

# India: Health of the Nation's States

## The India State-Level Disease Burden Initiative

INDIAN COUNCIL OF MEDICAL RESEARCH  
PUBLIC HEALTH FOUNDATION OF INDIA  
INSTITUTE FOR HEALTH METRICS AND EVALUATION



ICMR



Department of Health Research  
Ministry of Health and Family Welfare  
Government of India



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The India State-Level Disease Burden Initiative

INDIAN COUNCIL OF MEDICAL RESEARCH  
PUBLIC HEALTH FOUNDATION OF INDIA  
INSTITUTE FOR HEALTH METRICS AND EVALUATION

Disease Burden Trends in the States of India  
1990 to 2016



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Department of Health Research  
Ministry of Health and Family Welfare  
Government of India



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## About ICMR

**The Indian Council of Medical Research (ICMR)** is the apex government body in India for the formulation, coordination, and promotion of biomedical and health research. It is one of the oldest medical research bodies in the world. Besides the headquarters in New Delhi, ICMR has 32 research institutes, centres, and units across India. ICMR funds both intramural and extramural research in India. The priorities of ICMR coincide with the national health priorities and have the goal of reducing the total burden of disease and promoting the health and well-being of India's population. As part of this agenda, ICMR is interested in improving the estimates of disease burden and risk factors in India, especially at the subnational levels, for better health planning, policy framing, and fund allocation.

[www.icmr.nic.in](http://www.icmr.nic.in)

## About PHFI

**The Public Health Foundation of India (PHFI)** is a premier public health institution in India with presence across the country. It collaborates with multiple constituencies including Indian and international academia, state and central governments, multi- and bi-lateral agencies, and civil society groups. The vision of PHFI is to strengthen India's public health institutional and systems capability and provide knowledge to achieve better health outcomes for all through strengthening training, research and policy development in public health. As part of this vision, PHFI has major interest in improving the robustness of subnational disease burden estimates to inform health action and in evaluating the impact of large-scale population health interventions.

[www.phfi.org](http://www.phfi.org)

## About IHME

**The Institute for Health Metrics and Evaluation (IHME)** is a global health research institute at the University of Washington in Seattle that provides independent, rigorous, and comparable measurement of the world's most important health problems and evaluates the strategies used to address them. IHME aims to identify the best strategies to build a healthier world by measuring health, tracking program performance, finding ways to maximise health system impact, and developing innovative measurement systems to provide a foundation for informed decision-making that will ultimately allocate resources to best improve population health.

[www.healthdata.org](http://www.healthdata.org)



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# Message by Hon'ble Vice-President of India



सत्यमेव जयते

भारत के उपराष्ट्रपति  
VICE-PRESIDENT OF INDIA



## MESSAGE

India is home to almost one-fifth of the world's population. People living in different parts of the country and states differ in their ethnic origin, culture and various other ways that influence their health status. Achieving good health for all of India's population is an important goal of India's government as a foundation for further social and economic development.

India has had important national surveys that indicate significant differences in the burden of some diseases between different parts of the country. A systematic compilation of the burden of all diseases and the risk factors behind them is needed for each state of India to plan health and other services that address the specific situation of each state. This report by the India State-level Disease Burden Initiative provides these comprehensive estimates for each state from 1990 to 2016 for the first time in India, and offers insights into the health inequalities between the states of India. The findings show that the overall disease burden per person in some states of India is almost twice as much as in some other states, and the burden rate due to the leading diseases ranges five to ten times between the states. The specific disease burden trends for each state in this report provide a reference for planning interventions that are needed to address the major disease problems in each state. Such evidence-based health planning in each state would result in overall health improvements in India and reduce the health inequalities between the states.

It is encouraging that the work leading to this report was done by a network of collaborators including many leading health scientists and stakeholders in India representing over one hundred institutions, under the overall guidance of the Director General of the Indian Council of Medical Research. I wish continuing success for further work of the India State-level Disease Burden Initiative in providing the best possible annual disease burden estimates for every state and union territory that could be utilized in many ways for improving the health of Indians in every nook and corner of the country.

  
(M. Venkaiah Naidu)

New Delhi  
30<sup>th</sup> October, 2017.



# Message by Hon'ble Minister of Health and Family Welfare, Government of India



स्वास्थ्य एवं परिवार कल्याण मंत्री  
भारत सरकार  
Minister of Health & Family Welfare  
Government of India



## Message

The Government of India is committed to improving the health and lives of the poor with special focus on the states that are relatively less developed. Comprehensive estimates of what diseases cause the most burden in each state and what risk factors are responsible for this would be very helpful in taking more specific action to improve health of the population. The National Health Policy, 2017 has recommended disease burden tracking to monitor health improvements across the Country.

The data and results in this report of the India State-level Disease Burden Initiative can serve as a useful guide to fine-tuning health planning in each state of the Country. The results show that the burden due to non-communicable diseases and injuries has overtaken the burden due to infectious and maternal-child diseases in every state of India, though this happened in some states about three decades ago and in some other states more recently. This means that the more developed states that had this transition a long time ago need to go on a war footing to control the rapidly rising burden of major non-communicable diseases and injuries. On the other hand, the states which have had this transition more recently, such as the EAG states, now have rising risk for non-communicable diseases and also continue to have a high burden of infectious and maternal-child diseases. This poses quite a challenging situation to these states, which must be tackled with larger health investments and a balanced approach that would increase the pace of reduction of infectious and maternal-child diseases and also blunt the rising tide of non-communicable diseases and injuries.

The profile of each state in this report showing the contribution of specific diseases and risk factors to the overall health loss can be a useful guide for states when they develop their Project Implementation Plans for health. The open access visualisation tool that is being released along with this report, shows disease and risk trends in each state from 1990 onwards. This can be of much use for policy makers.

