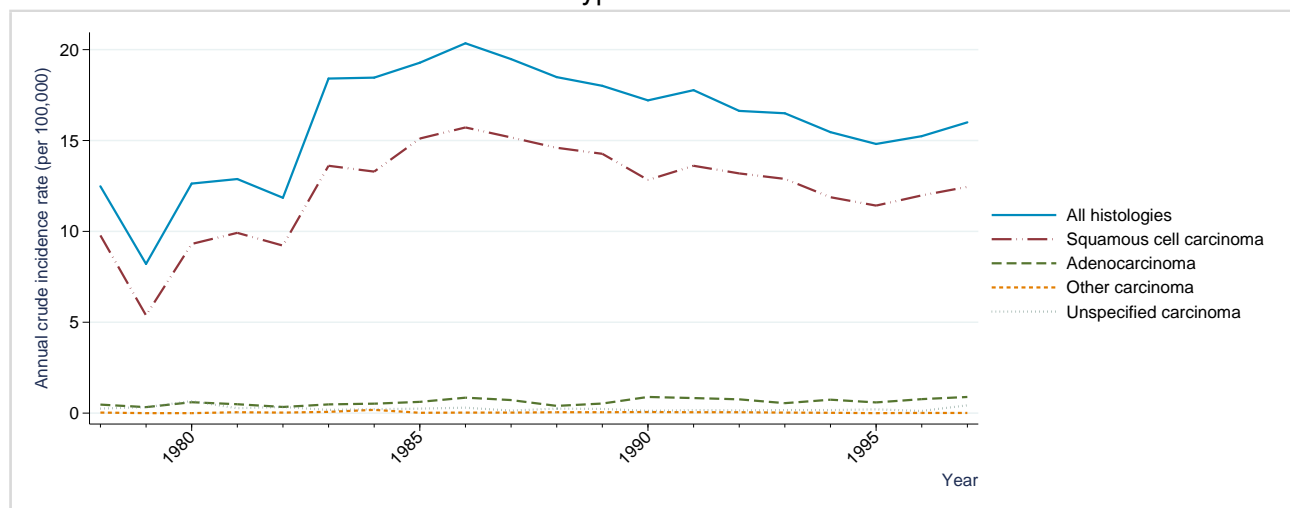
MV: Microscopically Verified.

Data sources:

IARC, Cancer Incidence in 5 Continents, Vol IX

<sup>a</sup> Care should be taken in interpreting the estimates. Some limitations were present in determining the number of cases or the population at risk that could affect the ability to make direct comparisons with other registry datasets.

Figure 7: Time trends of age-truncated (15-85 years) incidence rates of cervical cancer by histological type in India

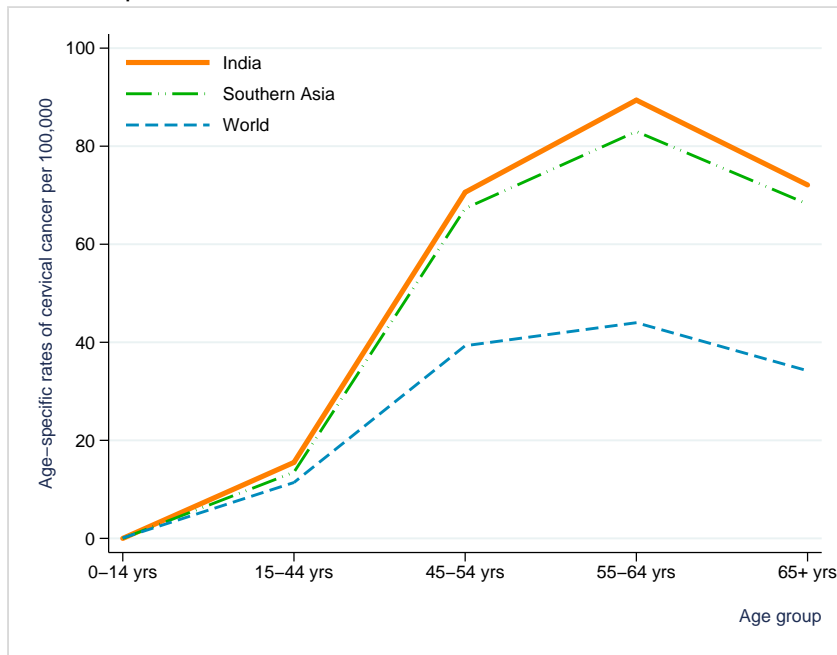


Data source:

IARC, Cancer Incidence in 5 Continents, Vol I-VIII

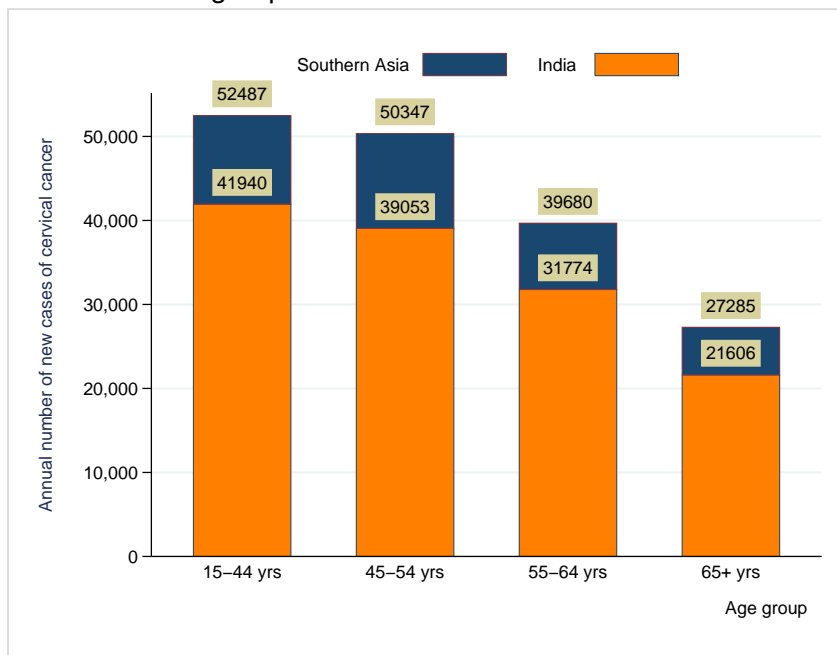
1978-1982: Mumbai (Bombay); 1983-1997: Mumbai (Bombay), Chennai (Madras);

Figure 8: Age-specific incidence rates of cervical cancer in India compared to estimates in Southern Asia and the World



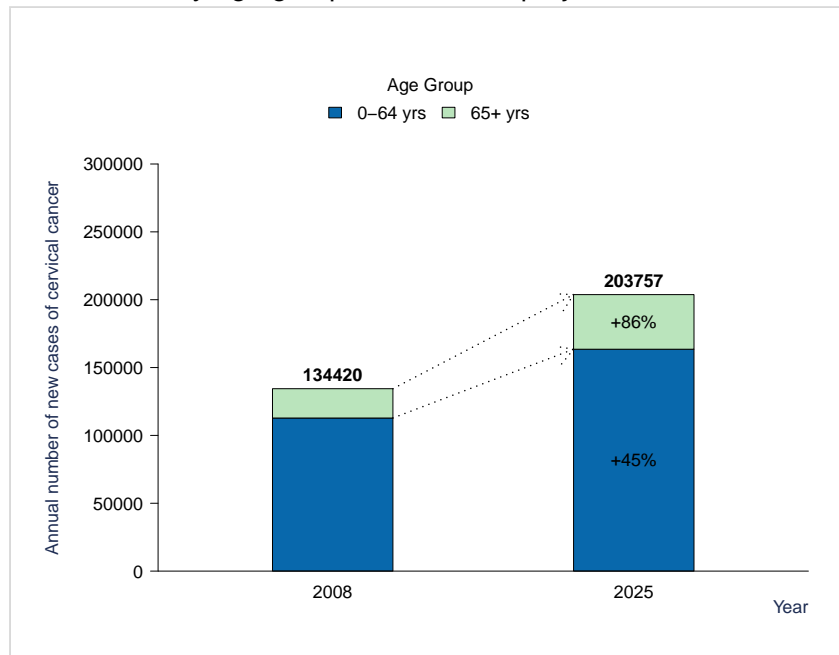
Rates per 100,000 women per year.  
 Data sources:  
 IARC, Globocan 2008. Age-specific data from GLOBOCAN 2008 were obtained from IARC, personal communication.  
 For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

Figure 9: Annual number of new cases of cervical cancer by age group in India and Southern Asia



Data sources:  
 IARC, Globocan 2008. Age-specific data from GLOBOCAN 2008 were obtained from IARC, personal communication.  
 For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

Figure 10: Estimated number of new cases of cervical cancer in India by age group, in 2008 and projected in 2025



Projected burden in 2025 is estimated by applying current population forecasts for the country and assuming that current incidence rates of cervical cancer are constant over time.

Data sources:

IARC, Globocan 2008.

### 3.1.2 Mortality

Table 7: Mortality of cervical cancer in India, Southern Asia and the World

Indicator	India	Southern Asia	World
Crude mortality rate <sup>1</sup>	12.8	11.6	8.2
Age-standardized mortality rate <sup>1</sup>	15.2	14.4	7.8
Cumulative risk (%) ages 0-74 years <sup>1</sup>	1.7	1.6	0.9
Annual number of deaths	72825	93818	275128

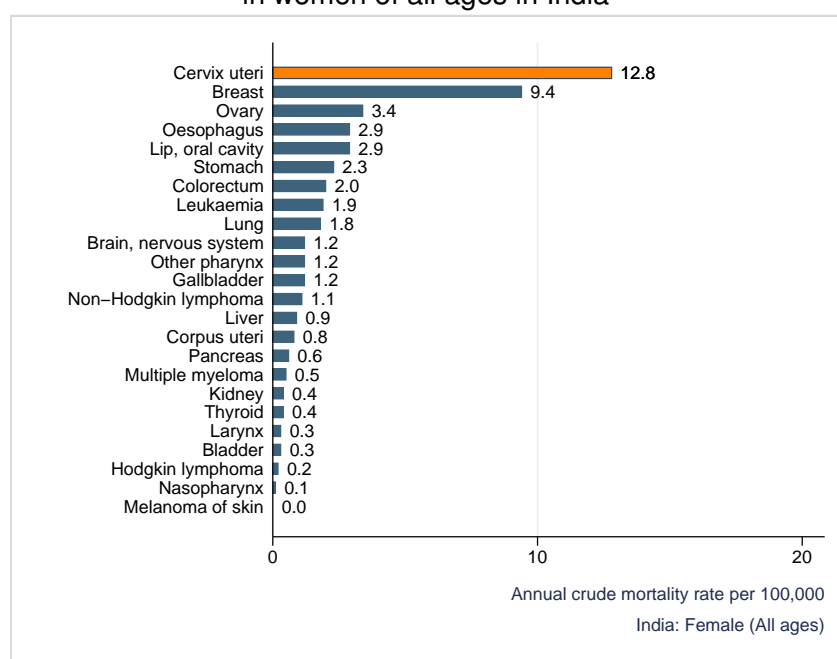
Standardized rates have been estimated using the direct method and the World population as the reference.

<sup>1</sup> Rates per 100,000 women per year.

Data sources:

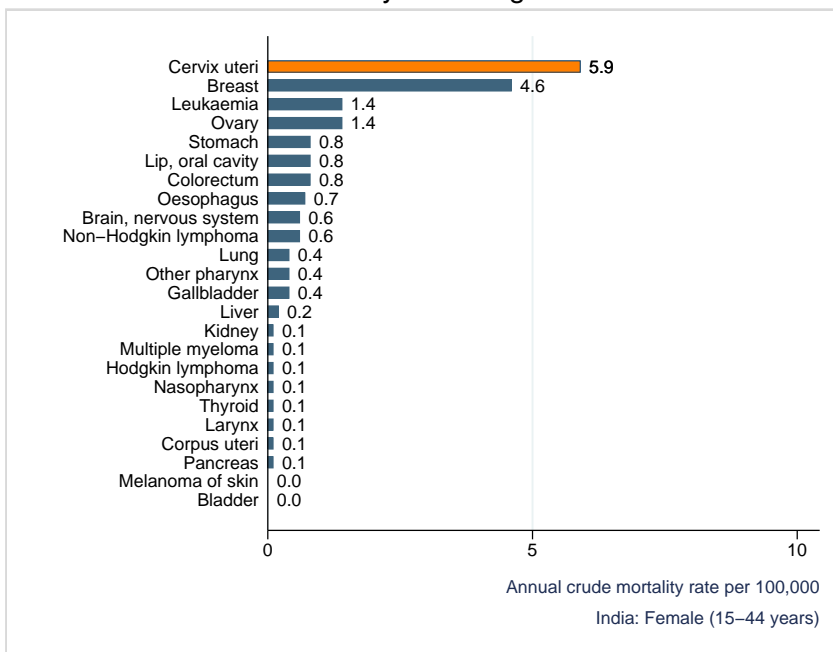
IARC, Globocan 2008. (Specific methodology for India: National cancer mortality was estimated using 5-year relative survival by site (all ages) in rural and urban Indian cancer registries (Sankar et al, 2009) applied to the estimated 2008 rural and urban incidence. The number of cancer deaths (all ages) was partitioned by age using proportions from Mumbai and Chennai (1998-2002) cancer mortality data. Finally, the number of cancer cases AND cancer deaths were 'scaled' to the estimated WHO total number of cancer deaths by sex and age for 2008. For further details refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp) and <http://globocan.iarc.fr/method/method.asp?country=356>.)

