

# CANCER MORTALITY TRENDS IN INDIA WITH PREDICTIONS FOR 2020

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# MORTALITY IN INDIA

## BACKGROUND (1)

## METHODS

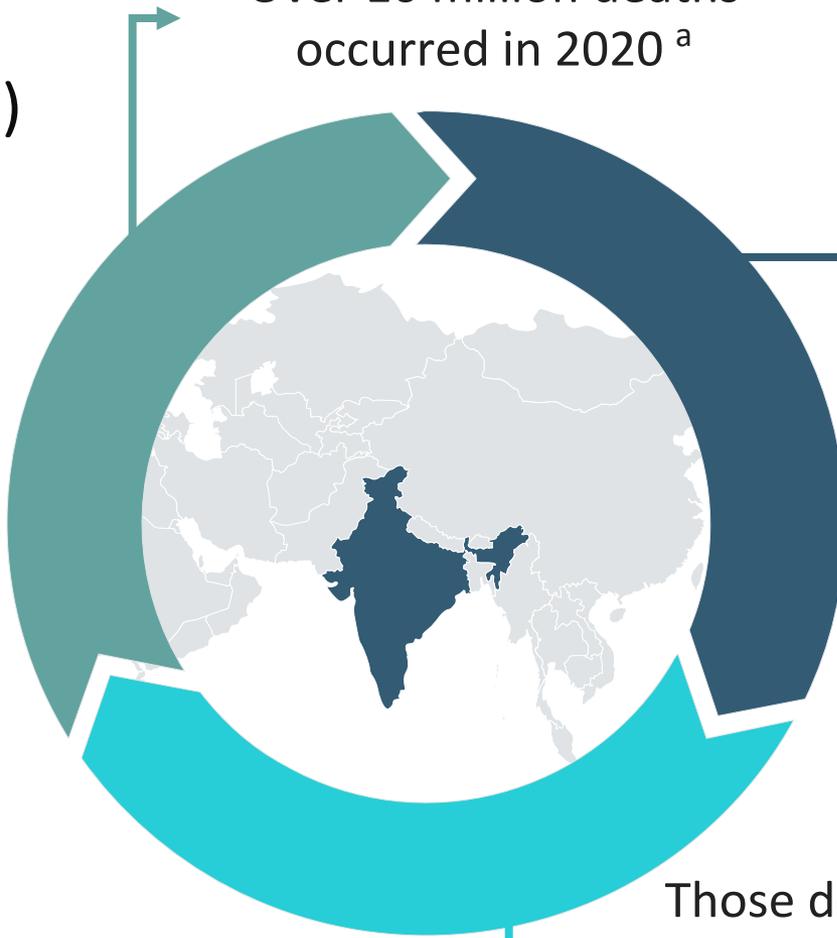
## RESULTS

## COMMENTS

Over 10 million deaths occurred in 2020<sup>a</sup>

Over 75% of deaths occur at home **without medical attention**

Those deaths are undocumented and do not have a medically certified cause of death



<sup>a</sup> From UN estimates

MORTALITY IN INDIA

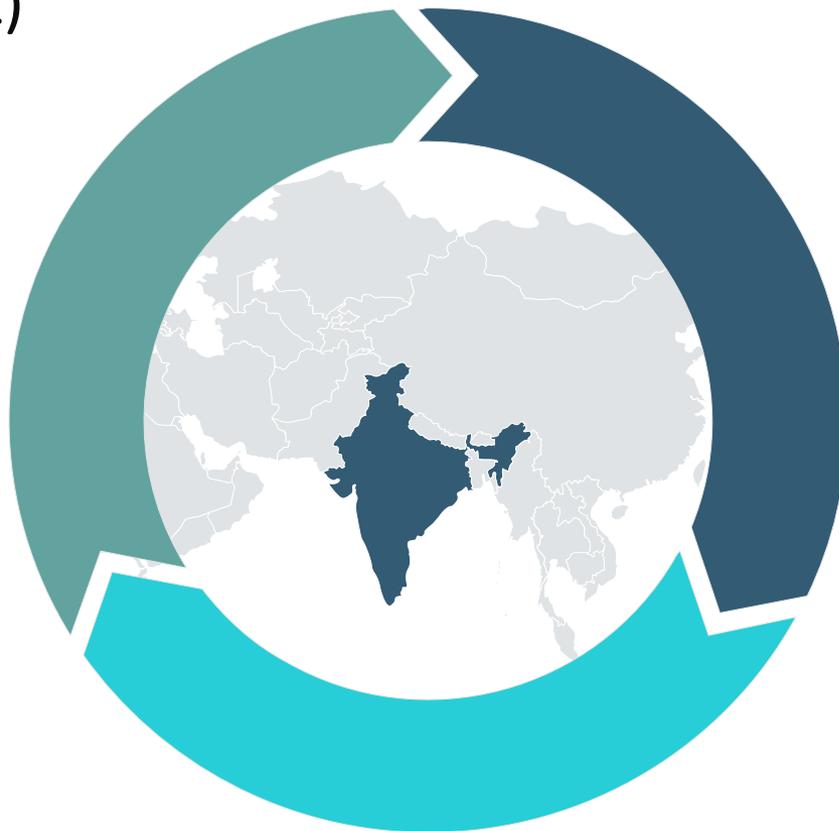
BACKGROUND (1)