I hope that the planners and experts in each state will use the findings in this report and engage with the India State-level Disease Burden Initiative to further improve health in their respective states. I wish the best to the collaborators of this Initiative and hope that their continuing efforts will lead to significant public good.



(Jagat Prakash Nadda)

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# Message by Hon'ble Vice Chairman of NITI Aayog, Government of India

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## Message

The states of India are at different levels of health and overall development. The NITI Aayog Action Agenda 2017-2020 envisions data-driven and decentralized health planning to more effectively improve population health. The estimates of disease burden and risk factors produced in this report from 1990 to 2016 for every state of India are timely for a more nuanced health policy and system development in each state.

More emphasis on public health or health of the population, as compared with the predominantly curative healthcare for individuals when they are sick, is needed in India to transform the health status of the country and reduce health inequalities. In order to do so, availability of reliable and comprehensive estimates of the burden due to diseases and risk factors at the population level for every state is crucial. In fact, it would be ideal to have such comprehensive estimates for each district, though this may require further generation of relevant data. The comprehensive state-level findings of disease burden in this report are a useful start in this direction.

It is indeed amazing that child and maternal malnutrition continues to be the leading risk factor for health loss in India in 2016, even though this has improved substantially since 1990. This situation should not be allowed to continue as the implications of this for overall societal development are sweeping. Parallel to this, the increasing burden of outdoor air pollution and the risks such as unhealthy diet, high blood pressure and high blood sugar across all parts of the country are of much concern. The important contribution of this report is the computation of the level of each of these risks in every state, and their trajectories since 1990. This is very useful information for prioritization and specific action in each state. A corresponding important point to note is that most of these major risks cannot be dealt with by the health sector alone. Extensive inter-sectoral collaborations are needed if these risks have to be mitigated. These have to be grounded in the reality of each state. The data and findings in this report can be utilized well for this purpose.

NITI Aayog has recommended monitoring of health status in each state. The annual production of estimates planned by the India State-level Disease Burden Initiative could serve as an important input for this monitoring.

  
(Rajiv Kumar)

New Delhi

Dated: 27<sup>th</sup> October 2017







# Preface

For some time now, health planners in India have been seeking better availability of disease burden data and trends at subnational levels. These are necessary for informed health policy and programming at the state and district levels, a prerequisite to improve population health based on local trends. Useful trends of some health indicators for the states of India have been available, but not a complete understanding of the magnitude and time trends of all major diseases and risk factors for every state of the country. Computation of a complete matrix of the best possible estimates for which diseases and risk factors cause the most premature deaths and disability in each state based on all available data, and how these trends have changed over time, would be a crucial contributor to the planning of what needs to be done in each state to maximise population health gains. This exercise would also highlight the major data gaps that need to be addressed in different parts of the country for better monitoring of health and disease trends.

Faced with this compromising knowledge gap, a confluence of scientific and political interests enabled the launch of the India State-level Disease Burden Initiative in October 2015. This Initiative received strong support from the Ministry of Health and Family Welfare of the Government of India, and was launched as a collaboration between the Indian Council of Medical Research, Public Health Foundation of India, and the Institute for Health Metrics and Evaluation, with the intent of engaging domain experts and stakeholders across the country. This Initiative was approved by the Health Ministry Screening Committee of the Indian Council of Medical Research. The public good importance of this effort was soon recognised widely, resulting in the engagement of experts from about a hundred institutions in India as collaborators, and the support of the top government leadership in accessing crucial data needed for computing the estimates. The fourteen domain expert groups that were formed as part of this Initiative contributed their knowledge and skills generously to bring incisive insights into relevant data, analysis, and findings, which has certainly resulted in much more reliable findings in this report than would have otherwise been possible.

After two years of intense collaborative effort that included many leading health experts and policymakers in India, it is a matter of great satisfaction that this report is now being presented to the government, policymakers, health planners, academics, and other stakeholders, elucidating the disease burden and risk factors trends in every state of the country from 1990 to 2016. We anticipate that these estimates will continue to be produced at regular intervals and with improving accuracy as more data become available, enabling increasingly more robust monitoring of the progress in health parameters in all parts of India. We are grateful for the constructive engagement of a large number of highly skilled people with this effort to produce an open-access public good knowledge base, which has the potential of making fundamental and long-term contributions to improving health in every state of the country through provision of the best possible composite trends of disease burden and risk factors for policymakers to utilise in their decision-making.

More broadly, in order to achieve its full development potential, India has to ensure a better health status of its citizens, akin to the optimism and sparkle seen on the faces of the children on the cover of this report. This can be more than just rhetoric if public health science and political will come together to make evidence-based policy making a norm in all parts of the country. We believe that this Initiative can contribute significantly to this goal. To put

things in perspective, however, many other efforts to strengthen health system research and implementation science commensurate with the health status heterogeneity in different parts of India are needed as well. A tangible policy-relevant output from the India State-level Disease Burden Initiative can serve as an example of how other necessary public health science initiatives can be established through large-scale collaborative efforts to achieve reduction in health inequalities between Indians and progress toward a better health status of all in India.

**Soumya Swaminathan**

*Secretary to the Government of India,  
Department of Health Research,  
Ministry of Health and Family Welfare;  
Director-General, Indian Council of Medical  
Research*

**Lalit Dandona**

*Director, India State-level Disease Burden Initiative*

## Acronyms

<b>CMNNDs</b>	Communicable, maternal, neonatal, and nutritional diseases
<b>COPD</b>	Chronic obstructive pulmonary disease
<b>DALYs</b>	Disability-adjusted life years
<b>EAG</b>	Empowered Action Group
<b>ETL</b>	Epidemiological transition level
<b>GBD</b>	Global Burden of Disease
<b>ICMR</b>	Indian Council of Medical Research
<b>IHME</b>	Institute for Health Metrics and Evaluation
<b>NCDs</b>	Non-communicable diseases
<b>PHFI</b>	Public Health Foundation of India
<b>SDI</b>	Socio-demographic Index
<b>UT</b>	Union territory
<b>WaSH</b>	Unsafe water, sanitation, and handwashing
<b>YLDs</b>	Years lived with disability
<b>YLLs</b>	Years of life lost

# Glossary of terms

## Age-standardisation

A statistical technique used to compare populations with different age structures, in which the characteristics of the populations are statistically transformed to match those of a reference population. Useful because relative over- or underrepresentation of different age groups can obscure comparisons of age-dependent diseases (e.g., ischaemic heart disease or neonatal disorders) across populations.