Figure 11: Cervical cancer mortality compared to other cancers in women of all ages in India



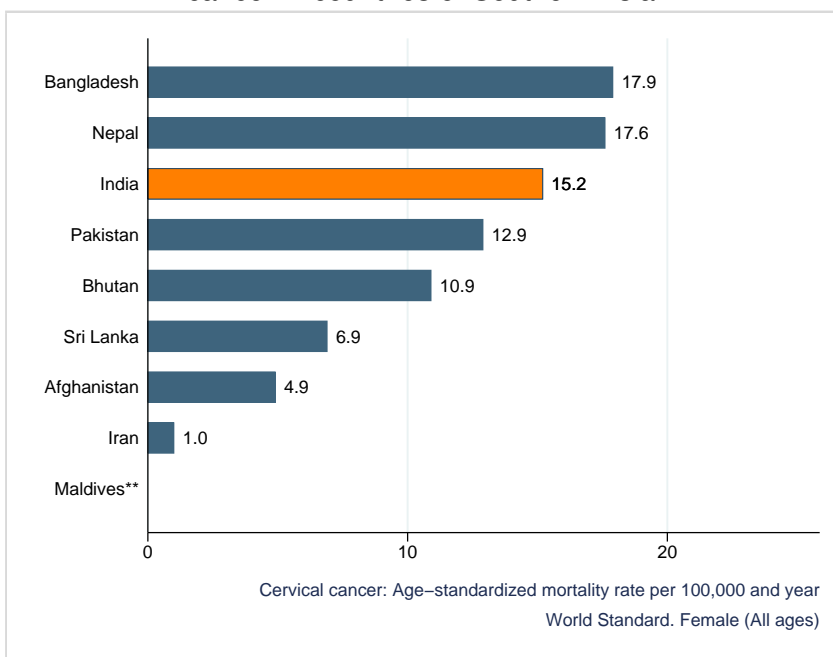
Data sources: IARC, Globocan 2008. For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

Figure 12: Age-specific mortality rates of cervical cancer compared to age-specific mortality rates of other cancers among women 15-44 years of age in India



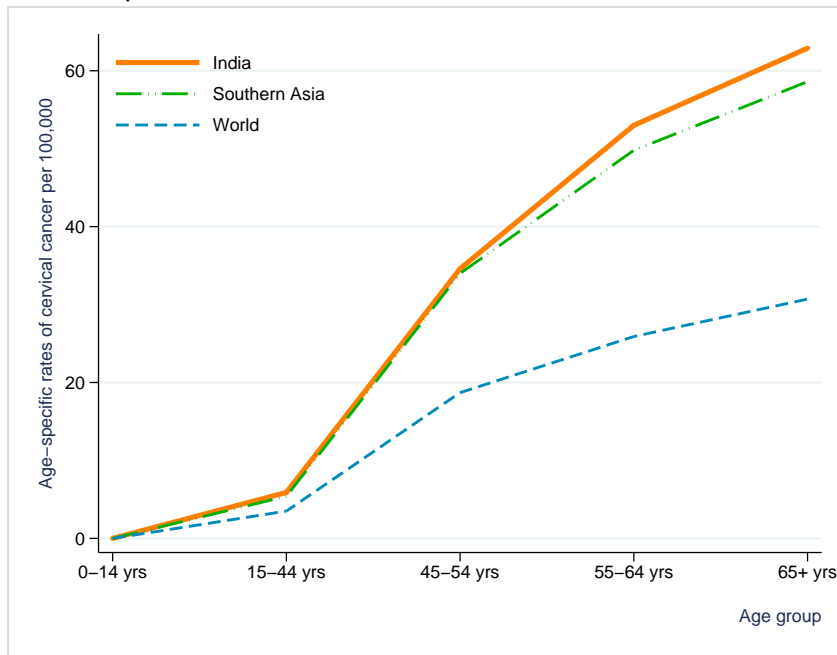
Data sources: IARC, Globocan 2008. Age-specific data from GLOBOCAN 2008 were obtained from IARC, personal communication. For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

Figure 13: Age-standardized (ASR) mortality rates of cervical cancer in countries of Southern Asia



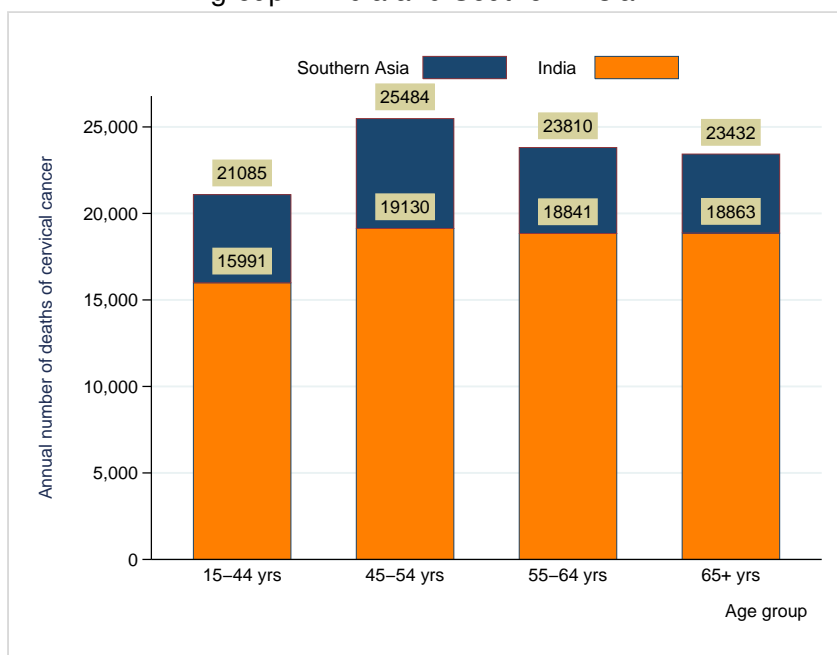
Rates per 100,000 women per year. \*\* No rates are available  
 Data sources: IARC, Globocan 2008. Age-specific data from GLOBOCAN 2008 were obtained from IARC, personal communication. For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

Figure 14: Age-specific mortality rates of cervical cancer in India compared to estimates in Southern Asia and the World



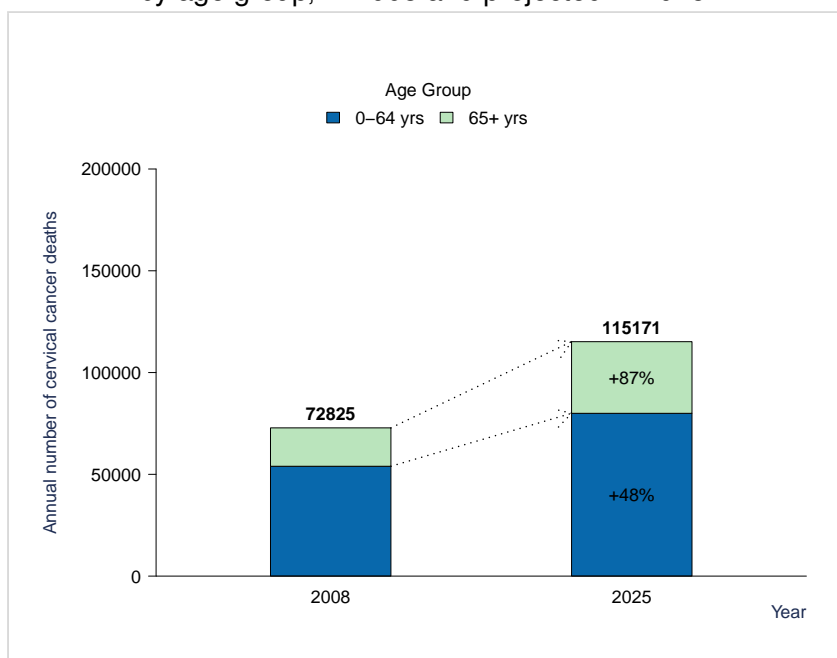
Rates per 100,000 women per year.  
 Data sources:  
 IARC, Globocan 2008. Age-specific data from GLOBOCAN 2008 were obtained from IARC, personal communication.  
 For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

Figure 15: Annual number of deaths of cervical cancer by age group in India and Southern Asia



Data sources:  
 IARC, Globocan 2008. Age-specific data from GLOBOCAN 2008 were obtained from IARC, personal communication.  
 For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

Figure 16: Estimated number of deaths of cervical cancer in India by age group, in 2008 and projected in 2025

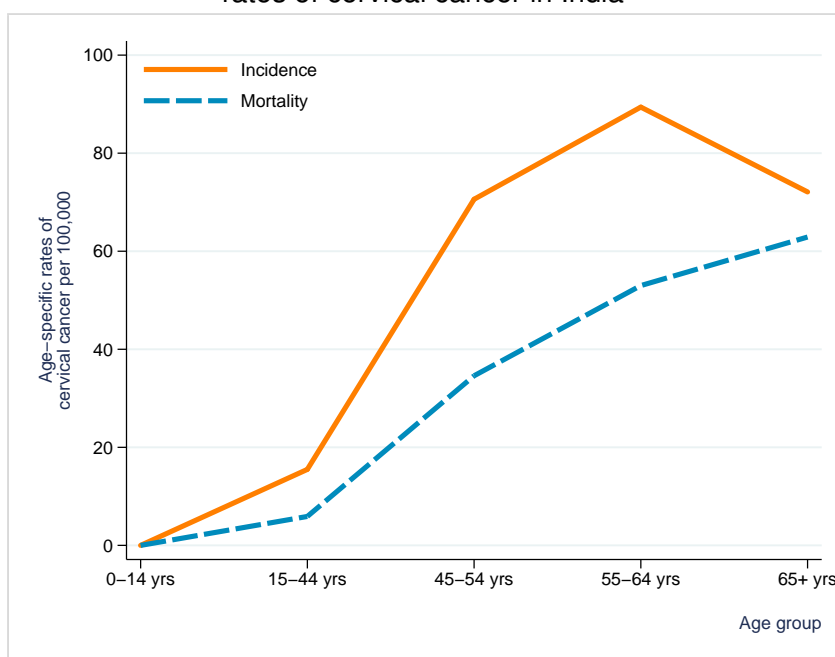


Projected burden in 2025 is estimated by applying current population forecasts for the country and assuming that current incidence rates of cervical cancer are constant over time.

Data sources:  
IARC, Globocan 2008.

### 3.1.3 Comparison of incidence and mortality

Figure 17: Comparison of age-specific incidence and mortality rates of cervical cancer in India



Rates per 100,000 women per year.

Data sources:

IARC, Globocan 2008. Age-specific data from GLOBOCAN 2008 were obtained from IARC, personal communication. For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

## 3.2 Anogenital cancers other than the cervix

Data on the role of HPV in anogenital cancers other than the cervix are limited, but there is an increasing body of evidence strongly linking HPV DNA with cancers of the anus, vulva, vagina, and penis. Although these cancers are much less frequent compared to cancer of the cervix, their association with HPV make them potentially preventable and subject to similar preventative strategies as those for cervical cancer.

(*Vaccine 2006, Vol. 24, Supl 3; Vaccine 2008, Vol. 26, Supl 10; IARC Monographs 2007, Vol. 90*)

### 3.2.1 Anal cancer

Cancer of the anus is rare, with an estimated 99,000 new cases in 2002, 40% of cases in men and 60% in women. Incidence has been increasing in both men and women over the last five decades, and incidence is particularly high among populations of men who have sex with men (MSM) and those who are HIV-infected. These cancers are predominantly squamous cell carcinoma, adenocarcinomas, or basaloid and cloacogenic carcinomas.

Table 8: Incidence of anal cancer by cancer registry and sex in India

Cancer registry	Period	MALE			FEMALE		
		N cases <sup>1</sup>	Crude rate <sup>2</sup>	ASR <sup>2</sup>	N cases <sup>1</sup>	Crude rate <sup>3</sup>	ASR <sup>3</sup>
Chennai	1998-2002	51	0.5	0.5	41	0.4	0.5
Karunagappally	1998-2002	0	0.0	0.0	2	0.2	0.2
Mumbai	1998-2002	81	0.2	0.3	67	0.3	0.3
Nagpur <sup>a</sup>	1998-2002	27	0.5	0.6	14	0.3	0.4
New Delhi <sup>a</sup>	1998-2002	160	0.5	0.8	71	0.3	0.4
Poona <sup>a</sup>	1998-2002	31	0.3	0.5	14	0.2	0.2
Trivandrum <sup>a</sup>	1998-2002	4	0.1	0.1	2	0.1	0.1

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

<sup>1</sup> Accumulated number of cases during the period

<sup>2</sup> Rates per 100,000 men per year.

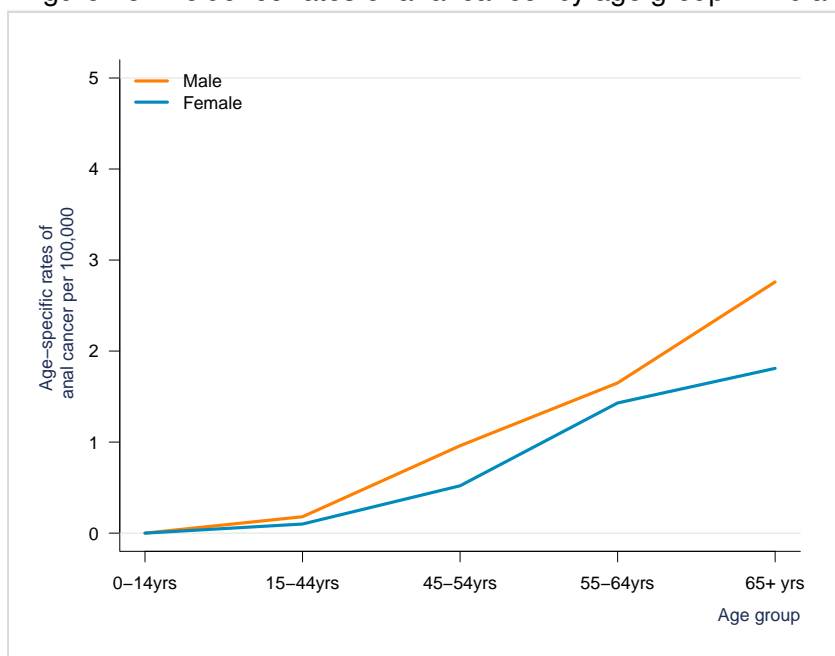
<sup>3</sup> Rates per 100,000 women per year.

Data sources:

IARC, Cancer Incidence in 5 Continents, Vol IX

<sup>a</sup> Care should be taken in interpreting the estimates. Some limitations were present in determining the number of cases or the population at risk that could affect the ability to make direct comparisons with other registry datasets.

Figure 18: Incidence rates of anal cancer by age group in India



Pooled estimates of anal cancer incidence from cancer registries in Mumbai, Karunagappally, Chennai, Nagpur, Poona, Trivandrum, New Delhi.

Data sources:  
Cancer Incidence in Five Continents Vol. IX

### 3.2.2 Vulvar Cancer

Cancer of the vulva is rare among women worldwide, with an estimated 26,800 new cases in 2002, representing 3% of all gynaecologic cancers. Worldwide, about 60% of all vulvar cancer cases occur in developed countries, indicating the limited impact of cervical screening programmes to prevent vulvar and vaginal cancers. Vulvar cancer is common in older women with approximately 66% of cases diagnosed at  $\geq 70$  years. The majority of vulvar cancer cases are squamous cell carcinoma (90%), followed by melanoma, Bartholin gland carcinoma, basal cell carcinoma, verrucous carcinoma, and Paget's disease.

Table 9: Incidence of vulvar cancer by cancer registry in India

Cancer registry	Period	N cases <sup>1</sup>	Crude rate <sup>2</sup>	ASR <sup>2</sup>
Chennai	1998-2002	53	0.5	0.6
Karunagappally	1998-2002	1	0.1	0.1
Mumbai	1998-2002	65	0.2	0.3
Nagpur <sup>a</sup>	1998-2002	28	0.6	0.7
New Delhi <sup>a</sup>	1998-2002	82	0.3	0.5
Poona <sup>a</sup>	1998-2002	8	0.1	0.1
Trivandrum <sup>a</sup>	1998-2002	10	0.3	0.3

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

<sup>1</sup> Accumulated number of cases during the period

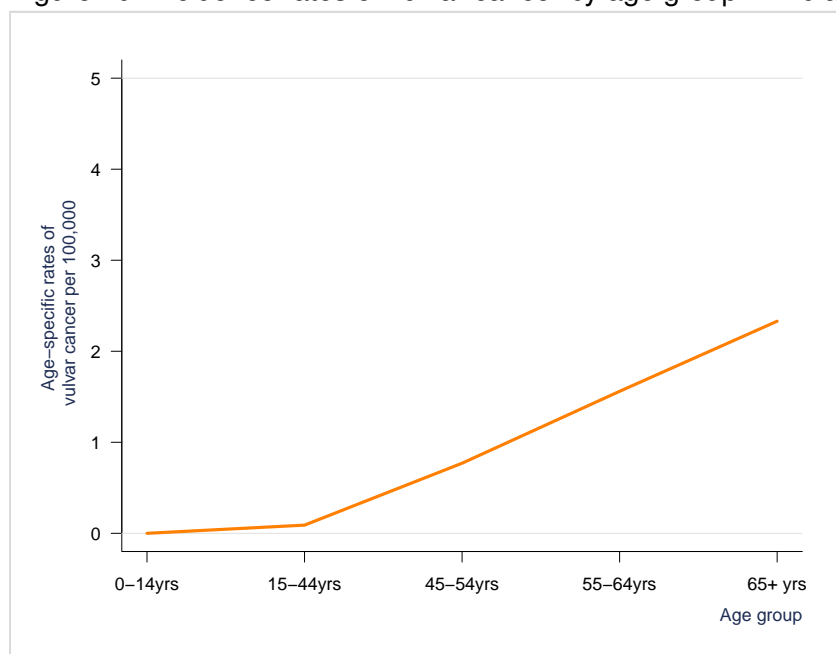
<sup>2</sup> Rates per 100,000 women per year.