METHODS

RESULTS

COMMENTS

# THE MILLION DEATH STUDY



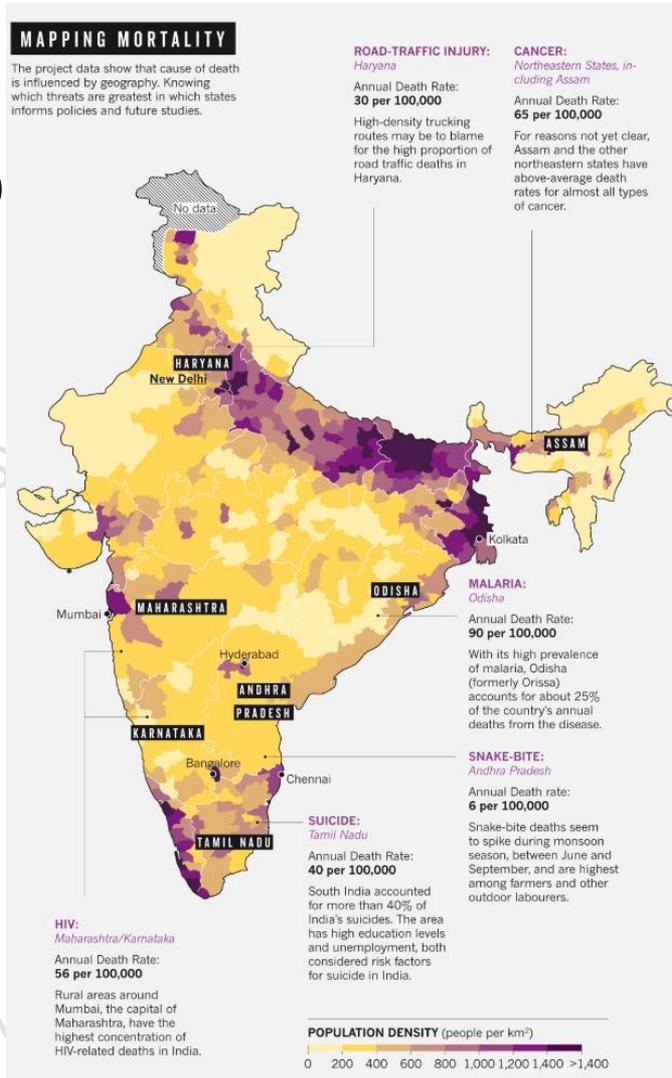
# MORTALITY IN INDIA

## BACKGROUND

## METHODS

## RESULTS

## COMMENTS



## THE MILLION DEATH STUDY

Nationally-representative health survey in India (2001-2014)

Mortality survey of 2.4 million households, using **verbal autopsy (VA)** methods

Two components: questionnaire & unstructured narrative

# VERBAL AUTOPSY

## HOW THEY GATHER THE DATA

The Million Death Study (MDS) involved two phases, 1997–2003 and 2004–2013, each of which surveyed a different selection of more than 1 million homes.

# 800–900

government surveyors visit the homes every six months.



# 50,000–58,000

verbal autopsies are collected each year.



# TWO

trained doctors from a pool of 300 assign a cause of death on the basis of each autopsy.



Jha P et al. PLoS Med, 2006  
Aleksandrowicz L et al. BMC Med, 2014

# CANCER MORTALITY IN INDIA

## BACKGROUND (2)

Population ageing and growth

Increased prevalence of risk factors associated with economic transition

Improvements in cancer awareness and detection

The burden of cancer has been growing in India

## METHODS

## RESULTS

## COMMENTS



# CANCER MORTALITY IN INDIA

## Cancer mortality in India: a nationally representative survey



*Rajesh Dikshit, Prakash C Gupta, Chinthanie Ramasundarahettige, Vendhan Gajalakshmi, Lukasz Aleksandrowicz, Rajendra Badwe, Rajesh Kumar, Sandip Roy, Wilson Suraweera, Freddie Bray, Mohandas Mallath, Poonam K Singh, Dharendra N Sinha, Arun S Shet, Hellen Gelband, Prabhat Jha, for the Million Death Study Collaborators\**

Study deaths, 2001-03

All India, 2010

UN's estimates of deaths from all causes (×1000)

Estimated cancer deaths\* (×1000)