## Attributable burden

The share of the burden of a disease that can be estimated to occur due to exposure to a particular risk factor.

## Disability-adjusted life years (DALYs)

Years of healthy life lost to premature death and suffering. DALYs are the sum of years of life lost and years lived with disability.

## Disability weight

Number on a scale from 0 to 1 that represents the severity of health loss associated with a health state.

## Empowered Action Group (EAG) states

A group of eight states that receive special development effort attention from the Government of India, namely, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttarakhand, and Uttar Pradesh.

## Epidemiological transition level (ETL)

Based on the ratio of the number of DALYs in a population due to communicable, maternal, neonatal, and nutritional diseases to the number of DALYs due to non-communicable diseases and injuries together. A decreasing ratio indicates advancing epidemiological transition with an increasing relative burden from non-communicable diseases as compared with communicable, maternal, neonatal, and nutritional diseases.

## Global Burden of Disease (GBD) study

A systematic, scientific effort to quantify the comparative magnitude of health loss due to diseases, injuries, and risk factors by age, sex, and geographies for specific points in time.

## North-East states

Eight states in the hilly northeastern region of India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura.

## Risk factors

Potentially modifiable causes of disease and injury.

## Sense organ diseases

A group of diseases that mainly cause hearing loss and vision loss, but also includes diseases that affect the other sense organs.

## Sequelae

Consequences of diseases and injuries.

## Socio-demographic Index (SDI)

A summary measure that identifies where countries or other geographic areas fall on the spectrum of development. Expressed on a scale of 0 to 1, SDI is a composite average of the rankings of the per capita income, average educational attainment, and fertility rates of all areas in the GBD study.

## Summary exposure value

A measure of a population's exposure to a risk factor that takes into account the extent of exposure by risk level and the severity of that risk's contribution to disease burden.

## Uncertainty interval

A range of values that is likely to include the correct estimate of health loss for a given cause. Narrow uncertainty intervals indicate that evidence is strong, while wide uncertainty intervals show that evidence is weaker.

## Years of life lost (YLLs)

Years of life lost due to premature mortality.

## Years lived with disability (YLDs)

Measure of years lived with disability due to a disease or injury, weighted for the severity of the disability.

# Executive Summary

## Introduction

With almost one-fifth of the world's population living in India, the health status and the drivers of health loss are expected to vary between different parts of the country and between the states. Accordingly, effective efforts to improve population health in each state require systematic knowledge of the local health status and trends. While state-level trends for some important health indicators have been available in India, a comprehensive assessment of the diseases causing the most premature deaths and disability in each state, the risk factors responsible for this burden, and their time trends have not been available in a single standardised framework. The India State-level Disease Burden Initiative was launched in October 2015 to address this crucial knowledge gap with support from the Ministry of Health and Family Welfare of the Government of India. This is a collaborative effort between the Indian Council of Medical Research, Public Health Foundation of India, Institute for Health Metrics and Evaluation, and experts and stakeholders from about 100 institutions across India. The work of this Initiative is overseen by an Advisory Board consisting of eminent policymakers and involves extensive engagement of 14 domain expert groups with the estimation process. Based on intense work over two years, this report describes the distribution and trends of diseases and risk factors for every state of India from 1990 to 2016.

## Methods and data

The estimates were produced as part of the Global Burden of Disease Study 2016. The analytical methods of this study have been standardised over two decades of scientific work, which has been reported in over 16,000 peer-reviewed publications, making it the most widely used approach globally for disease burden estimation. These methods enable standardised comparisons of health loss caused by different diseases and risk factors, between geographic units, sexes, and age groups, and over time in a unified framework. The key metric used for this comparison is disability-adjusted life years (DALYs), which is the sum of the number of years of life lost due to premature death and a weighted measure of the years lived with disability due to a disease or injury. The use of DALYs to track disease burden is recommended by India's National Health Policy of 2017.

Through an elaborate process, all data sources and inputs available to estimate disease burden in every state and union territory of India were identified and attempts were made to access these data. These included censuses, vital registration, Sample Registration System, large-scale national household surveys, other population-level surveys and cohort studies, disease surveillance data, disease programme-level data, administrative records of health services, disease registries, and a wide range of other studies conducted across India. Access to several important datasets was facilitated by senior government officials. Data were included in the analysis if they met quality and inclusion criteria.

## Health status improving, but major inequalities between states

Life expectancy at birth improved in India from 59.7 years in 1990 to 70.3 years in 2016 for females, and from 58.3 years to 66.9 years for males. There were, however, continuing inequalities between states, with a range of 66.8 years in Uttar Pradesh to 78.7 years in Kerala for females, and from 63.6 years in Assam to 73.8 years in Kerala for males in 2016. The per person disease burden measured as DALYs rate dropped by 36% from 1990 to 2016 in India, after adjusting for the changes in the population age structure during this period. But there was an almost two-fold difference in this disease burden rate between the states in 2016, with Assam, Uttar Pradesh, and Chhattisgarh having the highest rates, and Kerala and Goa the lowest rates. While the disease burden rate in India has improved since 1990, it was 72% higher per person than in Sri Lanka or China in 2016. The under-5 mortality rate has reduced substantially from 1990 in all states, but there was a four-fold difference in this rate between the highest in Assam and Uttar Pradesh as compared with the lowest in Kerala in 2016, highlighting the vast health inequalities between the states.