Data sources:

IARC, Cancer Incidence in 5 Continents, Vol IX

<sup>a</sup> Care should be taken in interpreting the estimates. Some limitations were present in determining the number of cases or the population at risk that could affect the ability to make direct comparisons with other registry datasets.

Figure 19: Incidence rates of vulvar cancer by age group in India



Pooled estimates of vulvar cancer incidence from cancer registries in Mumbai, Karunagappally, Chennai, Nagpur, Poona, Trivandrum, New Delhi.

Data sources:

Cancer Incidence in Five Continents Vol. IX

### 3.2.3 Vaginal cancer

Cancer of the vagina is a rare cancer, with an estimated 13,200 of new cases in 2002, representing 2% of all gynaecologic cancers. Similar to cervical cancer, the majority of vaginal cancer cases (68%) occur in developing countries. Most vaginal cancers are squamous cell carcinoma (90%), followed by clear cell adenocarcinomas and melanoma. There are few data available on vaginal cancers, which are primarily reported in developed countries, and in some settings, metastatic cervical cancer can be misclassified as cancer of the vagina. Vaginal cancer is diagnosed primarily in older women (>=65 years) with a median age at diagnosis of 69 years, and the incidence of carcinoma in situ is diagnosed between the ages of 55 and 70 years.

Table 10: Incidence of vaginal cancer by cancer registry in India

Cancer registry	Period	N cases <sup>1</sup>	Crude rate <sup>2</sup>	ASR <sup>2</sup>
Chennai	1998-2002	71	0.7	0.8
Karunagappally	1998-2002	6	0.6	0.7
Mumbai	1998-2002	127	0.5	0.6
Nagpur <sup>a</sup>	1998-2002	0	0.0	0.0
New Delhi <sup>a</sup>	1998-2002	85	0.3	0.5
Poona <sup>a</sup>	1998-2002	45	0.5	0.7
Trivandrum <sup>a</sup>	1998-2002	7	0.2	0.2

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

<sup>1</sup> Accumulated number of cases during the period

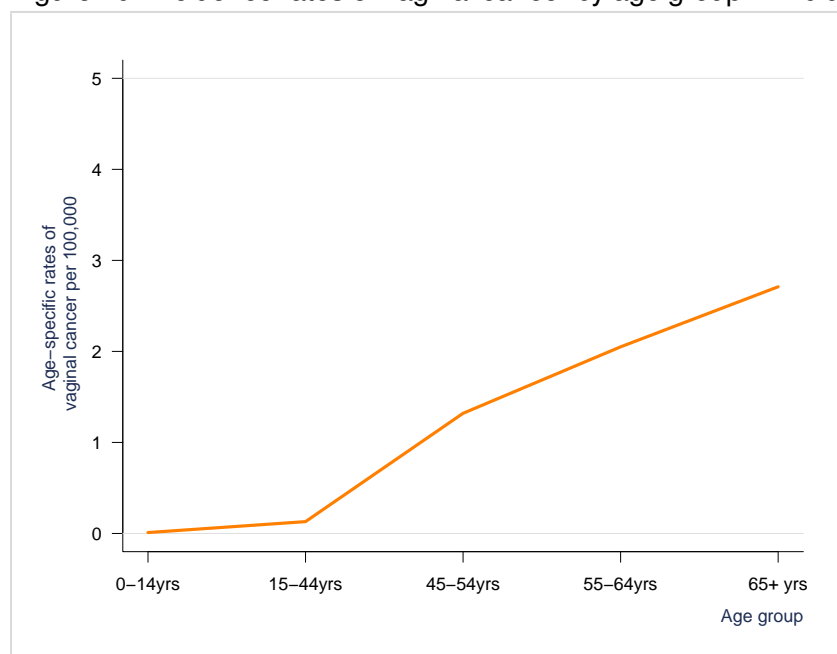
<sup>2</sup> Rates per 100,000 women per year.

Data sources:

IARC, Cancer Incidence in 5 Continents, Vol IX

<sup>a</sup> Care should be taken in interpreting the estimates. Some limitations were present in determining the number of cases or the population at risk that could affect the ability to make direct comparisons with other registry datasets.

Figure 20: Incidence rates of vaginal cancer by age group in India



Pooled estimates of vaginal cancer incidence from cancer registries in Mumbai, Karunagappally, Chennai, Nagpur, Poona, Trivandrum, New Delhi.

Data sources:

Cancer Incidence in Five Continents Vol. IX

### 3.2.4 Penile cancer

Cancer of the penis represents less than 0.5% of cancers in men. Incidence rates are less than 1 per 100,000 in Western countries, with higher rates found in Latin America such as Brazil, Colombia, and Peru, Uganda, and specific regions in India and Thailand. A geographical correlation between the incidence of cancer of the penis and cervix and the concordance of these two cancers in married couples suggested the common aetiology of HPV. Cancers of the penis are primarily of the squamous cell histological type.

Table 11: Incidence of penile cancer by cancer registry in India

Cancer registry	Period	N cases <sup>1</sup>	Crude rate <sup>2</sup>	ASR <sup>2</sup>
Chennai	1998-2002	162	1.5	1.7
Karunagappally	1998-2002	9	0.9	1.0
Mumbai	1998-2002	196	0.6	0.8
Nagpur <sup>a</sup>	1998-2002	68	1.3	1.6
New Delhi <sup>a</sup>	1998-2002	211	0.6	0.9
Poona <sup>a</sup>	1998-2002	87	0.9	1.3
Trivandrum <sup>a</sup>	1998-2002	22	0.8	0.8

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

<sup>1</sup> Accumulated number of cases during the period

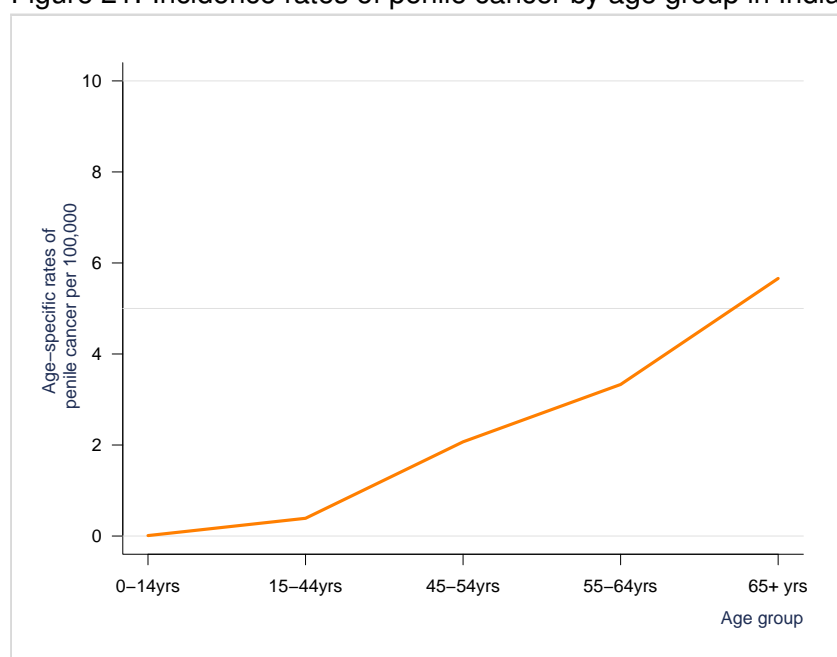
<sup>2</sup> Rates per 100,000 men per year.

Data sources:

IARC, Cancer Incidence in 5 Continents, Vol IX

<sup>a</sup> Care should be taken in interpreting the estimates. Some limitations were present in determining the number of cases or the population at risk that could affect the ability to make direct comparisons with other registry datasets.

Figure 21: Incidence rates of penile cancer by age group in India



Pooled estimates of penile cancer incidence from cancer registries in Mumbai, Karunagappally, Chennai, Nagpur, Poona, Trivandrum, New Delhi.

Data sources:

Cancer Incidence in Five Continents Vol. IX

### 3.3 Head and neck cancers

About 400,000 new cases of the oral cavity and the pharynx (excluding nasopharynx) and 223,000 deaths occurred worldwide in 2008. Two-thirds of cases occurred in developing countries. The majority of head and neck cancers is associated with high tobacco and alcohol consumption. However, there are about 15-20% of head and neck cancer cases that are associated with HPV and there is growing evidence that these HPV-related cases, particularly oral pharyngeal cancers, are associated with sexual behaviour including the practice of oral sex.

#### 3.3.1 Oral cavity

Table 12: Incidence and mortality of cancer of the oral cavity by sex in India, Southern Asia and the World

Indicator	MALE			FEMALE		
	India	Southern Asia	World	India	Southern Asia	World
<b>INCIDENCE</b>						
Crude incidence rate <sup>1</sup>	7.4	7.1	5.0	4.3	4.4	2.8
Age-standardized incidence rate <sup>1</sup>	9.8	9.6	5.3	5.2	5.7	2.6
Cumulative risk (%) ages 0-74 years <sup>1</sup>	1.2	1.1	0.6	0.6	0.7	0.3
Annual number of new cancer cases	45445	60577	170903	24375	36034	92958
<b>MORTALITY</b>						
Crude mortality rate <sup>1</sup>	5.1	4.6	2.4	2.9	2.9	1.3
Age-standardized mortality rate <sup>1</sup>	6.8	6.4	2.6	3.6	3.7	1.2
Cumulative risk (%) ages 0-74 years <sup>1</sup>	0.8	0.8	0.3	0.4	0.5	0.1
Annual number of deaths	31102	39669	83254	16551	23231	44697

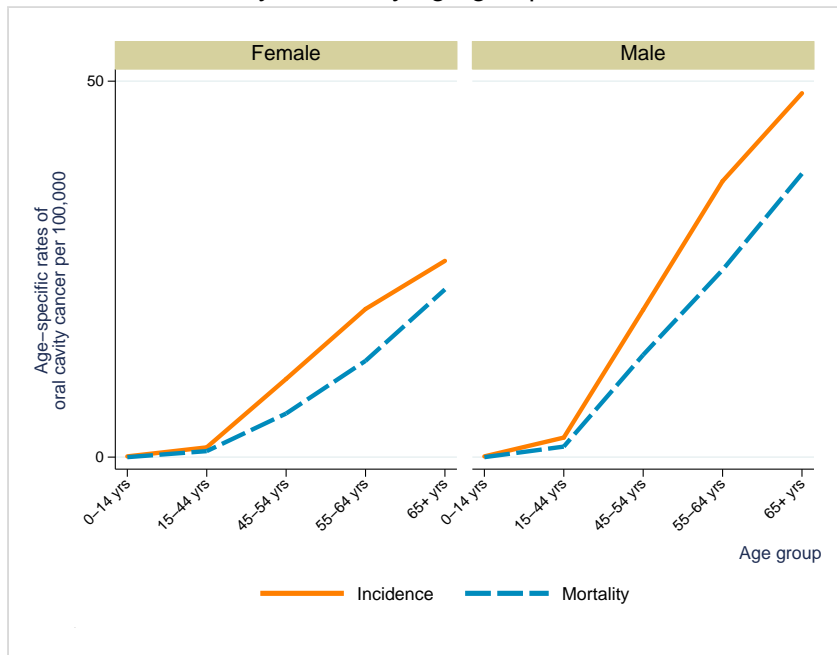
Standardized rates have been estimated using the direct method and the World population as the reference.

<sup>1</sup> Male: Rates per 100,000 men per year. Female: Rates per 100,000 women per year.

Data sources:

IARC, Globocan 2008. (Specific methodology for India: A) Incidence. . B) Mortality. National cancer mortality was estimated using 5-year relative survival by site (all ages) in rural and urban Indian cancer registries (Sankar et al, 2009) applied to the estimated 2008 rural and urban incidence. The number of cancer deaths (all ages) was partitioned by age using proportions from Mumbai and Chennai (1998-2002) cancer mortality data. Finally, the number of cancer cases AND cancer deaths were scaled to the estimated WHO total number of cancer deaths by sex and age for 2008. For further details refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp) and <http://globocan.iarc.fr/method/method.asp?country=356>.)

Figure 22: Comparison of incidence and mortality rates of oral cavity cancer by age group in India



Data sources: IARC, Globocan 2008. Age-specific data from GLOBOCAN 2008 were obtained from IARC, personal communication. For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

### 3.3.2 Pharynx (excluding nasopharynx)

Table 13: Incidence and mortality of cancer of the pharynx (excluding nasopharynx) by sex in India, Southern Asia and the World

Indicator	MALE			FEMALE		
	India	Southern Asia	World	India	Southern Asia	World
<b>INCIDENCE</b>						
Crude incidence rate <sup>1</sup>	6.0	5.3	3.2	1.5	1.4	0.8
Age-standardized incidence rate <sup>1</sup>	8.3	7.5	3.4	1.8	1.8	0.8
Cumulative risk (%) ages 0-74 years <sup>1</sup>	1.0	0.9	0.4	0.2	0.2	0.1
Annual number of new cancer cases	36731	45232	107941	8540	11506	27744
<b>MORTALITY</b>						
Crude mortality rate <sup>1</sup>	5.3	4.6	2.2	1.2	1.2	0.6
Age-standardized mortality rate <sup>1</sup>	7.2	6.5	2.4	1.5	1.5	0.5
Cumulative risk (%) ages 0-74 years <sup>1</sup>	0.8	0.8	0.3	0.2	0.2	0.1
Annual number of deaths	32446	39601	76363	6900	9399	19095

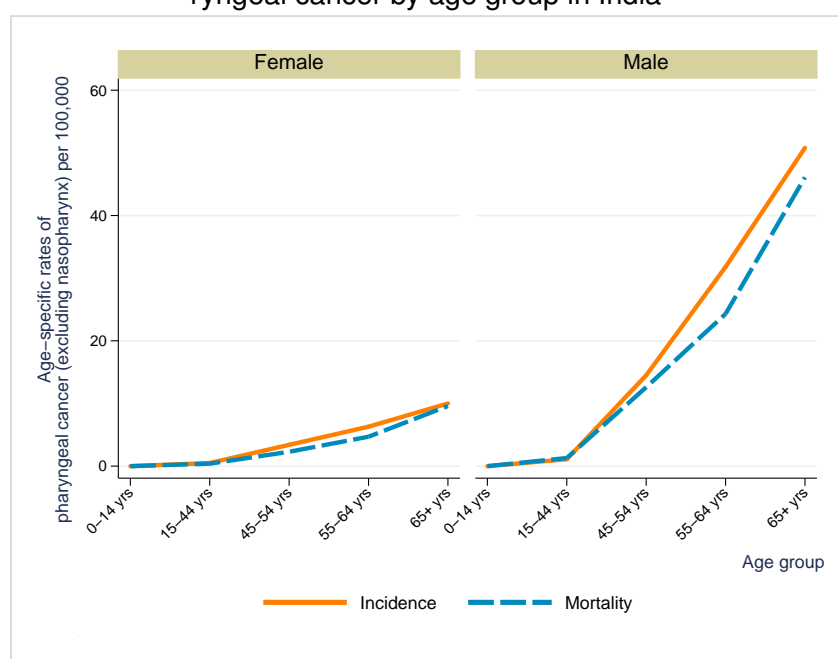
Standardized rates have been estimated using the direct method and the World population as the reference.