Male

Female

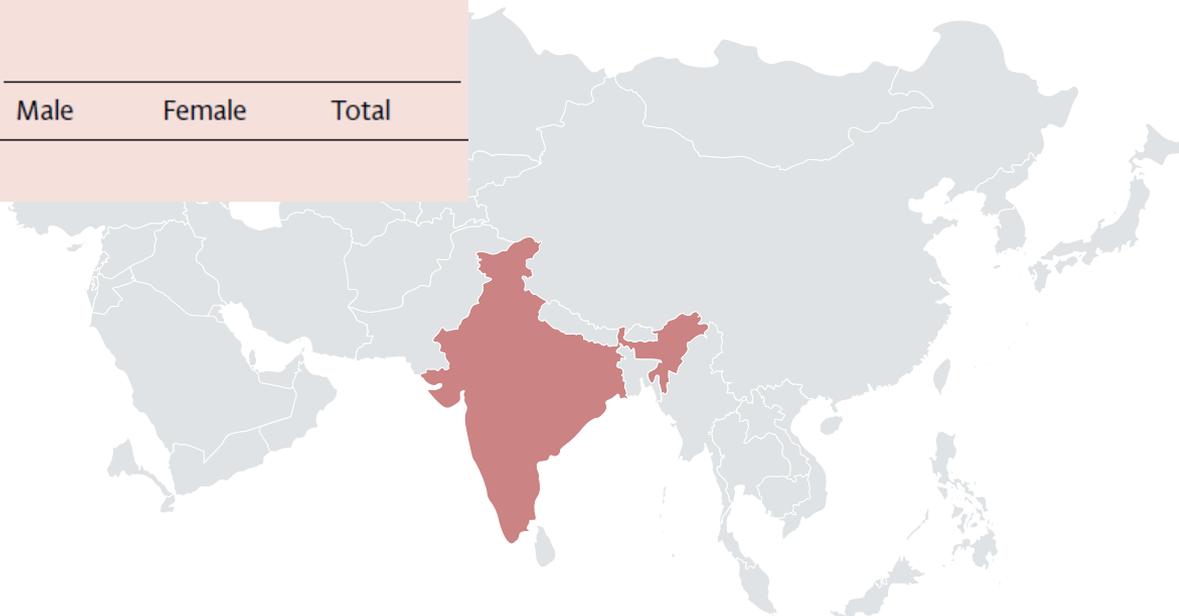
Male

Female

Male

Female

Total



# CANCER MORTALITY IN INDIA AND PREDICTIONS FOR 2020

Using the MDS database...

AIMS



To provide mortality trends for all cancer combined and specific types of cancers over the period 2004-2013



To estimate the projected number of deaths along with age-standardized mortality rates for 2020

METHODS

RESULTS

COMMENTS

# CANCER MORTALITY IN INDIA AND PREDICTIONS FOR 2020

BACKGROUND

DATA AVAILABILITY

**MDS database:**

- 19,655 deaths coded as cancer among people aged 30-69 years
- Calendar years from 2004 to 2013

**UN database:**

- Estimates of number of deaths in India
- Estimates of population in India
- Calendar years from 2004 to 2013 and 2020

METHODS (1)

RESULTS

COMMENTS

# CANCER MORTALITY IN INDIA AND PREDICTIONS FOR 2020

BACKGROUND

## VARIABLES

Sex & age

**Cancer site**

Rural/Urban

States/Regions

## MALES

Lip, oral cavity and pharynx  
Upper aero digestive  
Stomach  
Colon, rectum and small intestine  
Liver  
Other digestive  
Lung & airway cancers  
Male genital cancers  
Urinary tract  
Brain and eye  
Hematopoietic malignancies

## FEMALES

Lip, oral cavity and pharynx  
Upper aero digestive  
Stomach  
Colon, rectum and small intestine  
Liver  
Other digestive  
Lung & airway cancers  
Breast  
Cervix & uterus  
Other female genital cancer  
Brain and eye  
Hematopoietic malignancies

METHODS (1)

RESULTS

COMMENTS

# CANCER MORTALITY IN INDIA AND PREDICTIONS FOR 2020

BACKGROUND



TRENDS OVER 2004-2013

METHODS (2)

1. We estimated the expected number of cancer deaths by applying the proportion of cancer deaths occurred to the UN estimated deaths in the corresponding calendar year
2. We then derived the age-adjusted mortality rates using the UN estimated population for the corresponding calendar year

RESULTS

COMMENTS

# CANCER MORTALITY IN INDIA AND PREDICTIONS FOR 2020

BACKGROUND



PREDICTIONS FOR 2020

METHODS (3)

1. We estimated the expected number of cancer deaths for 2020 by applying the proportion of cancer deaths occurred in 2011-2013 to the UN estimated deaths for 2020
2. We derived the age-adjusted mortality rates using the UN estimated population for 2020