## Large differences between states in the changing disease profile

Of the total disease burden in India measured as DALYs, 61% was due to communicable, maternal, neonatal, and nutritional diseases (termed infectious and associated diseases in this summary for simplicity) in 1990, which dropped to 33% in 2016. There was a corresponding increase in the contribution of non-communicable diseases from 30% of the total disease burden in 1990 to 55% in 2016, and of injuries

from 9% to 12%. Infectious and associated diseases made up the majority of disease burden in most of the states in 1990, but this was less than half in all states in 2016. However, the year when infectious and associated diseases transitioned to less than half of the total disease burden ranged from 1986 to 2010 for the various state groups in different stages of this transition. The wide variations between the states in this epidemiological transition are reflected in the range of the contribution of major disease groups to the total disease burden in 2016: 48% to 75% for non-communicable diseases, 14% to 43% for infectious and associated diseases, and 9% to 14% for injuries. Kerala, Goa, and Tamil Nadu have the largest dominance of non-communicable diseases and injuries over infectious and associated diseases, whereas this dominance is present but relatively the lowest in Bihar, Jharkhand, Uttar Pradesh, and Rajasthan.

### **Infectious and associated diseases reducing, but still high in many states**

The burden of most infectious and associated diseases reduced in India from 1990 to 2016, but five of the ten individual leading causes of disease burden in India in 2016 still belonged to this group: diarrhoeal diseases, lower respiratory infections, iron-deficiency anaemia, preterm birth complications, and tuberculosis. The burden caused by these conditions generally continues to be much higher in the Empowered Action Group (EAG) and North-East state groups than in the other states, but there were notable variations between the states within these groups as well. The range of disease burden or DALY rate among the states of India was 9 fold for diarrhoeal disease, 7 fold for lower respiratory infections, and 9 fold for tuberculosis in 2016, highlighting the need for targeted efforts based on the specific trends in each state. The burden also differed between the sexes, with diarrhoeal disease, iron-deficiency anaemia, and lower respiratory infections higher among females, and tuberculosis higher among males. The proportion of total disease burden caused by infectious and associated diseases was highest among children, which contributed to the disproportionately higher overall disease burden suffered by the under-5 years age group. For India as whole, the disease burden or DALY rate for diarrhoeal diseases, iron-deficiency anaemia, and tuberculosis was 2.5 to 3.5 times higher than the average globally for other geographies at a similar level of development, indicating that this burden can be brought down substantially.

### **Rising burden of non-communicable diseases in all states**

The contribution of most of the major non-communicable disease groups to the total disease burden has increased all over India since 1990, including cardiovascular diseases, diabetes, chronic respiratory diseases, mental health and neurological disorders, cancers, musculoskeletal disorders, and chronic kidney disease. Among the leading non-communicable diseases, the largest disease burden or DALY rate increase from 1990 to 2016 was observed for diabetes, at 80%, and ischaemic heart disease, at 34%. In 2016, three of the five leading individual causes of disease burden in India were non-communicable, with ischaemic heart disease and chronic obstructive pulmonary disease as the top two causes and stroke as the fifth leading cause. The range of disease burden or DALY rate among the states in 2016 was 9 fold for ischaemic heart disease, 4 fold for chronic obstructive pulmonary disease, and 6 fold for stroke, and 4 fold for diabetes across India. While ischaemic heart disease and diabetes generally had higher DALY rates in states that are at a more advanced epidemiological transition stage toward non-communicable diseases, the DALY rates of chronic obstructive pulmonary disease were generally higher in the EAG states that are at a relatively less advanced epidemiological transition stage. On the other hand, the DALY rates of stroke varied across the states without any consistent pattern in relation to the stage of epidemiological transition. This variety of trends of the different major non-communicable diseases indicates that policy and health system interventions to tackle their increasing burden have to be informed by the specific trends in each state.

### **Increasing but variable burden of injuries among states**

The contribution of injuries to the total disease burden has increased in most states since 1990. The highest proportion of disease burden due to injuries is in young adults. Road injuries and self-harm, which includes suicides and non-fatal outcomes of self-harm, are the leading contributors to the injury burden in India. The range of disease burden or DALY rate varied 3 fold for road injuries and 6 fold for self-harm among the states of India in 2016. There was no consistent relationship between the DALY rates of road injuries or self-harm versus the stage of epidemiological transition of the states. The burden due to road injuries was much higher in males than in females. The DALY rate for self-harm for India as a whole was 1.8 times higher than the average globally for other geographies at a similar level of development in 2016.

## Unacceptably high risk of child and maternal malnutrition

While the disease burden due to child and maternal malnutrition has dropped in India substantially since 1990, this is still the single largest risk factor, responsible for 15% of the total disease burden in India in 2016. This burden is highest in the major EAG states and Assam, and is higher in females than in males. Child and maternal malnutrition contributes to disease burden mainly through increasing the risk of neonatal disorders, nutritional deficiencies, diarrhoeal diseases, lower respiratory infections, and other common infections. As a stark contrast, the disease burden due to child and maternal malnutrition in India was 12 times higher per person than in China in 2016. Kerala had the lowest burden due to this risk among the Indian states, but even this was 2.7 times higher per person than in China. This situation after decades of nutritional interventions in the country must be rectified as one of the highest priorities for health improvement in India.

## Unsafe water and sanitation improving, but not enough yet

Unsafe water and sanitation was the second leading risk responsible for disease burden in India in 1990, but dropped to the seventh leading risk in 2016, contributing 5% of the total disease burden, mainly through diarrhoeal diseases and other infections. The burden due to this risk is also highest in several EAG states and Assam, and higher in females than in males. The improvement in exposure to this risk from 1990 to 2016 was least in the EAG states, indicating that higher focus is needed in these states for more rapid improvements. Remarkably, the per person disease burden due to unsafe water and sanitation was 40 times higher in India than in China in 2016. The massive effort of the ongoing Swachh Bharat Abhiyan in India has the potential to improve this situation.