<sup>1</sup> Male: Rates per 100,000 men per year. Female: Rates per 100,000 women per year.

Data sources:

IARC, Globocan 2008. (Specific methodology for India: A) Incidence. . B) Mortality. National cancer mortality was estimated using 5-year relative survival by site (all ages) in rural and urban Indian cancer registries (Sankar et al. 2009) applied to the estimated 2008 rural and urban incidence. The number of cancer deaths (all ages) was partitioned by age using proportions from Mumbai and Chennai (1998-2002) cancer mortality data. Finally, the number of cancer cases AND cancer deaths were scaled to the estimated WHO total number of cancer deaths by sex and age for 2008. For further details refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp) and <http://globocan.iarc.fr/method/method.asp?country=356>.)

Figure 23: Comparison of incidence and mortality rates of pharyngeal cancer by age group in India



Data sources:

IARC, Globocan 2008. Age-specific data from GLOBOCAN 2008 were obtained from IARC, personal communication. For specific estimation methodology refer to [http://globocan.iarc.fr/DataSource\\_and\\_methods.asp](http://globocan.iarc.fr/DataSource_and_methods.asp).

## 4 HPV related statistics

Human papillomavirus 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. This section presents the HPV burden at each of the anogenital tract sites. 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 cautiously and used only as a guidance to assess the burden of HPV infection in the population. (*Vaccine 2006, Vol. 24, Supl 3; Vaccine 2008, Vol. 26, Supl 10; IARC Monographs 2007, Vol. 90*)

### 4.1 HPV burden in women with normal cytology, precancerous cervical 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 means of HPV DNA detection in cervical cells (fresh tissue, paraffin embedded or exfoliated cells).

The prevalence of HPV increases with severity of the lesion. HPV causes virtually 100% of cases of cervical cancer, and an underestimation of HPV prevalence in cervical cancer is most likely due to the limitations of study methodologies. Worldwide, HPV-16 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 HPV-16/18, 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 et al. Vaccine 2006;24(S3):26-34*).

HPV is also responsible for other benign genital infections such as recurrent juvenile respiratory papillomatosis and genital warts, both mainly caused by HPV types 6 and 11 (*Lacey CJ et al. Vaccine 2006; 24(S3):35-41*).

### 4.1.1 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.

#### **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)**

Cancerous cells are confined to the cervix and have not spread to other parts of the body.

#### **Invasive cervical cancer (ICC) / Cervical cancer**

If the high-grade precancerous cells invade deeper tissues of the cervix or to other tissues or organs, then the disease is called invasive cervical cancer or cervical cancer.

#### **Invasive squamous cell carcinoma**

Invasive carcinoma composed of cells resembling those of squamous epithelium.

#### **Adenocarcinoma**

Invasive tumour with glandular and squamous elements intermingled.

## 4.1.2 HPV prevalence in women with normal cytology

Table 14: Prevalence of HPV among women with normal cytology

Country/Region	Number of women tested	HPV prevalence % (95% CI)
India <sup>a</sup>	23061	7.9 (7.5-8.2)
Southern Asia	23061	7.9 (7.5-8.2)
World	436430	11.4 (11.3-11.5)

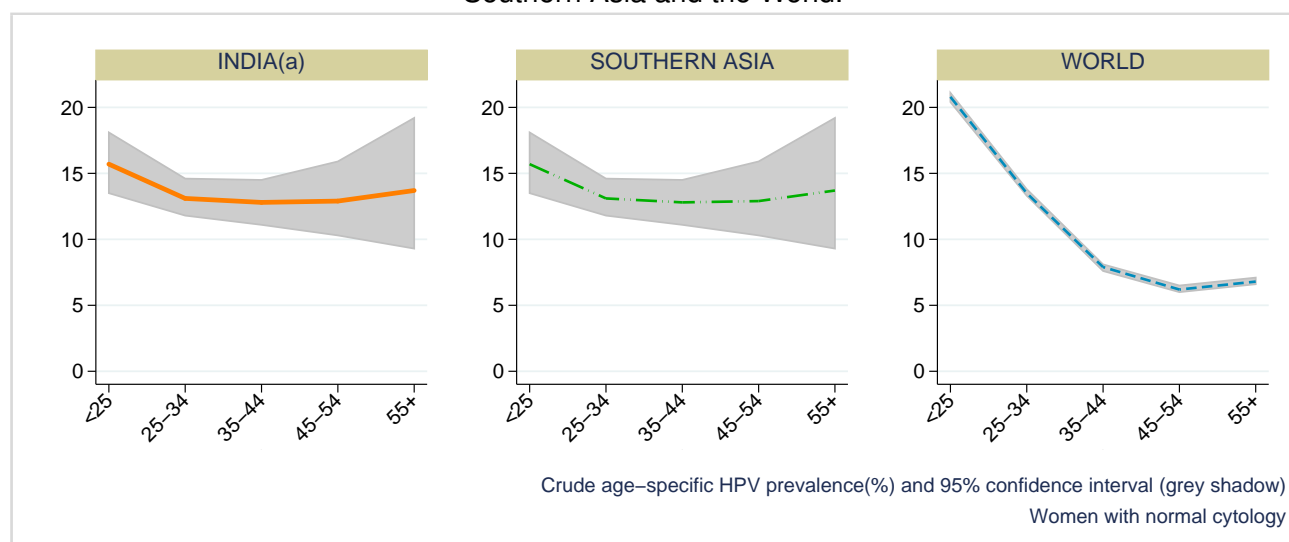
## Data sources:

Data have been compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia and have been published as meta-analysis in: De Sanjosé S, Lancet Infect Dis 2007; 7: 453 and Bruni L, 25th IPV Society Meeting, Malmö, Sweden, 8-14 May 2009 (Manuscript in preparation).

<sup>a</sup> Aggarwal R, Indian J Cancer 2006; 43: 110 | Arora R, Eur J Obstet Gynecol Reprod Biol 2005; 121: 104 | Bhatla N, Int J Gynecol Pathol 2008; 27: 426 | Franceschi S, Br J Cancer 2005; 92: 601 | Gupta S, Cytopathology 2008; : | Laikangbam P, Int J Gynecol Cancer 2007; 17: 107 | Sankaranarayanan R, Int J Cancer 2004; 112: 341

For Southern Asia and the World, refer to specific reports or methods document for complete data sources.

Figure 24: Crude age-specific HPV prevalence in women with normal cytology in India compared to Southern Asia and the World.



## Data sources:

Data have been compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia and have been published as meta-analysis in: De Sanjosé S, Lancet Infect Dis 2007; 7: 453 and Bruni L, 25th IPV Society Meeting, Malmö, Sweden, 8-14 May 2009 (Manuscript in preparation).

<sup>a</sup> Aggarwal R, Indian J Cancer 2006; 43: 110 | Arora R, Eur J Obstet Gynecol Reprod Biol 2005; 121: 104 | Bhatla N, Int J Gynecol Pathol 2008; 27: 426 | Franceschi S, Br J Cancer 2005; 92: 601 | Gupta S, Cytopathology 2008; : | Laikangbam P, Int J Gynecol Cancer 2007; 17: 107 | Sankaranarayanan R, Int J Cancer 2004; 112: 341

For Southern Asia and the World, refer to specific reports or methods document for complete data sources.

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

Table 15: Prevalence of HPV-16 and HPV-18 by cytology in India, Southern Asia and the World

	India		Southern Asia		World	
	No. tested	HPV 16/18 Prevalence % (95% CI)	No. tested	HPV 16/18 Prevalence % (95%CI)	No. tested	HPV 16/18 Prevalence % (95%CI)
Normal cytology <sup>a</sup>	5696	6.0 (5.4-6.7)	5696	6.0 (5.4-6.7)	218339	3.8 (3.7-3.9)
Low-grade lesions <sup>†b</sup>	51	29.4 (17.5-43.8)	63	33.3 (22.0-46.3)	14762	24.3 (23.6-25.0)
High-grade lesions <sup>‡c</sup>	25	56.0 (34.9-75.6)	32	59.3 (40.6-76.3)	14901	51.1 (50.3-51.9)
Cervical cancer <sup>d</sup>	747	82.5 (79.5-85.1)	925	82.3 (79.7-84.7)	22826	70.9 (70.3-71.5)

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

**Abbreviations used:**

95% CI: 95% Confidence Interval

†Low-grade lesions: LSIL or CIN-1

‡High-grade lesions: CIN-2, CIN-3, CIS or HSIL

**Data sources:**

<sup>a</sup> Data have been compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia and have been published as meta-analysis in: De Sanjosé S, Lancet Infect Dis 2007; 7: 453 and Bruni L, 25th IPV Society Meeting, Malmo, Sweden, 8-14 May 2009 (Manuscript in preparation).

Specific for India: Aggarwal R, Indian J Cancer 2006; 43: 110 | Arora R, Eur J Obstet Gynecol Reprod Biol 2005; 121: 104 | Bhatia N, Int J Gynecol Pathol 2008; 27: 426 | Franceschi S, Br J Cancer 2005; 92: 601 | Gupta S, Cytopathology 2008; : | Laikangbam P, Int J Gynecol Cancer 2007; 17: 107

<sup>b</sup> Data have been compiled by the IARC Infection and Cancer Epidemiology Group and have been published as a systematic review and meta-analysis in: Clifford GM, Cancer Epidemiol Biomarkers Prev 2005; 14: 1157

Specific for India: Nagpal JK, Eur J Clin Invest 2002; 32: 943 | Nair P, Pathol Oncol Res 1999; 5: 95

<sup>c</sup> Data have been compiled by the IARC Infection and Cancer Epidemiology Group and have been published as a systematic review and meta-analysis in: Clifford G, Br J Cancer 2003;89:101 | Smith JS Int J Cancer 2007;121:621

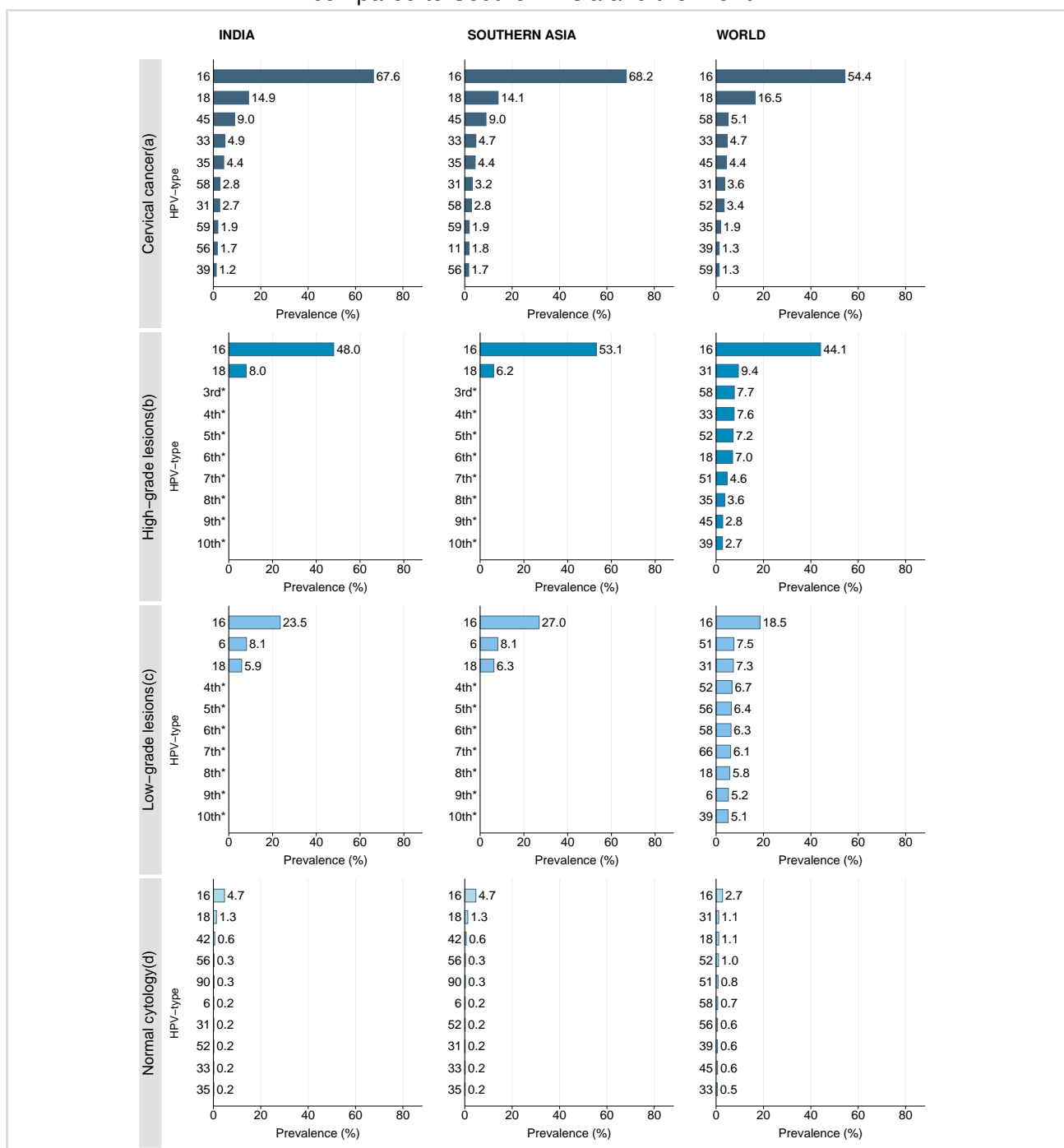
Specific for India: Nagpal JK, Eur J Clin Invest 2002; 32: 943

<sup>d</sup> Data have been compiled by the IARC Infection and Cancer Epidemiology Group and have been published as a systematic review and meta-analysis in: Clifford G, Br J Cancer 2003;88:63 | Clifford G, Int J Cancer 2008; 122: 1684

Specific for India: Bhatia N, Int J Gynecol Pathol 2006; 25: 398 | Franceschi S, Int J Cancer 2003; 107: 127 | Gheit T, Vaccine 2009; 27: 636 | Munirajan AK, Gynecol Oncol 1998; 69: 205 | Nagpal JK, Eur J Clin Invest 2002; 32: 943 | Peedicayil A, Int J Gynecol Cancer 2006; 16: 1591 | Sowjanya AP, BMC Infect Dis 2005; 5: 116

For Southern Asia and the World, refer to specific reports or methods document for complete data sources.