RESULTS

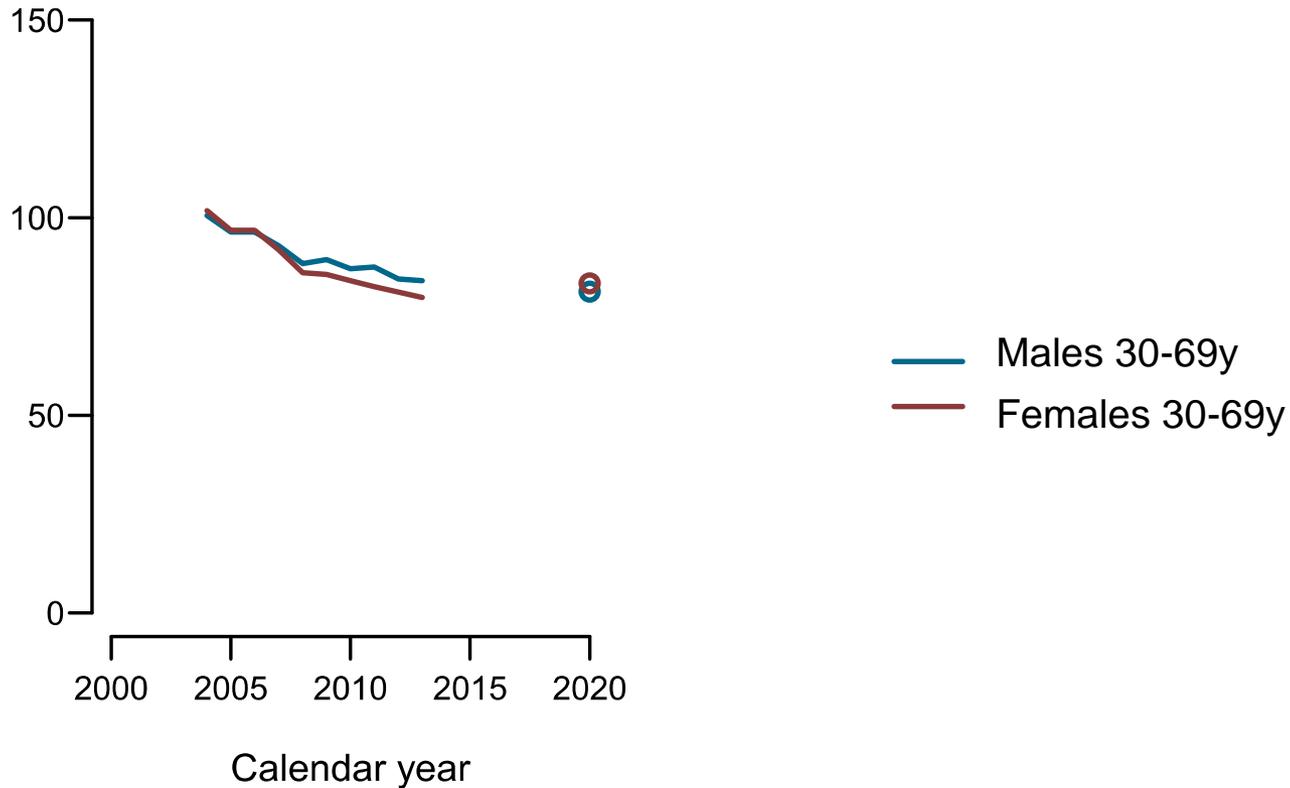
COMMENTS



# TRENDS OVER 2004-2013

3 years moving average mortality rates and predictions for 2020

## All neoplasms

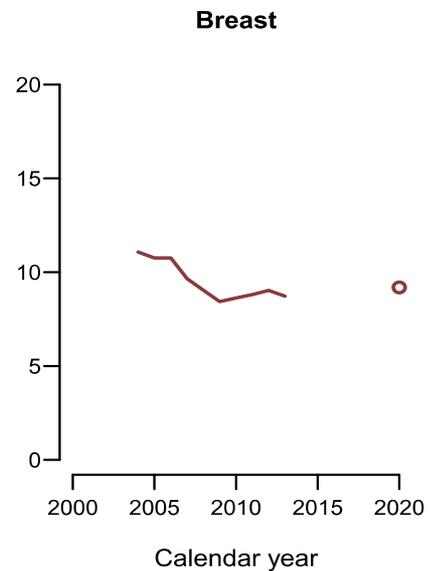
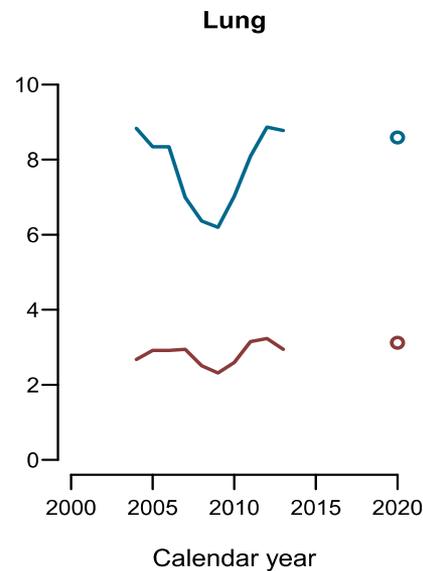