## Household air pollution improving, outdoor air pollution worsening

The contribution of air pollution to disease burden remained high in India between 1990 and 2016, with levels of exposure among the highest in the world. It causes burden through a mix of non-communicable and infectious diseases, mainly cardiovascular diseases, chronic respiratory diseases, and lower respiratory infections. The burden of household air pollution decreased during this period due to decreasing use of solid fuels for cooking, and that of outdoor air pollution increased due to a variety of pollutants from power production, industry, vehicles, construction, and waste burning. Household air pollution was responsible for 5% of the total disease burden in India in 2016, and outdoor air pollution for 6%. The burden due to household air pollution is highest in the EAG states, where its improvement since 1990 has also been the slowest. On the other hand, the burden due to outdoor air pollution is highest in a mix of northern states, including Haryana, Uttar Pradesh, Punjab, Rajasthan, Bihar, and West Bengal. Control of air pollution has to be ramped up through inter-sectoral collaborations based on the specific situation of each state.

## Rising risks for cardiovascular diseases and diabetes

Of the total disease burden in India in 1990, a tenth was caused by a group of risks including unhealthy diet, high blood pressure, high blood sugar, high cholesterol, and overweight, which mainly contribute to ischaemic heart disease, stroke, and diabetes. The contribution of this group of risks increased massively to a quarter of the total disease burden in India in 2016. The combination of these risks was highest in Punjab, Tamil Nadu, Kerala, Andhra Pradesh, and Maharashtra in 2016, but importantly, the contribution of these risks has increased in every state of the country since 1990. The other significant contributor to cardiovascular diseases and diabetes, as well as to cancers and some other diseases, is tobacco use, which was responsible for 6% of the total disease burden in India in 2016. All of these risks are generally higher in males than in females. The sweeping increase of the burden due to this combination of risks in every part of the country indicates emphatically that major efforts need to be put in place to control their impact in every state before the situation gets totally out of control.

## Importance of understanding the specific health situation of each state

Understanding the health and disease trends in groups of states at a similar level of development or epidemiological transition is an important intermediate step in teasing apart the heterogeneity of disease and risk factor epidemiology in India. However, effective action to improve health must finally be based on the specific health situation of each state. This point is elucidated by significant variations in the burden from leading diseases and risk factors in 2016 between the following pairs of states that have physical proximity and are at similar levels of development and epidemiological transition.

The major EAG states of Madhya Pradesh and Uttar Pradesh both have a relatively lower level of development indicators and are at a similar less advanced epidemiological transition stage. However, Uttar Pradesh had 50% higher disease burden per person from chronic obstructive pulmonary disease, 54% higher burden from tuberculosis, and 30% higher burden from diarrhoeal diseases, whereas Madhya Pradesh had 76% higher disease burden per person from stroke. The cardiovascular risks were generally higher in Madhya Pradesh, and the unsafe water and sanitation risk was relatively higher in Uttar Pradesh.

The two North-East India states of Manipur and Tripura are both at a lower-middle stage of epidemiological transition but have quite different disease burden rates from specific leading diseases. Tripura had 49% higher per person burden from ischaemic heart disease, 52% higher from stroke, 64% higher from chronic obstructive pulmonary disease, 159% higher from iron-deficiency anaemia, 59% higher from lower respiratory infections, and 56% higher from neonatal disorders. Manipur, on the other hand, had 88% higher per person burden from tuberculosis and 38% higher from road injuries. Regarding the level of risks, child and maternal malnutrition, air pollution, and several of the cardiovascular risks were higher in Tripura.

The two adjoining north Indian states of Himachal Pradesh and Punjab both have a relatively higher level of development indicators and are at a similar more advanced epidemiological transition stage. However, there were striking differences between them in the level of burden from specific leading diseases. Punjab had 157% higher per person burden from diabetes, 134% higher burden from ischaemic heart disease, 49% higher burden from stroke, and 56% higher burden from road injuries. On the other hand, Himachal Pradesh had 63% higher per person burden from chronic obstructive pulmonary disease. Consistent with these findings, Punjab had substantially higher levels of cardiovascular risks than Himachal Pradesh.

These examples highlight why it is necessary to understand the specific disease burden trends in each state, over and above the useful broad insights provided by trends common for groups of states at similar levels of epidemiological transition, if health action has to be planned for the specific context of each state. The chances of achieving the overall health targets set by India would be much higher if the biggest health problems and risks in each state are tackled on priority than with a more generic approach that does not take into account the specific disease burden trends in each state.

## Application of the state-level disease burden findings and future work

The findings in this report of the India State-level Disease Burden Initiative can be used for planning of state health budgets, prioritisation of interventions relevant to each state, informing the government's Health Assurance Mission in each state, monitoring of health-related Sustainable Development Goals targets in each state, assessing impact of large-scale interventions based on time trends of disease burden, and forecasting population health under various scenarios in each state. The findings are also available in easily understandable visual graphics in an online open-access interactive visualisation tool at <https://vizhub.healthdata.org/gbd-compare/india>.

Future plans of the India State-level Disease Burden Initiative include annual updates of the estimates based on newly available data, and more disaggregated findings such as the rural-urban estimates planned for next year and sub-state level estimates subsequently when adequate data become available.

## Conclusion

The disease burden and risk factor estimates for every state of India from 1990 to 2016 in this report are the most comprehensive description of disease epidemiology attempted so far in a single standardised framework for every part of the country. These included all available data and inputs from a large network of highly skilled collaborators. This knowledge base can be a crucial aid for more informed policy and interventions to improve population health in every state and union territory of India and in reducing health inequalities between the states. These findings and the ongoing work of the India State-level Disease Burden Initiative could provide important inputs for the data-driven and decentralised health planning and monitoring recommended by the National Health Policy 2017 and the NITI Aayog Action Agenda 2017–2020.