Figure 25: Ten most frequent HPV types among women with and without cervical lesions in India compared to Southern Asia and the World



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

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

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:

<sup>a</sup> Data have been compiled by the IARC Infection and Cancer Epidemiology Group and have been published as a systematic review and meta-analysis in: Clifford G, Br J Cancer 2003;88:63 | Clifford G, Int J Cancer 2008; 122: 1684  
 Specific for India: Bhatla N, Int J Gynecol Pathol 2006; 25: 398 | Franceschi S, Int J Cancer 2003; 107: 127 | Gheit T, Vaccine 2009; 27: 636 | Munirajan AK, Gynecol Oncol 1998; 69: 205 | Nagpal JK, Eur J Clin Invest 2002; 32: 943 | Peedicayil A, Int J Gynecol Cancer 2006; 16: 1591 | Sowjanya AP, BMC Infect Dis 2005; 5: 116

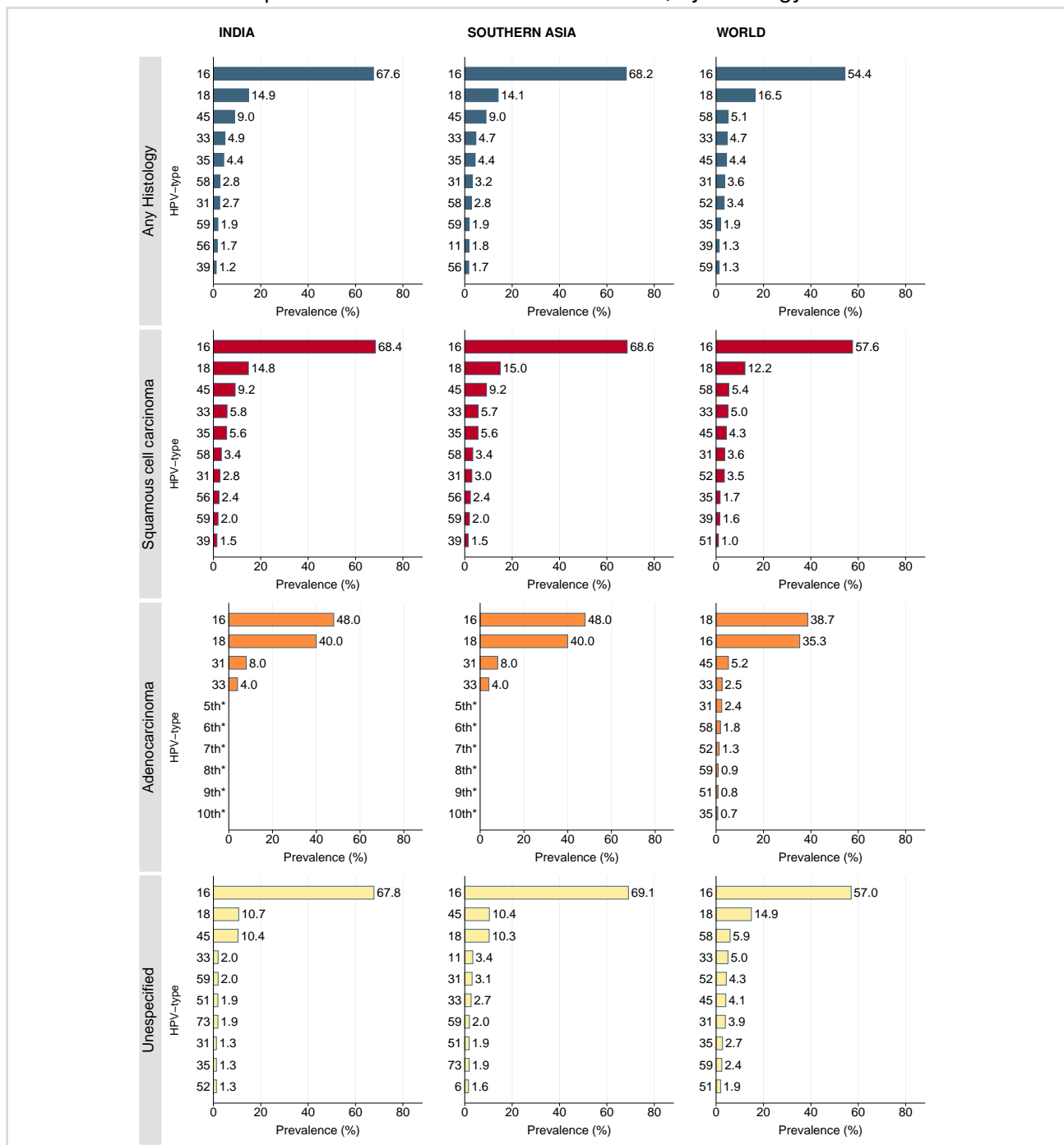
<sup>b</sup> Data have been compiled by the IARC Infection and Cancer Epidemiology Group and have been published as a systematic review and meta-analysis in: Clifford G, Br J Cancer 2003;89:101 | Smith JS Int J Cancer 2007;121:621  
 Specific for India: Nagpal JK, Eur J Clin Invest 2002; 32: 943

<sup>c</sup> Data have been compiled by the IARC Infection and Cancer Epidemiology Group and have been published as a systematic review and meta-analysis in: Clifford GM, Cancer Epidemiol Biomarkers Prev 2005; 14: 1157  
 Specific for India: Nagpal JK, Eur J Clin Invest 2002; 32: 943 | Nair P, Pathol Oncol Res 1999; 5: 95

<sup>d</sup> Data have been compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia and have been published as meta-analysis in: De Sanjosé S, Lancet Infect Dis 2007; 7: 453 and Bruni L, 25th IPV Society Meeting, Malmö, Sweden, 8-14 May 2009 (Manuscript in preparation).  
 Specific for India: Aggarwal R, Indian J Cancer 2006; 43: 110 | Arora R, Eur J Obstet Gynecol Reprod Biol 2005; 121: 104 | Bhatla N, Int J Gynecol Pathol 2008; 27: 426 | Franceschi S, Br J Cancer 2005; 92: 601 | Gupta S, Cytopathology 2008; : | Laikangbam P, Int J Gynecol Cancer 2007; 17: 107

For Southern Asia and the World, refer to specific reports or methods document for complete data sources.

Figure 26: Ten most frequent HPV types among women with invasive cervical cancer in India compared to Southern Asia and the World, by histology



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

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

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:

Data have been compiled by the IARC Infection and Cancer Epidemiology Group and have been published as a systematic review and meta-analysis in: Clifford G, Br J Cancer 2003;88:63 | Clifford G, Int J Cancer 2008; 122: 1684  
 Bhatla N, Int J Gynecol Pathol 2006; 25: 398 | Franceschi S, Int J Cancer 2003; 107: 127 | Gheit T, Vaccine 2009; 27: 636 | Munirajan AK, Gynecol Oncol 1998; 69: 205 | Nagpal JK, Eur J Clin Invest 2002; 32: 943 | Peedicayil A, Int J Gynecol Cancer 2006; 16: 1591 | Sowjanya AP, BMC Infect Dis 2005; 5: 116  
 For Southern Asia and the World, refer to specific reports or methods document for complete data sources.

Table 16: Type-specific HPV prevalence in women with normal cytology, precancerous cervical lesions and invasive cervical cancer in India

HPV Type	Normal cytology <sup>a</sup>		Low-grade lesions <sup>†b</sup>		High-grade lesions <sup>‡c</sup>		Cervical cancer <sup>d</sup>	
	No. tested	HPV Prev % (95%CI)	No. tested	HPV Prev % (95%CI)	No. tested	HPV Prev % (95%CI)	No. tested	HPV Prev % (95%CI)
6	3026	0.2 (0.1-0.4)	37	8.1 (1.7-21.9)	-	--	340	0.3 (0.0-1.6)
11	3026	0.1 (0.1-0.3)	-	--	-	--	297	0.7 (0.1-2.4)
13	-	--	-	--	-	--	-	--
16	5696	4.7 (4.2-5.3)	51	23.5 (12.8-37.5)	25	48.0 (27.8-68.7)	747	67.6 (64.1-71.0)
18	5696	1.3 (1.0-1.6)	51	5.9 (1.2-16.2)	25	8.0 (1.0-26.0)	747	14.9 (12.4-17.6)
26	2257	0.0 (0.0-0.1)	-	--	-	--	-	--
30	1799	0.1 (0.0-0.2)	-	--	-	--	-	--
31	2257	0.2 (0.1-0.4)	-	--	-	--	635	2.7 (1.6-4.3)
32	1799	0.1 (0.0-0.2)	-	--	-	--	-	--
33	2257	0.2 (0.1-0.4)	-	--	-	--	676	4.9 (3.4-6.8)
34	2257	0.0 (0.0-0.1)	-	--	-	--	-	--
35	2257	0.2 (0.1-0.4)	-	--	-	--	676	4.4 (3.0-6.3)
39	2257	0.2 (0.1-0.3)	-	--	-	--	592	1.2 (0.5-2.4)
40	2257	0.1 (0.0-0.2)	-	--	-	--	-	--
42	2257	0.6 (0.4-0.8)	-	--	-	--	-	--
43	1799	0.1 (0.0-0.2)	-	--	-	--	-	--
44	2257	0.1 (0.0-0.2)	-	--	-	--	-	--
45	2257	0.1 (0.0-0.2)	-	--	-	--	633	9.0 (6.9-11.5)
51	2257	0.1 (0.1-0.3)	-	--	-	--	592	1.0 (0.4-2.2)
52	2257	0.2 (0.1-0.4)	-	--	-	--	676	1.0 (0.4-2.1)
53	2257	0.1 (0.0-0.2)	-	--	-	--	-	--
54	2257	0.1 (0.0-0.2)	-	--	-	--	-	--
55	-	--	-	--	-	--	-	--
56	2257	0.3 (0.2-0.5)	-	--	-	--	635	1.7 (0.9-3.1)
57	2257	0.0 (0.0-0.1)	-	--	-	--	-	--
58	2257	0.1 (0.0-0.2)	-	--	-	--	676	2.8 (1.7-4.4)
59	2257	0.2 (0.1-0.3)	-	--	-	--	676	1.9 (1.0-3.3)
61	2257	0.0 (0.0-0.1)	-	--	-	--	-	--
62	458	0.0 (0.0-0.1)	-	--	-	--	-	--
64	-	--	-	--	-	--	-	--
66	2257	0.2 (0.1-0.3)	-	--	-	--	592	0.2 (0.0-0.9)
67	2257	0.0 (0.0-0.1)	-	--	-	--	-	--
68	2257	0.0 (0.0-0.1)	-	--	-	--	592	0.3 (0.0-1.2)
69	2257	0.0 (0.0-0.1)	-	--	-	--	-	--
70	2257	0.1 (0.0-0.2)	-	--	-	--	592	0.0 (0.0-0.6)
71	2257	0.0 (0.0-0.1)	-	--	-	--	-	--
72	2257	0.0 (0.0-0.1)	-	--	-	--	-	--
73	2257	0.1 (0.0-0.2)	-	--	-	--	633	0.9 (0.3-2.1)
74	-	--	-	--	-	--	-	--
81	1799	0.1 (0.1-0.3)	-	--	-	--	-	--
82	2257	0.1 (0.0-0.2)	-	--	-	--	592	0.3 (0.0-1.2)
83	2257	0.0 (0.0-0.1)	-	--	-	--	-	--
84	2257	0.1 (0.0-0.2)	-	--	-	--	-	--
85	-	--	-	--	-	--	-	--
86	1799	0.0 (0.0-0.1)	-	--	-	--	-	--
89	1799	0.1 (0.0-0.2)	-	--	-	--	-	--
90	1799	0.3 (0.2-0.5)	-	--	-	--	-	--
91	-	--	-	--	-	--	-	--

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

Abbreviations used:

95% CI: 95% Confidence Interval

†Low-grade lesions: LSIL or CIN-1

‡High-grade lesions: CIN-2, CIN-3, CIS or HSIL

Data sources:

<sup>a</sup> Data have been compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia and have been published as meta-analysis in: De Sanjosé S, Lancet Infect Dis 2007; 7: 453 and Bruni L, 25th IPV Society Meeting, Malmo, Sweden, 8-14 May 2009 (Manuscript in preparation).

Aggarwal R, Indian J Cancer 2006; 43: 110 | Arora R, Eur J Obstet Gynecol Reprod Biol 2005; 121: 104 | Bhatia N, Int J Gynecol Pathol 2008; 27: 426 | Franceschi S, Br J Cancer 2005; 92: 601 | Gupta S, Cytopathology 2008; : | Laikangbam P, Int J Gynecol Cancer 2007; 17: 107

<sup>b</sup> Data have been compiled by the IARC Infection and Cancer Epidemiology Group and have been published as a systematic review and meta-analysis in: Clifford GM, Cancer Epidemiol Biomarkers Prev 2005; 14: 1157

Nagpal JK, Eur J Clin Invest 2002; 32: 943 | Nair P, Pathol Oncol Res 1999; 5: 95

<sup>c</sup> Data have been compiled by the IARC Infection and Cancer Epidemiology Group and have been published as a systematic review and meta-analysis in: Clifford G, Br J Cancer 2003;89:101 | Smith JS Int J Cancer 2007;121:621

Nagpal JK, Eur J Clin Invest 2002; 32: 943

<sup>d</sup> Data have been compiled by the IARC Infection and Cancer Epidemiology Group and have been published as a systematic review and meta-analysis in: Clifford G, Br J Cancer 2003;88:63 | Clifford G, Int J Cancer 2008; 122: 1684

Bhatia N, Int J Gynecol Pathol 2006; 25: 398 | Franceschi S, Int J Cancer 2003; 107: 127 | Gheit T, Vaccine 2009; 27: 636 | Munirajan AK, Gynecol Oncol 1998; 69: 205 | Nagpal JK, Eur J Clin Invest 2002; 32: 943 | Peedicayil A, Int J Gynecol Cancer 2006; 16: 1591 | Sowjanya AP, BMC Infect Dis 2005; 5: 116

Table 17: Type-specific HPV prevalence among invasive cervical cancer cases in India, 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)
6	340	0.3 (0.0-1.6)	179	0.0 (0.0-2.0)	12	0.0 (0.0-26.5)	149	0.7 (0.0-3.7)
11	297	0.7 (0.1-2.4)	179	0.6 (0.0-3.1)	12	0.0 (0.0-26.5)	106	0.9 (0.0-5.1)
16	747	67.6 (64.1-71.0)	573	68.4 (64.4-72.2)	25	48.0 (27.8-68.7)	149	67.8 (59.6-75.2)
18	747	14.9 (12.4-17.6)	573	14.8 (12.0-18.0)	25	40.0 (21.1-61.3)	149	10.7 (6.3-16.9)
31	635	2.7 (1.6-4.3)	461	2.8 (1.5-4.8)	25	8.0 (1.0-26.0)	149	1.3 (0.2-4.8)
33	676	4.9 (3.4-6.8)	502	5.8 (3.9-8.2)	25	4.0 (0.1-20.4)	149	2.0 (0.4-5.8)
35	676	4.4 (3.0-6.3)	502	5.6 (3.7-8.0)	25	0.0 (0.0-13.7)	149	1.3 (0.2-4.8)
39	592	1.2 (0.5-2.4)	461	1.5 (0.6-3.1)	25	0.0 (0.0-13.7)	106	0.0 (0.0-3.4)
45	633	9.0 (6.9-11.5)	502	9.2 (6.8-12.0)	25	0.0 (0.0-13.7)	106	10.4 (5.3-17.8)
51	592	1.0 (0.4-2.2)	461	0.9 (0.2-2.2)	25	0.0 (0.0-13.7)	106	1.9 (0.2-6.6)
52	676	1.0 (0.4-2.1)	502	1.0 (0.3-2.3)	25	0.0 (0.0-13.7)	149	1.3 (0.2-4.8)
56	635	1.7 (0.9-3.1)	461	2.4 (1.2-4.2)	25	0.0 (0.0-13.7)	149	0.0 (0.0-2.4)
58	676	2.8 (1.7-4.4)	502	3.4 (2.0-5.4)	25	0.0 (0.0-13.7)	149	1.3 (0.2-4.8)
59	676	1.9 (1.0-3.3)	502	2.0 (1.0-3.6)	25	0.0 (0.0-13.7)	149	2.0 (0.4-5.8)
66	592	0.2 (0.0-0.9)	461	0.2 (0.0-1.2)	25	0.0 (0.0-13.7)	106	0.0 (0.0-3.4)
68	592	0.3 (0.0-1.2)	461	0.4 (0.1-1.6)	25	0.0 (0.0-13.7)	106	0.0 (0.0-3.4)
70	592	0.0 (0.0-0.6)	461	0.0 (0.0-0.8)	25	0.0 (0.0-13.7)	106	0.0 (0.0-3.4)
73	633	0.9 (0.3-2.1)	502	0.8 (0.2-2.0)	25	0.0 (0.0-13.7)	106	1.9 (0.2-6.6)
82	592	0.3 (0.0-1.2)	461	0.2 (0.0-1.2)	25	0.0 (0.0-13.7)	106	0.9 (0.0-5.1)