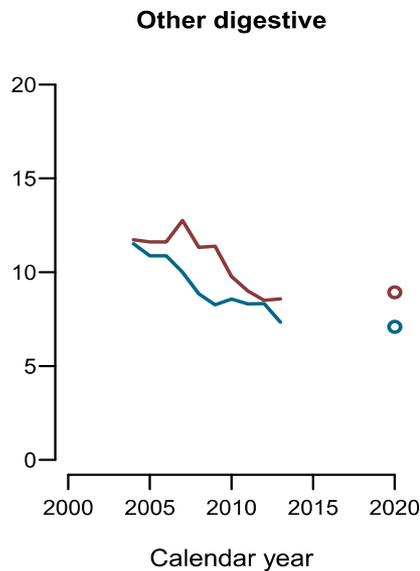
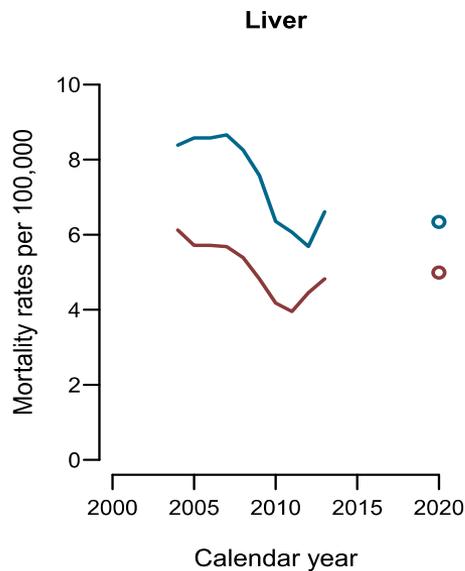
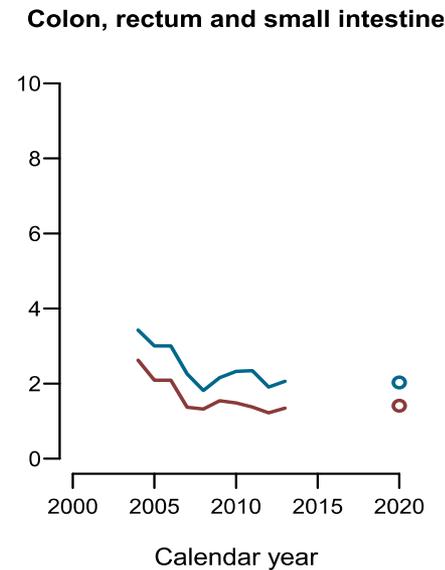
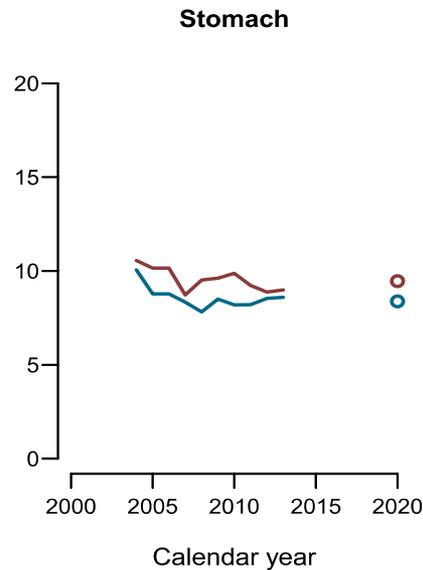
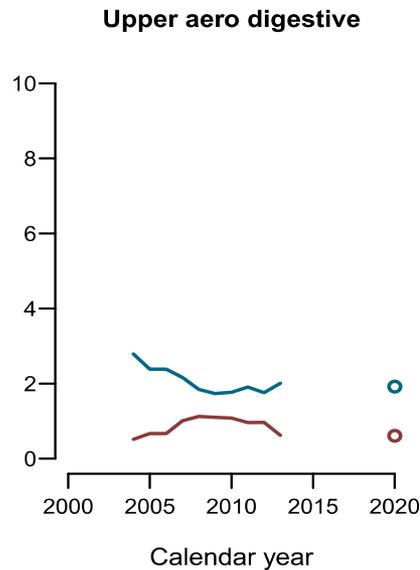
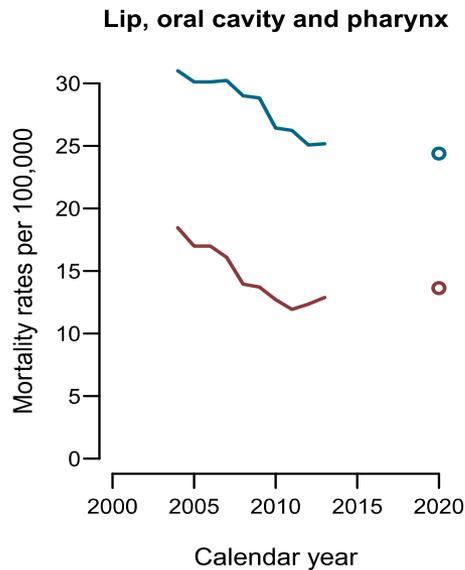