## About the India State-level Disease Burden Initiative

The India State-level Disease Burden Initiative is a collaboration between the Indian Council of Medical Research, Public Health Foundation of India, and Institute for Health Metrics and Evaluation at the University of Washington, and experts and stakeholders currently from close to 100 institutions across India. The goal of this Initiative, which was launched in October 2015, is to produce the best possible state-level disease burden and risk factors trends from 1990 onward as part of the Global Burden of Disease study, utilising all identifiable epidemiological data from India and in close engagement with the leading health scientists of India. The work of this Initiative is approved by the Health Ministry Screening Committee of the Indian Council of Medical Research.

The Advisory Board of this Initiative is chaired by a former Health Secretary to the Government of India, and includes some of the leading health policy-makers of the country. This Initiative is built upon extensive collaborations across India and has 14 domain expert groups that are closely involved with the estimation process and interpretation of findings. The work of the State-level Disease Burden Initiative is directly guided by the Secretary to the Government of India, Department of Health Research, and Director General of Indian Council of Medical Research. This work is coordinated by the Disease Burden India Secretariat based at the Public Health Foundation of India.

The first comprehensive set of state-level disease burden and risk factors estimates are being disseminated in this report. An online open-access interactive visualisation tool that will bring to life in an easily understandable manner the disease burden and risk factors trends over time across the Indian states is also being made available. An extensive engagement with central and state-level policymakers is anticipated for utilisation of the findings. The major anticipated utilisation of findings to inform policy includes planning of state health budgets, prioritisation of interventions relevant to each state, informing the government's Health Assurance Mission in each state, monitoring of health-related Sustainable Development Goals targets in each state, assessing the impact of large-scale interventions based on time trends of disease burden, and forecasting population health under various scenarios in each state. It is envisaged that the data gaps identified in this estimation process will inform enhancement of the health information system of India.

More detailed topic-specific publications and policy reports will also be produced for major diseases and risk factors for further granular insights to plan their control. Annual production of state-level disease burden estimates is planned, with estimates improving with increasing availability of data. Additional disaggregation of estimates is planned – for example, rural-urban estimates for each state next year, and geospatial mapping at a fine-grid level for key diseases and risk factors. Capacity-building in India to generate and analyse large-scale health data using strong methods is anticipated over the next five years of this work.

## About the Global Burden of Disease Study

The history and evolution of the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD), which was initiated over two decades ago for a comprehensive quantitative assessment of population health, has been described recently.<sup>1</sup> Prior to GBD, previous studies generally examined single causes or some groups of diseases, which often led to overestimation, with the sum of the deaths from individual causes being much larger than the total deaths in a population. The first preliminary GBD results for the year 1990 were published in the World Bank's World Development Report 1993. The construction of the metric disability-adjusted life years (DALYs), methods, assumptions, and data sources were debated, and the revised GBD 1990 study results were published in *The Lancet* in 1997. Since that first effort, four additional cycles of GBD estimates have been published for the years 2010, 2013, 2015, and 2016.

The GBD study can be described as a systematic, scientific effort to quantify the comparative magnitude of health loss from diseases, injuries, and risks by age, sex, and population over time. The goal of the study is to provide decision-makers at the local, regional, national, and global levels with the best possible and most up-to-date evidence on trends of population health and their drivers so that decisions are increasingly more evidence-based. During the past quarter-century, the scope, magnitude, and uses of the GBD study have increased substantially, as has the global network of collaborators. GBD 2016 had over 2,500 collaborators from 133 countries and three territories, half of whom were from low- or middle-income countries. With each cycle of the GBD study, the granularity of the analysis has increased. GBD 2016 included more than 3.5 billion estimated quantities. Health-related Sustainable Development Goal indicators are also reported, starting with GBD 2015. GBD 2016 covered 195 countries and territories, with subnational assessments for 12 countries, calculated for each year since 1990. It is comprehensive, including 333 diseases and injuries, 2,982 sequelae of these diseases and injuries, and 84 risks or combinations of risks. The increasing scope of work is guided by the GBD Scientific Council since 2013 to resolve scientific issues, decide on the adoption of new methods, diseases, or risks, and review and critique preliminary findings. In addition, an Independent Advisory Committee for GBD, chaired by Professor Peter Piot, provides an overall review of the GBD work and strategic guidance on areas that can be strengthened. The GBD study has now become an annual assessment of the state of the world's health.

With more than 16,000 peer-reviewed publications and reports generated from the GBD work, and references to the GBD study cited more than 700,000 times according to Google Scholar, the GBD study has become the most extensively used source for health, disease, and risk factors status of populations around the world. GBD findings have been utilised to inform prioritisation of specific policy interventions by many governments, and many global organisations use GBD results extensively. Recent inclusion of subnational estimates is further enhancing the utility of the GBD study to inform improvements in population health. Subnational estimates of disease burden have been reported previously by GBD for Brazil, China, Japan, Kenya, Mexico, Saudi Arabia, South Africa, UK, and USA, and are being reported for India and Indonesia in GBD 2016.

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1. Murray CJL, Lopez AD. Measuring global health: motivation and evolution of the Global Burden of Disease Study. *Lancet* 2017; 390: 1460–1464.

# Introduction

India is home to a wealth of cultural, social, and ethnic diversity across its 1.3 billion people. Its 29 states and seven union territories – many of which have populations larger than countries – vary widely in terms of their ecology, economy, and demography, all of which impact health outcomes. Accurate, comparable data on what is driving health loss is crucial for policymakers as they strive to make the best decisions possible for improving health.

National-level data can obscure disparities across India's varied landscape, so a detailed understanding of health challenges at the state level is necessary to ensure that policies are responsive to the specific context of each state.

While the central government policies have significant influence on health initiatives across the country, health is a state subject in the Indian federal structure, with the majority of public spending on health from the state budgets. A robust disaggregated understanding of the disease burden and risk factors trends in each state of India is therefore essential for effective health system and policy action to improve population health at the state level.