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

Abbreviations used:

95% CI: 95% Confidence Interval

Data sources:

Data have been compiled by the IARC Infection and Cancer Epidemiology Group and have been published as a systematic review and meta-analysis in: Clifford G, Br J Cancer 2003;88:63 | Clifford G, Int J Cancer 2008; 122: 1684  
Bhatla N, Int J Gynecol Pathol 2006; 25: 398 | Franceschi S, Int J Cancer 2003; 107: 127 | Gheit T, Vaccine 2009; 27: 636 | Munirajan AK, Gynecol Oncol 1998; 69: 205 | Nagpal JK, Eur J Clin Invest 2002; 32: 943 | Peedicayil A, Int J Gynecol Cancer 2006; 16: 1591 | Sowjanya AP, BMC Infect Dis 2005; 5: 116

## 4.2 HPV burden in anogenital cancers other than the cervix

### 4.2.1 Anal cancer

Anal cancer is similar to cervical cancer with respect to overall HPV DNA positivity, with approximately 85% of cases associated with HPV infection worldwide. HPV-16 is the most common detected type, representing 87% of all HPV-positive tumours. HPV-18 is the second most common type detected and is found in approximately 9% of cases. HPV DNA is also detected in the majority of precancerous anal lesions (AIN) and the prevalence of HPV increases with the severity of the lesion, 75% in AIN1, 86% in AIN2, and 94% in AIN3. In this section, the burden of HPV among cases of anal cancers in India is presented.

(*Vaccine 2006, Vol. 24, Supl 3; Vaccine 2008, Vol. 26, Supl 10; IARC Monographs 2007, Vol. 90*)

Table 18: Studies on HPV prevalence among cases of anal cancer in India

Study	HPV detection method	No. tested	HPV prevalence % (95% CI)
No data available	-	-	-

**Data sources:**

Ongoing data are compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia based on the initial meta-analysis conducted by the IARC Infection and Cancer Epidemiology Group in: De Vuyst H, Int J Cancer 2009; 124: 1626.

Table 19: Pooled estimate of HPV prevalence among cases of anal cancer by sex in India

Sex	No. tested	HPV prevalence	
		%	(95% CI)
Female	-	-	-
Male	-	-	-
Unspecified	-	-	-

**Data sources:**

Ongoing data are compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia based on the initial meta-analysis conducted by the IARC Infection and Cancer Epidemiology Group in: De Vuyst H, Int J Cancer 2009; 124: 1626.

Table 20: Pooled estimate of HPV prevalence among men who have sex with men (MSM) and non-MSM with anal cancer in India

MSM	No. tested	HPV prevalence	
		%	(95% CI)
MSM	-	-	-
Non-MSM	-	-	-
Unspecified	-	-	-

**Data sources:**

Ongoing data are compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia based on the initial meta-analysis conducted by the IARC Infection and Cancer Epidemiology Group in: De Vuyst H, Int J Cancer 2009; 124: 1626.

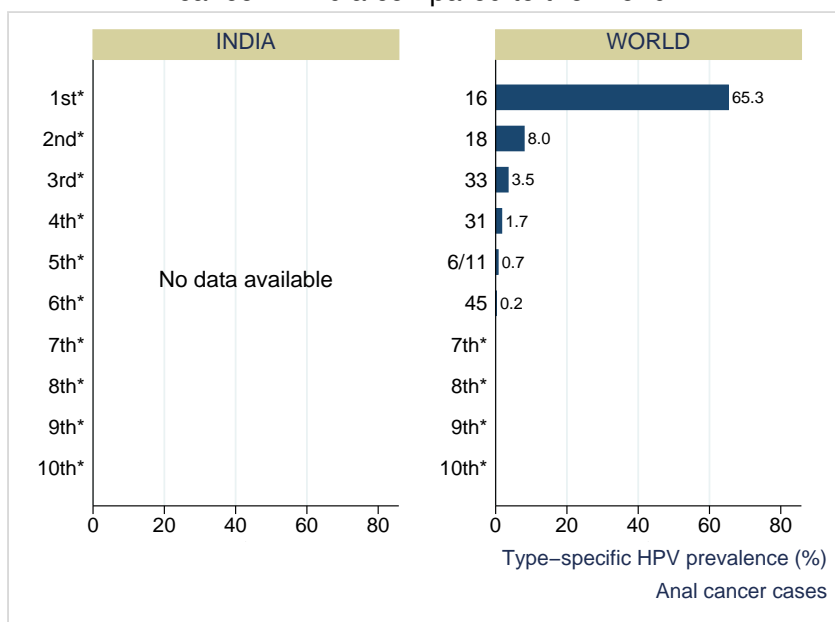
Table 21: Pooled estimate of HPV prevalence among cases of anal cancer by histology in India

Histology	No. tested	HPV prevalence	
		%	(95% CI)
Any Histology	-	-	-
Basaloid/Cloacogenic SCC	-	-	-
Keratinizing SCC	-	-	-
Unspecified SCC	-	-	-
Adenocarcinoma	-	-	-
Others	-	-	-

**Data sources:**

Ongoing data are compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia based on the initial meta-analysis conducted by the IARC Infection and Cancer Epidemiology Group in: De Vuyst H, Int J Cancer 2009; 124: 1626.

Figure 27: Ten most frequent HPV types among cases of anal cancer in India compared to the World



\*Not available. No more types than shown were tested or were positive

Data sources:

Ongoing data are compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia based on the initial meta-analysis conducted by the IARC Infection and Cancer Epidemiology Group in: De Vuyst H, Int J Cancer 2009; 124: 1626.

World: Refer to specific World report or methods document for data sources

### 4.2.2 Vulvar cancer

Vulvar cancer has two distinct histological patterns with two different risk factor profiles: (1) basaloid/warty types (2) keratinizing types. The majority of vulvar carcinomas are of the basaloid warty type (>55%), which occur mainly in younger women compared to the keratinizing types, and are associated with similar risk factors for HPV infection in the cervix. In contrast, keratinizing vulvar carcinomas are associated with a low prevalence of HPV DNA ( $\leq 10\%$ ) that occur mainly in older women and are associated with lichen planus. In a case series, HPV DNA prevalence ranged from 72-100% among cases of high-grade vulvar neoplasias (VIN3) and 27.3-100% among vulvar carcinomas (3.9-6.3% in keratinizing types). Similarly, a meta-analysis estimated a HPV prevalence of 76% for VIN and 36% for vulvar carcinomas. HPV-16 is the most common detected type (65-93% in VIN and 71% for vulvar cancer) followed by HPV-18. In this section, the HPV burden among cases of vulvar cancers in India is presented.

(*Vaccine 2006, Vol. 24, Supl 3; Vaccine 2008, Vol. 26, Supl 10; IARC Monographs 2007, Vol. 90*)

Table 22: Studies on HPV prevalence among cases of vulvar cancer in India

Study	HPV detection method	No. tested	HPV prevalence % (95% CI)
No data available	-	-	-

**Data sources:**

Ongoing data are compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia based on the initial meta-analysis conducted by the IARC Infection and Cancer Epidemiology Group in: De Vuyst H, *Int J Cancer* 2009; 124: 1626.

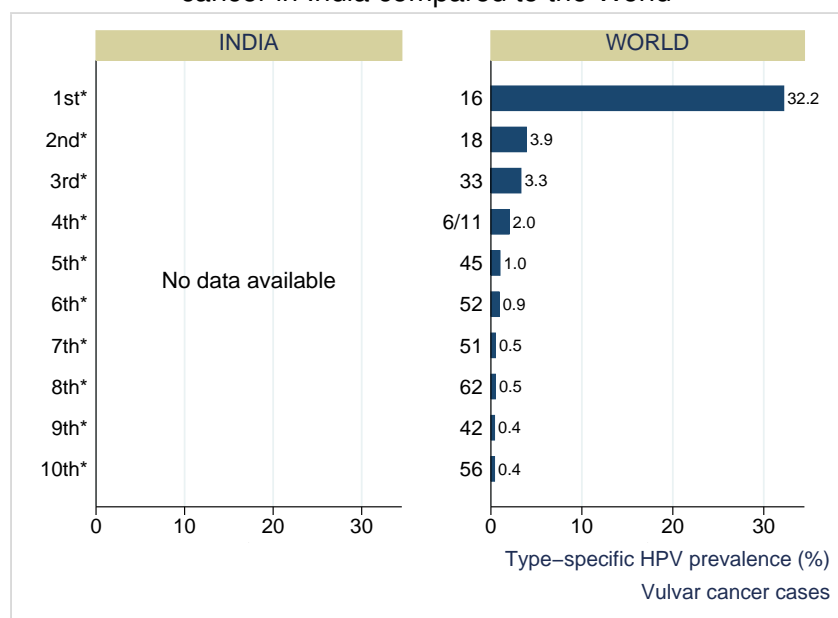
Table 23: Pooled estimate of HPV prevalence among cases of vulvar cancer by histology in India

Histology	No. tested	HPV prevalence	
		%	(95% CI)
Any Histology	-	-	-
Warty-Basaloid SCC	-	-	-
Keratinizing SCC	-	-	-
Verrucous SCC	-	-	-
Unspecified SCC	-	-	-
Adenocarcinoma	-	-	-

Data sources:

Ongoing data are compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia based on the initial meta-analysis conducted by the IARC Infection and Cancer Epidemiology Group in: De Vuyst H, Int J Cancer 2009; 124: 1626.

Figure 28: Ten most frequent HPV types among cases of vulvar cancer in India compared to the World



\*Not available. No more types than shown were tested or were positive

Data sources:

Ongoing data are compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia based on the initial meta-analysis conducted by the IARC Infection and Cancer Epidemiology Group in: De Vuyst H, Int J Cancer 2009; 124: 1626.

World: Refer to specific World report or methods document for data sources

### 4.2.3 Vaginal cancer

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 91% of invasive vaginal carcinomas and 82% of high-grade vaginal neoplasias (VAIN3). In a case series of vaginal cancers, HPV-16 is the most common type in at least 70% of HPV-positive carcinomas. In this section, the HPV burden among cases of vaginal cancers in India is presented. (*Vaccine 2006, Vol. 24, Supl 3; Vaccine 2008, Vol. 26, Supl 10; IARC Monographs 2007, Vol. 90*)

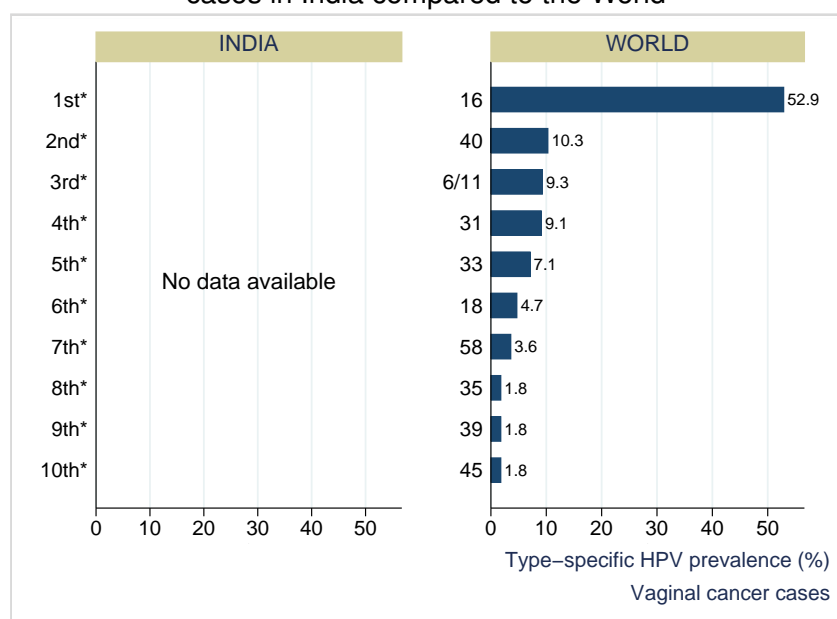
Table 24: Studies on HPV prevalence among cases of vaginal cancer in India

Study	HPV detection method	Histology	No. tested	HPV prevalence % (95% CI)
No data available	-	-	-	-

**Data sources:**

Ongoing data are compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia based on the initial meta-analysis conducted by the IARC Infection and Cancer Epidemiology Group in: De Vuyst H, Int J Cancer 2009; 124: 1626.

Figure 29: Ten most frequent HPV types among vaginal cancer cases in India compared to the World



\*Not available. No more types than shown were tested or were positive

**Data sources:**

Ongoing data are compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia based on the initial meta-analysis conducted by the IARC Infection and Cancer Epidemiology Group in: De Vuyst H, Int J Cancer 2009; 124: 1626.

World: Refer to specific World report or methods document for data sources

#### 4.2.4 Penile cancer

The geographical correlation between the incidence of penile and cervical cancers and the concordance of these two cancers among married couples suggested the common aetiology of HPV infection. HPV DNA is detectable in approximately 40-50% of all penile cancers. HPV DNA is detectable among penile intraepithelial neoplasias with the basaloid histological type, ranging from 75-80% of cases, and decreasing to 30-60% among invasive squamous cell carcinomas (SCC). The majority of penile carcinomas are squamous cell carcinomas (SCC), and it has been observed that some cases of penile SCC are HPV DNA negative. HPV DNA positivity among penile cancers varies with histopathological type, with a prevalence of 47% in basaloid/warty types, 75% in purely basaloid types, and 11% in keratinizing SCC. Among HPV-DNA positive cases, HPV-16 is the most common type. In this section, the HPV burden among cases of penile cancers in India is presented.