# TRENDS OVER 2004-2013

3 years moving average mortality rates and predictions for 2020

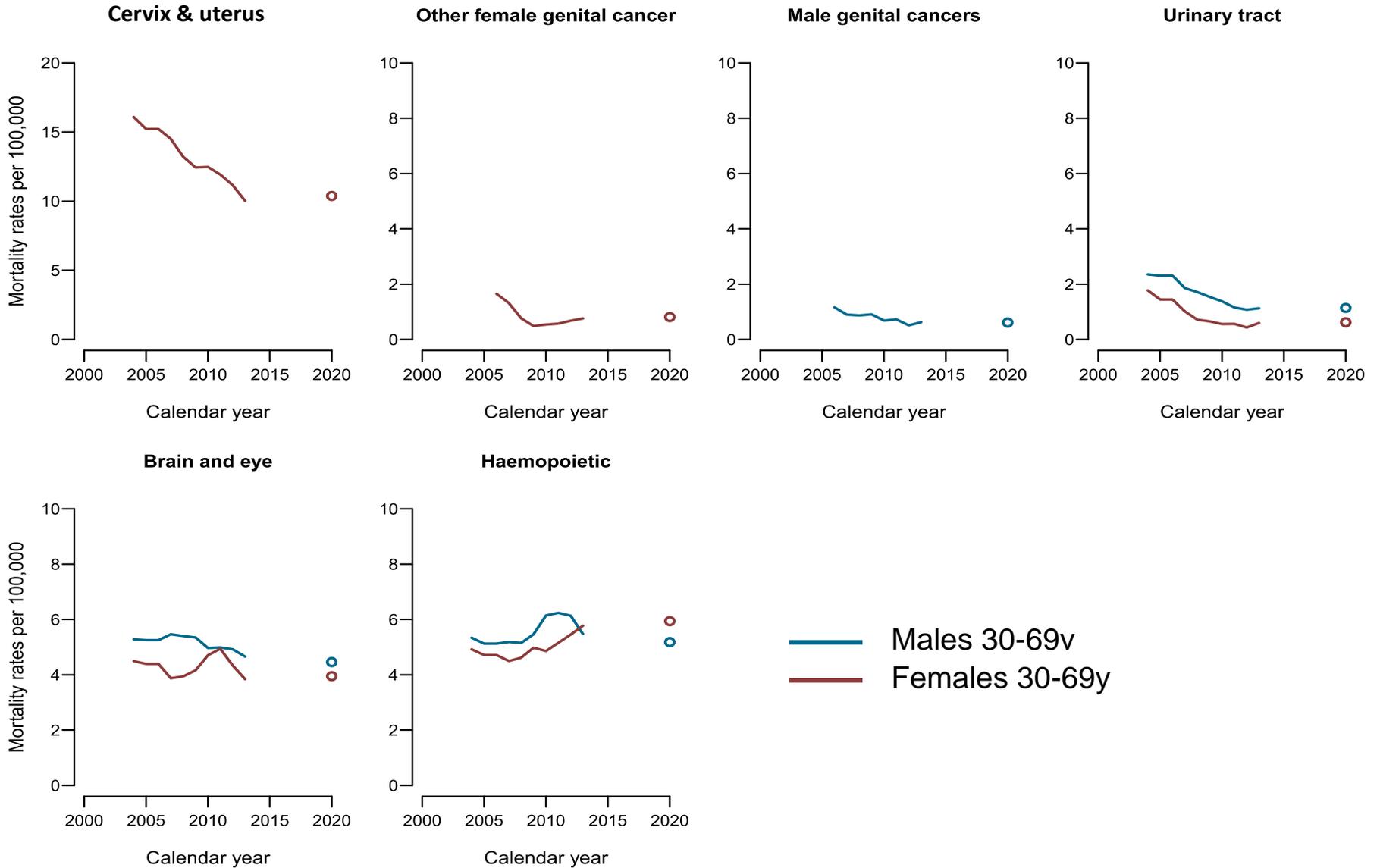
— Males 30-69y

— Females 30-69y



# TRENDS OVER 2004-2013

3 years moving average mortality rates and predictions for 2020



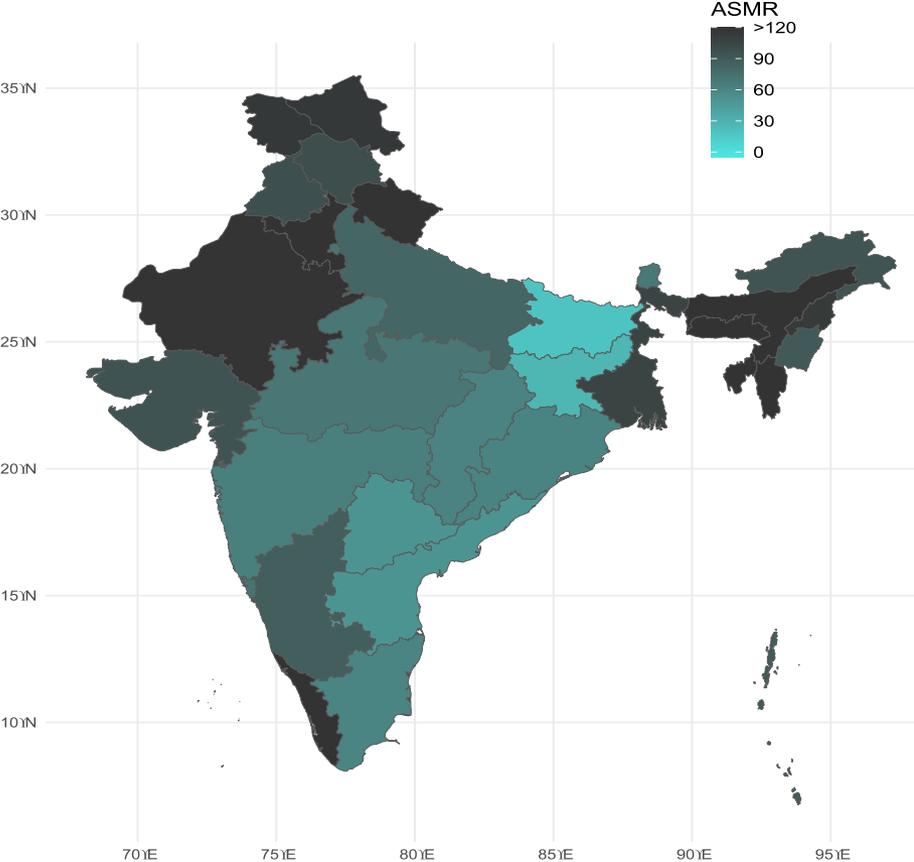


## PROJECTED FIGURES FOR 2020

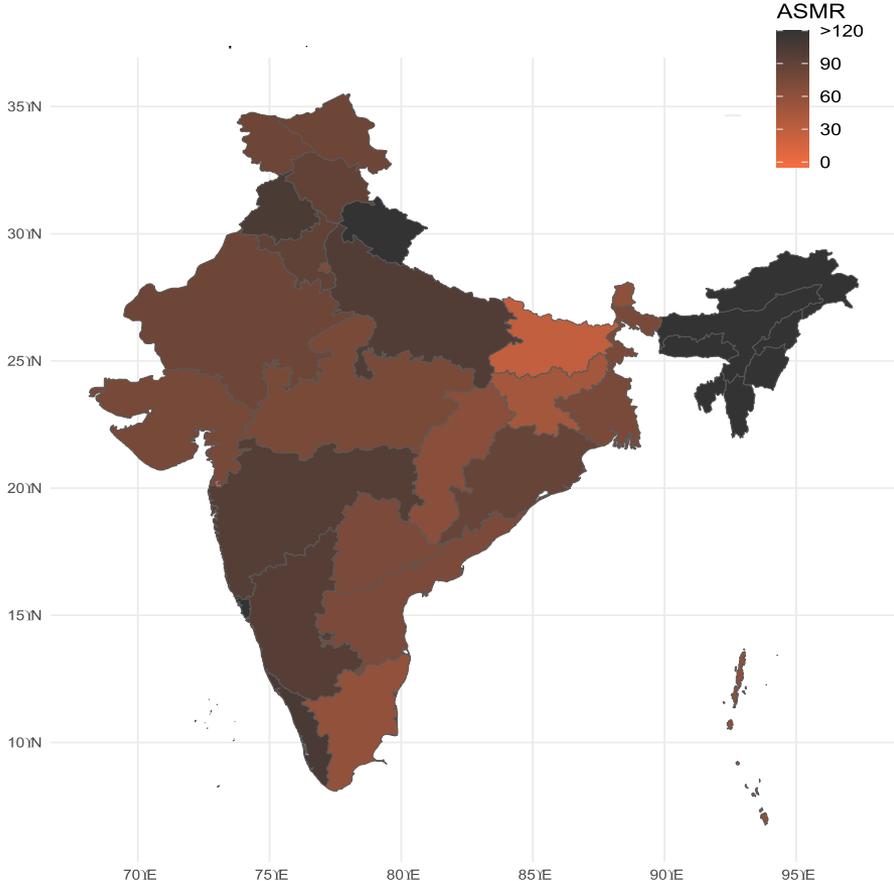
	Males		Females	
	Expected cancer deaths (x1000)	ASMR per 100,000	Expected cancer deaths (x1000)	ASMR per 100,000
<b>Total</b>	<b>225.40</b>	<b>81.30</b>	<b>227.81</b>	<b>83.38</b>
Central	32.37	76.16	38.43	91.58
East	13.10	<b>148.41</b>	11.73	<b>133.40</b>
North	25.65	<b>106.00</b>	22.77	<b>97.34</b>
Northeast	62.90	85.81	63.28	88.97
South	52.92	80.20	56.01	80.84
West	39.07	<b>62.30</b>	36.86	<b>63.16</b>
Rural	157.21	84.57	159.70	86.17
Urban	67.85	74.77	67.45	77.27
Poorest states	87.65	72.35	90.63	78.15
Richest states	136.69	87.37	134.39	85.58