(*Vaccine 2006, Vol. 24, Supl 3; Vaccine 2008, Vol. 26, Supl 10; IARC Monographs 2007, Vol. 90*)

Table 25: Studies on HPV prevalence among cases of penile cancer in India

Study	HPV detection method	No. tested	HPV prevalence % (95% CI)	
No data available	-	-	-	-

**Data sources:**

Data have been compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia and have been published as systematic review in: Miralles-Guri C, J Clin Pathol 2009; In press

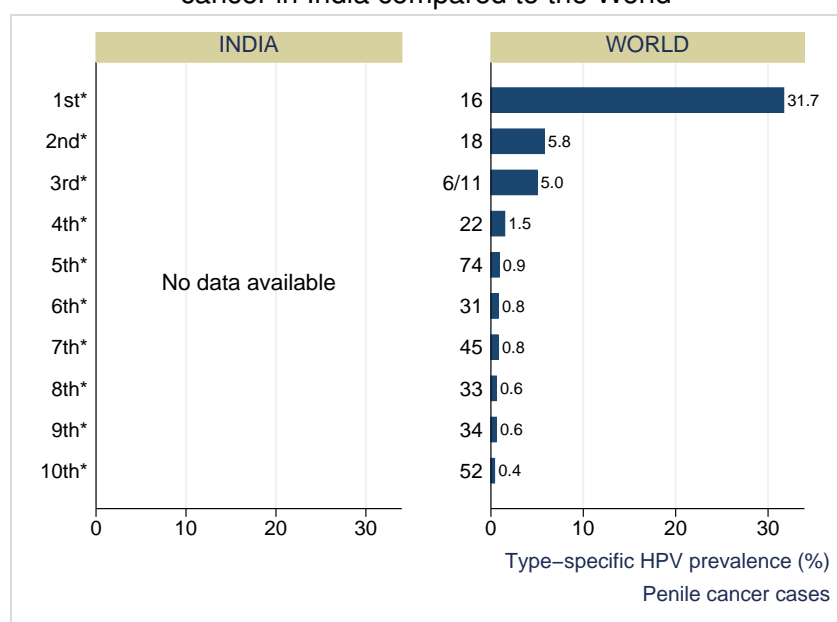
Table 26: Pooled estimate of HPV prevalence among cases of penile cancer by histology in India

Histology	No. tested	HPV prevalence	
		%	(95% CI)
Any Histology	-	-	-
Carc. In situ	-	-	-
SCC (unspecified)	-	-	-
Keratinizing SCC	-	-	-
Verrucous SCC	-	-	-
Basaloid SCC	-	-	-
Non-keratinizing SCC	-	-	-
Warty SCC	-	-	-

## Data sources:

Data have been compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia and have been published as systematic review in: Miralles-Guri C, J Clin Pathol 2009; In press

Figure 30: Ten most frequent HPV types among cases of penile cancer in India compared to the World



\*Not available. No more types than shown were tested or were positive

## Data sources:

Data have been compiled by the HPV Information Centre in the Unit of Infections and Cancer at the Institut Catala d'Oncologia and have been published as systematic review in: Miralles-Guri C, J Clin Pathol 2009; In press

World: Refer to specific World report or methods document for data sources

### 4.3 HPV burden in men

The information to date regarding penile HPV infection is primarily derived from studies that examined husbands of female cervical cancer cases, cross-sectional studies of selected populations such as individuals with sexually transmitted infections (STI) and military recruits, as well as from small prospective studies. HPV infection in the genital tract has been detected in up to 73% of healthy men. Like other STIs, HPV may be transmitted more readily from men to women than from women to men. In this section, the HPV burden among men in India is presented.

(*Vaccine 2008, Vol. 26, Supl 10*)

Table 27: Studies on HPV prevalence among men in India

Study	Anatomic sites samples	HPV detection method	Population	Age (years)	HPV prevalence	
					Men tested	% (95% CI)
No data available	-	-	-	-	-	-

Table 28: Studies on high-risk HPV Prevalence among men in India

Study	Anatomic sites samples	High-risk HPV tested	Population	Age (years)	HPV prevalence	
					Men tested	% (95% CI)
No data available	-	-	-	-	-	-

## 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; 24S3: S3-1*)

In this section, the prevalence of smoking, parity (fertility), oral contraceptive use, and HIV in India are presented.

Table 29: Factors contributing to cervical carcinogenesis (cofactors) in India

INDICATOR		MALE	FEMALE	TOTAL
<b>Smoking<sup>1</sup></b>				
Smoking of any tobacco prevalence (%)	Current	30.8 <sup>a</sup>	2.8 <sup>a</sup>	-
	Daily	24.9 <sup>a</sup>	1.8 <sup>a</sup>	-
Cigarette smoking prevalence (%)	Current	25.8 <sup>a</sup>	0.6 <sup>a</sup>	-
	Daily	20 <sup>a</sup>	0.3 <sup>a</sup>	-
<b>Parity<sup>2,3</sup></b>				
Total fertility rate per woman		-	2.8 <sup>b</sup>	-
	15-19 yrs	-	97 <sup>b</sup>	-
	20-24 yrs	-	214 <sup>b</sup>	-
	25-29 yrs	-	143 <sup>b</sup>	-
Age-specific fertility rate (per 1000 women)	30-34 yrs	-	66 <sup>b</sup>	-
	35-39 yrs	-	27 <sup>b</sup>	-
	40-44 yrs	-	8 <sup>b</sup>	-
	44-49 yrs	-	3 <sup>b</sup>	-
<b>Hormonal contraception<sup>4</sup></b>				
Oral contraceptive use (%)		-	-	3.1 <sup>c</sup>
<b>HIV</b>				
Adult (15-49 yrs) prevalence percent [low estimate - high estimate] <sup>5</sup>		-	-	0.3 [0.2-0.5] <sup>d</sup>
Young adults (15-24 yrs) rate of HIV (%) [low estimate - high estimate] <sup>5</sup>		0.3 [<0.1-0.5] <sup>d</sup>	0.3 [<0.1-0.5] <sup>d</sup>	-
Estimated number of adults and children living with HIV [low estimate - high estimate] <sup>5</sup>		-	-	2400000 [1800000-3200000] <sup>d</sup>
Estimated number of adults (15+ yrs) living with HIV [low estimate - high estimate] <sup>5</sup>		-	880000 [670000-1200000] <sup>d</sup>	2300000 [1700000-3100000] <sup>d</sup>
Estimated number of AIDS deaths in adults and children [low estimate - high estimate] <sup>5</sup>		-	-	-
Estimated antiretroviral therapy coverage (%) [low estimate - high estimate] <sup>6,7</sup>		-	-	-
Estimated number of people receiving antiretroviral therapy [low estimate - high estimate] <sup>6,7</sup>		-	-	158000 (138000-178000) <sup>d</sup>
HIV prevalence (%) among female sex workers in the capital city <sup>5</sup>		-	-	-
HIV prevalence (%) among men who have sex with men in the capital city <sup>5</sup>		6.4 <sup>d</sup>	-	-

Year of estimation: <sup>a</sup> 2008; <sup>b</sup> 2004; <sup>c</sup> 2005/06; <sup>d</sup> 2007;

<sup>2</sup> Fertility rate is a proxy measure of parity.

<sup>6</sup> The coverage estimates are based on the estimated unrounded numbers of people receiving antiretroviral therapy and the estimated unrounded need for antiretroviral therapy (based on UNAIDS/WHO methodology). The ranges in coverage estimates are based on plausibility bounds in the denominator: that is, low and high estimates of need.

Data sources:

<sup>1</sup> WHO Report on the Global Tobacco Epidemic, 2008 - The MPOWER package. Tobacco Free Initiative, World Health Organization, 2008 ([http://www.who.int/tobacco/mpower/gtcr\\_download/en/index.html](http://www.who.int/tobacco/mpower/gtcr_download/en/index.html))

<sup>3</sup> World fertility patterns 2007 [wall chart]. New York, Population Division, Department of Economic and Social Affairs, United Nations Secretariat, 2008.

<sup>4</sup> United Nations, Department of Economic and Social Affairs, Population Division. World Contraceptive Use 2005 (<http://www.un.org/esa/population/publications/contraceptive2005/WCU2005.htm>)

<sup>5</sup> 2008 Report on the global AIDS epidemic, UNAIDS/WHO, July 2008.

<sup>7</sup> World Health Organization. WHO and HIV/AIDS. Towards universal access: scaling up priority HIV/AIDS interventions in the health sector: progress report 2008.

## 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.

Table 30: Time of sexual intercourse and high-risk sexual behaviour in India, for females and males

Indicator	Male	Female
<b>Time of sexual intercourse</b>		
Median age at first sex among young men and women (15-24 years)	-	-
Median age at first sexual intercourse among men (25-54 years) and women (25-49 years) <sup>2</sup>	-	17.6 <sup>a</sup>
% of young people (15-24 years) who have had sex before the age of 15	-	-
Abstinence of never-married young men and women (age 15-24 years) <sup>1</sup>	-	-
<b>High-risk sexual behaviour</b>		
Extramarital sex in the last year <sup>3</sup>	11 <sup>b</sup>	2 <sup>b</sup>
Multiple partners in the last year among sexually active respondents aged 15-49 <sup>1</sup>	-	-
Commercial sex in last year	-	-

Year of estimation: <sup>a</sup> 2005/2006; <sup>b</sup> 2001;

Data sources:

<sup>1</sup> National Baseline High Risk Groups and Bridge Population BSS, India 2001

<sup>2</sup> India Demographic Health Survey 2005/6

<sup>3</sup> National Baseline High Risk Groups and Bridge Population BSS, India 2001

(Numerator): Nonmarital, noncohabiting partner includes commercial sex partners. (Denominator): The number of respondents who have had sex with a nonmarital, noncohabiting partner

Table 31: Reproductive health indicators in India

Factor	Indicator	Male	Female	Total	
Age at first marriage <sup>1</sup>	Average age at first marriage:	23.9 <sup>a</sup>	19.3 <sup>a</sup>	-	
	Percentage of ever married	15-19 yrs	9.5 <sup>a</sup>	35.7 <sup>a</sup>	-
		20-24 yrs	40.1 <sup>a</sup>	83.0 <sup>a</sup>	-
		45-49 yrs	97.6 <sup>a</sup>	99.3 <sup>a</sup>	-
	Difference in average at first marriage between men and women	-	-	4.7 <sup>a</sup>	
Married or in union <sup>2</sup>	Women aged 15-49 married or in union (thousands)	-	223179 <sup>b</sup>	-	
Contraceptive use <sup>3</sup>	Any contraceptive method (%)	-	56.3 <sup>b</sup>	-	
	Annual change (1997 to 2007): any contraceptive method	-	1.2 <sup>b</sup>	-	
	Annual change (1997 to 2007): modern methods	-	0.9 <sup>b</sup>	-	
	Modern methods	Condom (%)	-	5.2 <sup>b</sup>	-
		IUD (%)	-	1.7 <sup>b</sup>	-
		Injectable or implant (%)	-	0.1 <sup>b</sup>	-
		Pill/Oral contraceptive (%)	-	3.1 <sup>b</sup>	-
		Sterilization (%)	1.0 <sup>b</sup>	37.3 <sup>b</sup>	-
		Vaginal barrier method (%)	-	0.0 <sup>b</sup>	-
		Other modern methods (%)	-	0.0 <sup>b</sup>	-
	Prevalence of modern methods (%)	-	48.5 <sup>b</sup>	-	
	Traditional methods	With-drawal (%)	-	2.5 <sup>b</sup>	-
		Rhythm (%)	-	4.9 <sup>b</sup>	-
Other traditional methods (%)		-	0.3 <sup>b</sup>	-	

Year of estimation: <sup>a</sup> 1991; <sup>b</sup> 2005/06;

Data sources:

<sup>1</sup> World Bank HNPStats [online database]. Washington DC, World Bank Health, Nutrition and Population (HNP) statistics, 2007 (<http://go.worldbank.org/N2N84RDV00>, accessed 28 Jan 2009).

<sup>2</sup> United Nations, Department of Economic and Social Affairs, Population Division. World Contraceptive Use 2005 (<http://www.un.org/esa/population/publications/contraceptive2005/WCU2005.htm>)

<sup>3</sup> United Nations, Department of Economic and Social Affairs, Population Division. World Contraceptive Use 2007 (<http://www.un.org/esa/population/publications/contraceptive2007/contraceptive2007.htm>)

## 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. In addition, male circumcision and the use of condoms have shown a significant protective effect against HPV transmission and may offer an alternative preventative strategy. This section presents indicators on basic characteristics and performance of cervical cancer screening, status of HPV vaccine licensure, introduction and country recommendations and the prevalence of male circumcision and condom use in India.

### 7.1 Cervical cancer screening practices

Table 32: Main characteristics of cervical cancer screening in India

Indicator	Value
Screening ages (years)	-
Screening interval (years) or frequency of screens	-
Lifetime number of recommended smears	-
Smear taker	-

Variable screening ages and screening intervals or frequency of screens depend on different guidelines followed in the country.

Data sources:

IARC Handbooks of Cancer Prevention Vol. 10: Cervix Cancer Screening. IARC Press. Lyon, 2005.

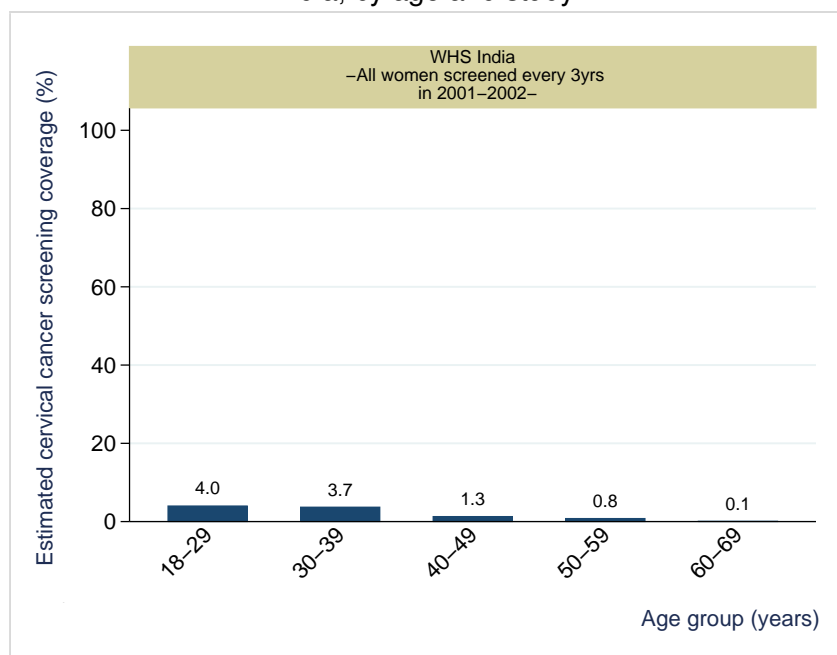
Table 33: Estimated coverage of cervical cancer screening in India

Reference	Year	Population studied	Rural or Urban	N Women	Age range	Coverage (%)	Within the last year(s)
WHS India	2001-2002	General female population	All	4586	18-69	2.6	3y
			Urban	499	18-69	4.9	3y
			Rural	4086	18-69	2.3	3y

## Notes and sources:

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

Figure 31: Estimated coverage of cervical cancer screening in India, by age and study



## Notes and sources:

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

Table 34: Estimated coverage of cervical cancer screening in India, by region

Region	N women	Age range	Coverage (%)	LY*	Population	Reference
No data available	-	-	-	-	-	-

LY\*: Within the last year(s)

## 7.2 HPV vaccination

### 7.2.1 HPV vaccine licensure and introduction

Table 35: Licensure status of current HPV vaccines in India

HPV vaccine	Date	Licensure
Bivalent vaccine/Cervarix	2009	Yes
Quadrivalent vaccine/Gardasil	2009	Yes

Due to importation, distribution, and other regulatory requirements, as well as price negotiations, a licensed vaccine may not necessarily be marketed in a given country.

Data sources:

Bivalent: GlaxoSmithKline Biologicals, Rixensart, Belgium, March 2009 | Quadrivalent: Merck & Co., Inc., Whitehouse Station, NJ, USA, March 2009

Table 36: HPV vaccine introduction in India

Indicator	Value
HPV vaccine schedule	-
Introduction in entire or part of the country	-
Comment	-

Data sources:

WHO-UNICEF Joint Reporting Form and WHO Regional offices 2009, WHO Immunization surveillance, assessment, and monitoring ([http://www.who.int/immunization\\_monitoring/data/data\\_subject/en/index.html](http://www.who.int/immunization_monitoring/data/data_subject/en/index.html))

### 7.2.2 Country recommendations on the inclusion of HPV vaccines in national immunization programmes

Table 37: Summary of national HPV vaccine recommendations and programmatic aspects in India

Indicator	Date	Value
Finance mechanism	-	-
Delivery strategy	-	-
Integration of vaccination and cervical cancer screening program	-	-
Announcement date and type; and recommendation committee	-	-
Recommendation for primary target population	-	-
Recommendation for catch-up population	-	-
Recommendation for vaccinating males	-	-
Comments	-	-

### 7.3 Male circumcision and condom use

Table 38: Prevalence of male circumcision in India

Reference	Prevalence % (95%CI)	Method
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%.
Drain 2006	<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 sources:

Drain PK, BMC Infect Dis 2006; 6: 172 | WHO 2007: Male circumcision: Global trends and determinants of prevalence, safety and acceptability

Table 39: Prevalence of condom use in India

Indicator	Prevalence %	Year of estimation
Condom use	5.2	2005/06

Data sources:

United Nations, Department of Economic and Social Affairs, Population Division. World Contraceptive Use 2005 (<http://www.un.org/esa/population/publications/contraceptive2007/contraceptive2007.htm>)

## 8 Indicators related to immunization practices other than HPV vaccines

This section presents data on immunization 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 Immunization surveillance, assessment and monitoring website.

([http://www.who.int/immunization\\_monitoring/en/](http://www.who.int/immunization_monitoring/en/)).

### 8.1 Immunization schedule

Table 40: General immunization schedule in India

Vaccine	Schedule	Coverage†	Comment
Bacille Calmette-Guérin vaccine	birth	entire	-
Tetanus and diphtheria toxoid childrens' dose	5 years	entire	-
Diphtheria and tetanus toxoid with whole cell pertussis vaccine	6, 10, 14 weeks; 16-24 months	entire	-
Hepatitis B vaccine	6, 10, 14 weeks	part	-
Japanese encephalitis	1-2 years	part	-
Measles vaccine	9-12 months	entire	-
Oral polio vaccine	birth; 6, 10, 14 weeks; 16-24 months	entire	-
Tetanus toxoid	10, 16 years	entire	0 & 16 Y Preg Women
Vitamin A supplementation	9, 18, 24, 30, 36, 42 months	entire	-

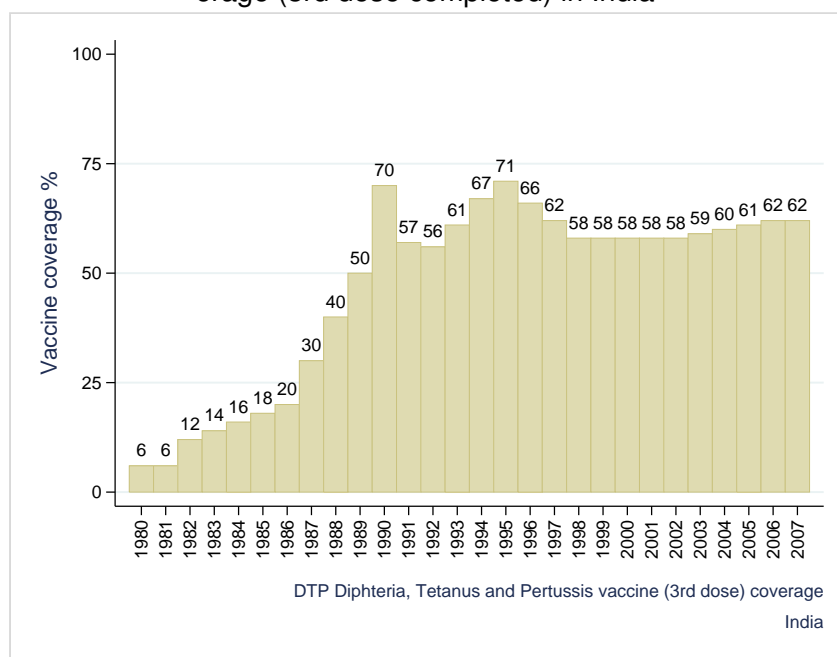
†Entire or part of the population covered.

Notes and sources:

WHO Immunization surveillance, assessment and monitoring ([http://www.who.int/immunization\\_monitoring/data/data\\_subject/en/](http://www.who.int/immunization_monitoring/data/data_subject/en/))

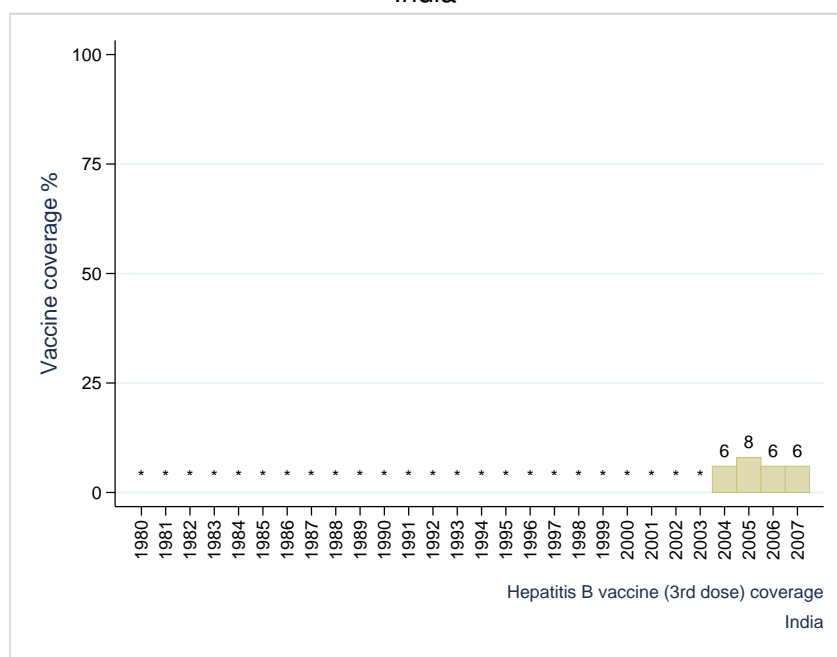
## 8.2 Immunization coverage estimates

Figure 32: DTP (Diphtheria, Tetanus and Pertussis) vaccine coverage (3rd dose completed) in India



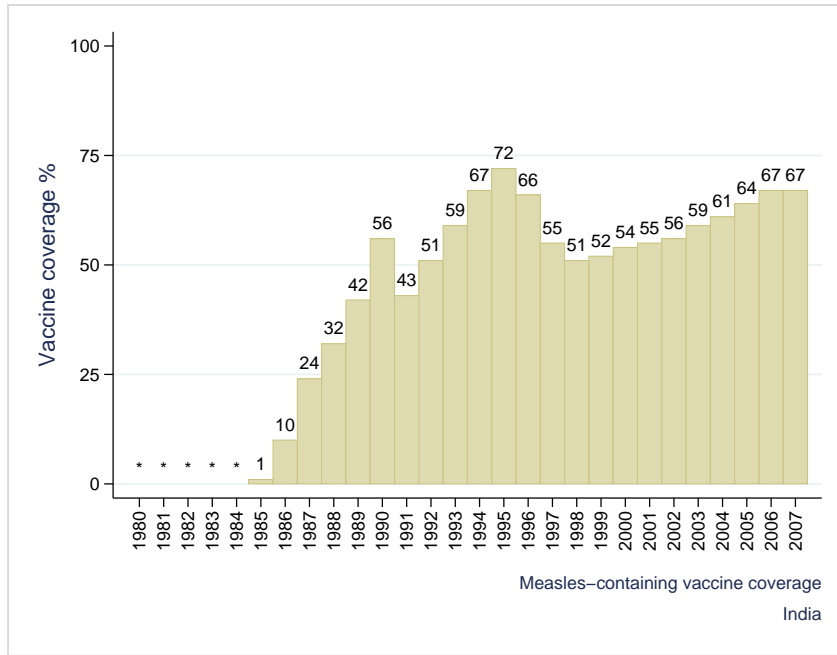
\*Data not available  
 Data sources: WHO Immunization surveillance, assessment and monitoring ([http://www.who.int/immunization\\_monitoring/data/data\\_subject/en/](http://www.who.int/immunization_monitoring/data/data_subject/en/))

Figure 33: Hepatitis B vaccine coverage (3rd dose completed) in India



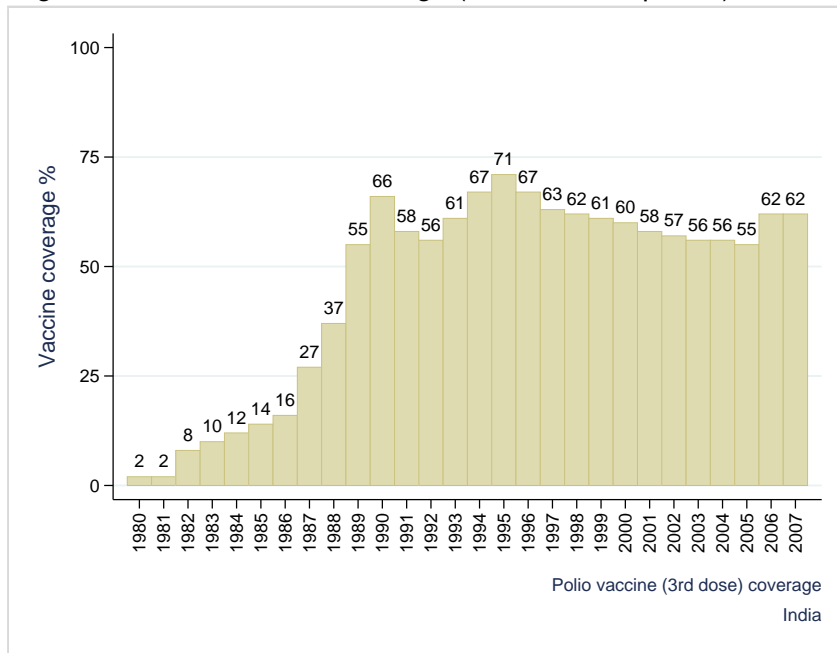
\*Data not available  
 Data sources: WHO Immunization surveillance, assessment and monitoring ([http://www.who.int/immunization\\_monitoring/data/data\\_subject/en/](http://www.who.int/immunization_monitoring/data/data_subject/en/))

Figure 34: Measles-containing vaccine coverage in India



\*Data not available  
 Data sources: WHO Immunization surveillance, assessment and monitoring ([http://www.who.int/immunization\\_monitoring/data/data\\_subject/en/](http://www.who.int/immunization_monitoring/data/data_subject/en/))

Figure 35: Polio vaccine coverage (3rd dose completed) in India



\*Data not available  
 Data sources: WHO Immunization surveillance, assessment and monitoring ([http://www.who.int/immunization\\_monitoring/data/data\\_subject/en/](http://www.who.int/immunization_monitoring/data/data_subject/en/))

### 8.3 Other immunization indicators

Table 41: Relevant indicators of vaccine implementation in India.

Indicator	Value <sup>a</sup>	
Immunization planning and management	Does the country have a multi-year plan (MYP) for immunization?	Yes
	What years does the MYP cover?	2005-2010
	Is MYP costing included?	Yes
	Is the MYP for immunization integrated into the broader health sector plan?	Yes
	Year of last inventory (models: location; age and working status) of all refrigeration equipment assigned for public immunization services in the country	-
Immunization system performance	Total number of districts in country	604
	% of districts $\geq$ 80% DTP3 coverage	84
	Drop-out rate between DTP1 and DTP3 coverage	-
Surveillance	Is there a system in place, with laboratory confirmation, to measure the impact of vaccination against invasive bacterial diseases, for example bacterial meningitis or pneumonia?	No
Safety	Non AD disposables: Type of injection equipment used for routine immunizations	-
	Sterilizable: Type of injection equipment used for routine immunizations	-
	Are safety boxes distributed with all vaccine deliveries?	No
	Was there any monitoring for immunization safety (i.e. monitoring of adverse events following immunization)?	Yes
Finance	Was there any monitoring for immunization safety (i.e. monitoring of adverse events following immunization)?	Yes
	What percentage of routine vaccine costs was financed by the government (including loans)?	100
	Was there a line item in the national budget for purchase of injection supplies (syringes: needles, sharp boxes) for routine immunizations?	Yes
	% of immunization spending financed using Government funds	100
New vaccine introduction	Is Hepatitis B vaccine integrated into the routine immunization systems?	Yes(P)
	Is Rubella vaccine integrated into the routine immunization systems?	No

<sup>a</sup>'A' means Adolescents, 'E' means Estimates and 'P' means Partial.

Reported for year: <sup>a</sup> 2007;

Data sources:

WHO Immunization surveillance, assessment and monitoring ([http://www.who.int/immunization\\_monitoring/data/data\\_subject/en/](http://www.who.int/immunization_monitoring/data/data_subject/en/))

## Note to the reader

Anyone who is aware of relevant published data that may not have been included in the WHO/ICO Information Centre on HPV and Cervical Cancer 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.

## Acknowledgments

This report has been developed by the Unit of Infections and Cancer within the Cancer Epidemiology Research Program at the Institut Català d'Oncologia (ICO, Catalan Institute of Oncology) in collaboration with WHO's Department of Immunization, Vaccines and Biologicals (IVB), which receives support from the Bill and Melinda Gates Foundation.

### Institut Català d'Oncologia (ICO)

F. Xavier Bosch, Xavier Castellsagué, Silvia de Sanjosé, Francisco Alarcón, Ginesa Albero, Laia Bruni, Elena Ferrer, Karly S. Louie, Carles Miralles, Núria Monfuleda, Jesus Muñoz, Susana Pérez, Cristina Rajo, Esther Roura.

### World Health Organization (WHO)

Teresa Aguado, Olivier Beauvais, Susan Byrne, Marta Gacic-Dobo.

## Licensed Logo Use

Use, reproduction, copying, or redistribution of HPV Information Centre logos are strictly prohibited without written permission from the HPV Information Centre.

### Contact information:

WHO/ICO HPV Information Centre  
Institut Català d'Oncologia  
Avda. Gran Via, s/n Km 2.7  
08907 L'Hospitalet de Llobregat (Barcelona, Spain)  
e-mail: [hpvcentre@iconcologia.net](mailto:hpvcentre@iconcologia.net)  
internet address: [www.who.int/hpvcentre](http://www.who.int/hpvcentre)