# GEOGRAPHICAL DISTRIBUTION OF ESTIMATED ASMR PER 100,000 FOR 2020

## Males



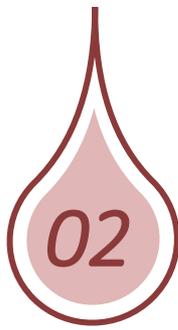
## Females





## PREDICTED FIGURES FOR 2020

Cancer site	Males	
	Expected cancer deaths (x1000)	ASMR per 100,000
Lip, oral cavity and pharynx	67.40	<b>24.39</b>
Upper aero digestive	5.25	1.92
Stomach	22.79	<b>8.38</b>
Colon, rectum and small intestine	5.63	2.03
Liver	17.89	6.34
Other digestive	19.69	7.09
Lung & airway cancers	23.41	<b>8.59</b>
Male genital cancers	1.63	0.61
Urinary tract	3.04	1.14
Brain and eye	12.76	4.46
Hematopoietic malignancies	14.87	5.18



## PREDICTED FIGURES FOR 2020

Cancer site	Females	
	Expected cancer deaths (x1000)	ASMR per 100,000
Lip, oral cavity and pharynx	36.69	<b>13.63</b>
Upper aero digestive	1.66	0.61
Stomach	25.8	<b>9.46</b>
Colon, rectum and small intestine	3.73	1.41
Liver	13.59	4.99
Other digestive	24.51	8.93
Lung & airway cancers	8.34	3.12
Breast	25.45	<b>9.19</b>
Cervix & uterus	28.53	<b>10.38</b>
Other female genital cancer	2.18	0.81
Urinary tract	1.64	0.62
Brain and eye	10.96	3.95
Hematopoietic malignancies	16.65	5.94

# COMPARISON OF ESTIMATES RATES FOR 2010 (*Dikshit R et al. 2012*)

## ASMR per 100,000 for 2010

	Dikshit et al. 2012	Our analysis	Dikshit et al. 2012	Our analysis
	Males		Females	
Lung	11.6	9.1	3.9	3.8
Stomach	12.5	10.7	13.5	9.9
Liver	6.8	6.9	5.6	4.8
Oesophagus	6.0	3.8	3.4	2.4
Urinary tract	2.0	1.2	-	-
Haemopoietic	5.8	5.2	6.1	6.1
Breast	-	-	9.4	9.2
Cervical	-	-	16.0	14.7
Bone	3.2	3.3	-	-
Brain	5.3	5.9	4.4	5.1
<b>All cancers</b>	<b>97.6</b>	<b>94.6</b>	<b>95.1</b>	<b>90.1</b>

# CANCER MORTALITY IN INDIA AND PREDICTIONS FOR 2020

## BACKGROUND

Our estimates appear reproducible with the ones published in 2012 by Dikshit et al.

## METHODS

Mortality trends for all neoplasms and for major sites showed stable or slightly decreasing patterns during 2004-2013

## RESULTS

The top three cancer deaths for males were oral, lung and stomach, and for females oral, cervical, and stomach

## SUMMARY

Differences in ASMRs were found across geographical areas, with higher rates recorded in the eastern states, in rural areas and in the richest states

# CANCER MORTALITY IN INDIA AND PREDICTIONS FOR 2020

## BACKGROUND

- Despite the limitations of available rates, cancer is a major cause of death in India, with exceedingly high rates of oral and stomach cancers in both sexes and cervical cancer in women

## METHODS

## RESULTS

- Those are largely preventable cancers

## COMMENTS

Unity Health Toronto Cancer Research Symposium  
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**THANKS FOR THE ATTENTION!**



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# ESTIMATES FROM GLOBOCAN, 2022

## Age-Standardized Rate (World) per 100 000, Mortality, Males and Females, age [30-69], in 2022

India

(Top 15 cancer sites)