The Sample Registration Survey of India reports state-level estimates of key indicators such as neonatal, infant, and under-5 mortality rates annually. The major national surveys in India, the National Family Health Survey, District Level Household Survey, and the Annual Health Survey have provided valuable periodic data on key health indicators, which are mostly related to child and reproductive health. The National AIDS Control Organization of India produces state-level estimates of HIV. In addition, a large number of studies from many parts of India provide a variety of data on the distribution of many diseases and risk factors. However, a comprehensive composite assessment of all major diseases and risk factors together across all states of India, providing estimates over an extended period of time, which is needed for an informed health system and policy development in each state, has not been available so far.

This report provides the first comprehensive set of findings for the distribution of diseases and risk factors across all states of the country from 1990 to 2016. These findings have been produced by the India State-level Disease Burden Initiative as part of the Global Burden of Disease study collaboration, utilising all available data identified through an extensive effort involving over 200 leading health scientists and policymakers in India from about 100 institutions. The generation of these estimates and their interpretation have benefited from the insights of domain experts through an intensive collaborative process over two years. The specific state-level findings presented in this report could serve as important tools for the data-driven and decentralised health planning, and for the tracking of subnational disease burden in India using DALYs, as recommended by the National Institution for Transforming India (NITI Aayog) of the Government of India and the National Health Policy 2017 released by the Ministry of Health and Family Welfare.<sup>1,2</sup>

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1. National Institution for Transforming India (NITI Aayog), Government of India. Three-Year Action Agenda, 2017-18 to 2019-20. <http://niti.gov.in/content/three-year-action-agenda-2017-18-2019-20>

2. Ministry of Health and Family Welfare, Government of India. National Health Policy 2017. New Delhi: Ministry of Health and Family Welfare; 2017. <http://www.mohfw.nic.in/documents/policy>

## Key concepts used in this report

In order to make informed decisions about how best to allocate resources, policymakers need to understand the relative harm caused by different health problems across time, geography, age, and sex. In response to this, the GBD study approach uses methods and metrics that emphasise comparability between different diseases.

Comparing the burden of health problems can be difficult. Some conditions kill people early in life while others cause death at older ages. Some conditions are not fatal but cause varying degrees of disability. The GBD's principal metric, the disability-adjusted life year (DALY), allows decision-makers to directly compare the seemingly disparate impacts of diseases and injuries, from heart disease to anaemia to road accidents.

DALYs express the premature death and disability attributable to a particular cause, and are made up of two components: years of life lost (YLLs) and years of life lived with disability (YLDs). YLLs measure all the time people lose when they die prematurely, before attaining their ideal life expectancy. Ideal life expectancy is based on the highest life expectancy observed in the world for that person's age group. YLDs measure years of life lived with any short- or long-term condition that prevents a person from living in full health. They are calculated by multiplying an amount of time (expressed in years) by a disability weight (a number that quantifies the severity of a disability).

Adding together YLLs and YLDs yields DALYs, a measure that portrays in one metric the total health loss a person experiences during their life. Adding all instances of health loss in a population together – and thereby estimating burden of premature death and disability – enables policymakers and researchers to make comparative, actionable assessments of population health.

Decision-makers can use DALYs to quickly compare the impact caused by very different conditions, such as cancer and depression, since the conditions are assessed using a single, comparable metric. Considering the number of DALYs instead of causes of death alone provides a more accurate picture of the main drivers of poor health. Information about changing disease patterns is a crucial input for decision-making, effective resource allocation, and policy planning.

Beyond providing a comparable and comprehensive picture of causes of premature death and disability, GBD also estimates the disease burden attributable to different risk factors. The GBD approach goes beyond risk factor prevalence, such as the number of smokers or heavy drinkers in a population. With comparative risk assessment, GBD incorporates both the prevalence of a given risk factor as well as the relative harm caused by that risk factor. It counts premature death and disability attributable to high blood pressure, tobacco and alcohol use, air pollution, poor diet, and other risk factors that lead to ill-health.

# Methods used for the analysis

Details of the methods used for the analysis leading to the findings in this report are provided in technical papers.<sup>1,2,3,4,5,6</sup> A brief summary follows.

Extensive attempts were made to identify and access all data sources that could contribute to the estimation of disease burden and risk factors at the population level in every state and union territory of India. The data sources included censuses; vital registration; Sample Registration System; large-scale national household surveys such as National Family Health Surveys, District Level Household Surveys, Annual Health Survey, and surveys conducted by the National Sample Survey Organization; representative population-level surveys and cohort studies; surveillance system data on disease burden; programme-level data on disease burden from government agencies; administrative records of health services; disease registries; and a wide range of other studies conducted across India and systematic reviews of epidemiological studies. The scope and quality of the data were assessed, and if the inclusion criteria were met the data were included in the analysis.

The 14 expert groups formed as part of the State-level Disease Burden Initiative in India, which included many of the leading health experts in India, engaged intensely to provide guidance on suitable sources of data, accessing those data, participation in the analytical process, and interpretation of the findings over a period of two years.

Life expectancy was estimated. Death rates, causes of death, prevalence and incidence of diseases, exposure to risk factors, and YLLs, YLDs, and DALYs were estimated for 333 disease conditions and injuries and 84 risk factors for each state of India, the union territory of Delhi, and the union territories other than Delhi from 1990 to 2016 as part of the GBD 2016 study. Standardised methods that have been described in detail in the published technical papers were used to compute the estimates.

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1. GBD 2016 Mortality Collaborators. Global, regional and national under-5 mortality, adult mortality, age-specific mortality and life expectancy 1970–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2017; 390: 1084–1150.

2. GBD 2016 Cause of Death Collaborators. Global, regional and national age-sex mortality for 264 cause of death, 1980–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2017; 390: 1151–1210.

3. GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional and national incidence, prevalence, and years lived with disability for 328 disease and injuries for 195 countries, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2017; 390: 1211–1259.

4. GBD 2016 DALYs and HALE Collaborators. Global, regional and national disability-adjusted life-years (DALYs) for 333 diseases and injuries and healthy life expectancy (HALE) for 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2017; 390: 1260–1344.

5. GBD 2016 Risk factors Collaborators. Global, regional and national comparative risk assessment of 84 behavioural, environmental and occupational and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2017; 390: 1345–1422.

6. India State-level Disease Burden Initiative Collaborators. Nations within a nation: variations in epidemiological transition across the states of India, 1990–2016 in the Global Burden of Disease Study. *Lancet* Epub 14 November 2017.

Uncertainty intervals were computed around the estimates to indicate the margin of error that could be expected for each estimate.

Disease burden and risk factors estimates were compared between the states of India. The DALY estimates for the leading diseases in each state were also compared with the estimates of those diseases in geographies that had a similar Socio-demographic Index level that was computed from income level, educational attainment, and fertility level.

In the GBD approach, when data are scarce for the estimation of a particular variable, strength is drawn from the covariates that have known association with that variable in order to make the best possible estimates for all diseases and risk factors included in the GBD list. This has the advantage of providing a complete set of estimates for policymakers to help them ascertain priorities. At the same time, data gaps identified in this process are useful in informing the generation of relevant data and improving those estimates subsequently. In summary, the GBD methods enable standardised comparison of the burden of diseases and risk factors across ages, sexes, geographies, and time through the use of all available data.

# Findings

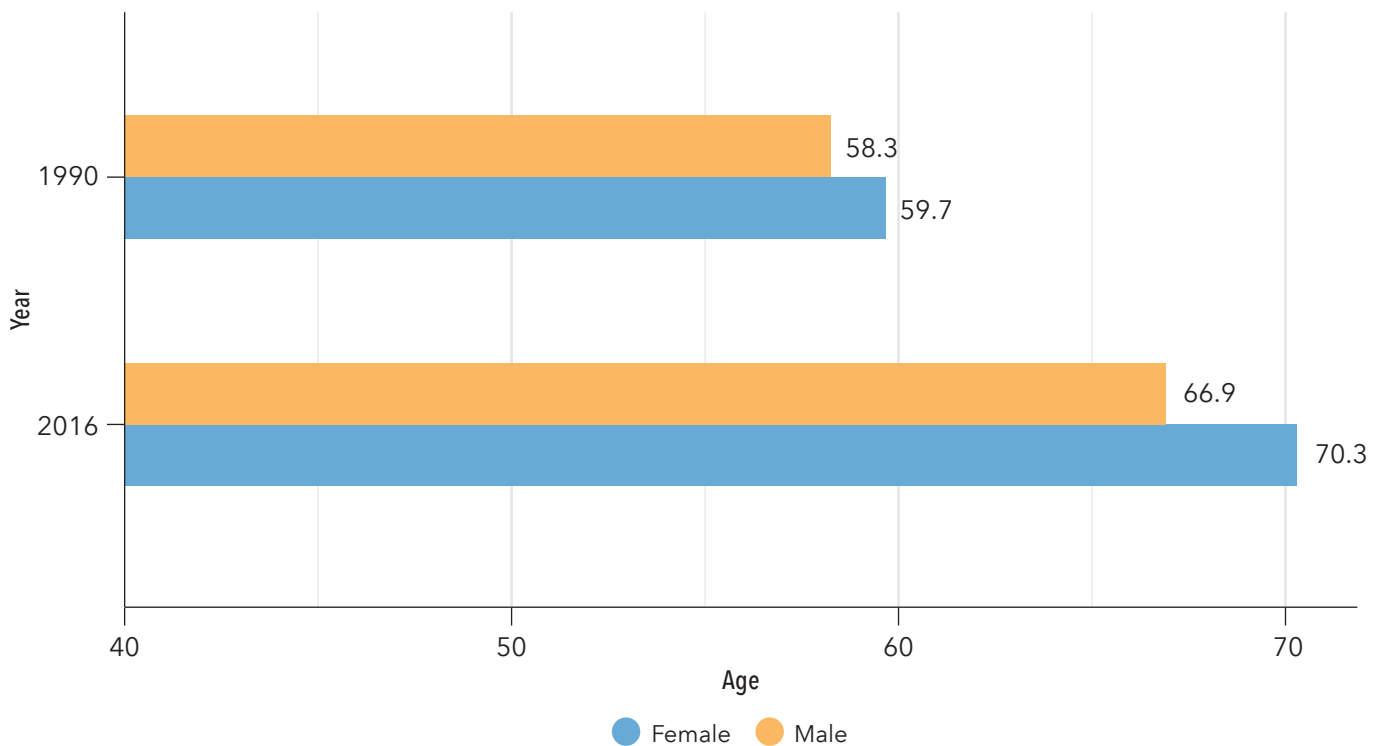
## Life expectancy

One of the simplest measures for understanding overall health outcomes is life expectancy at birth. If a country is generally expanding its longevity, it usually means that people are dying prematurely at lower rates. Around the world, people are living longer on average and populations are growing older.

In 1990, life expectancy at birth in India was 58.3 years for males and 59.7 years for females. By 2016, life expectancy at birth increased to 66.9 years for males and 70.3 years for females. India has made substantial progress in improving the life expectancy at birth. However, life expectancy varied widely between the states of India. In 2016, the range was from 66.8 years in Uttar Pradesh to 78.7 years in Kerala for females, and 63.6 years in Assam to 73.8 years in Kerala for males.

While life expectancy is a useful simple measure of a country's or state's health status, it does not reflect the variations and nuances in health loss throughout a person's lifespan, the understanding of which is necessary to minimise health loss at the population level.

**Figure 1**  
Life expectancy by sex in India, 1990 and 2016



## India's epidemiological transition

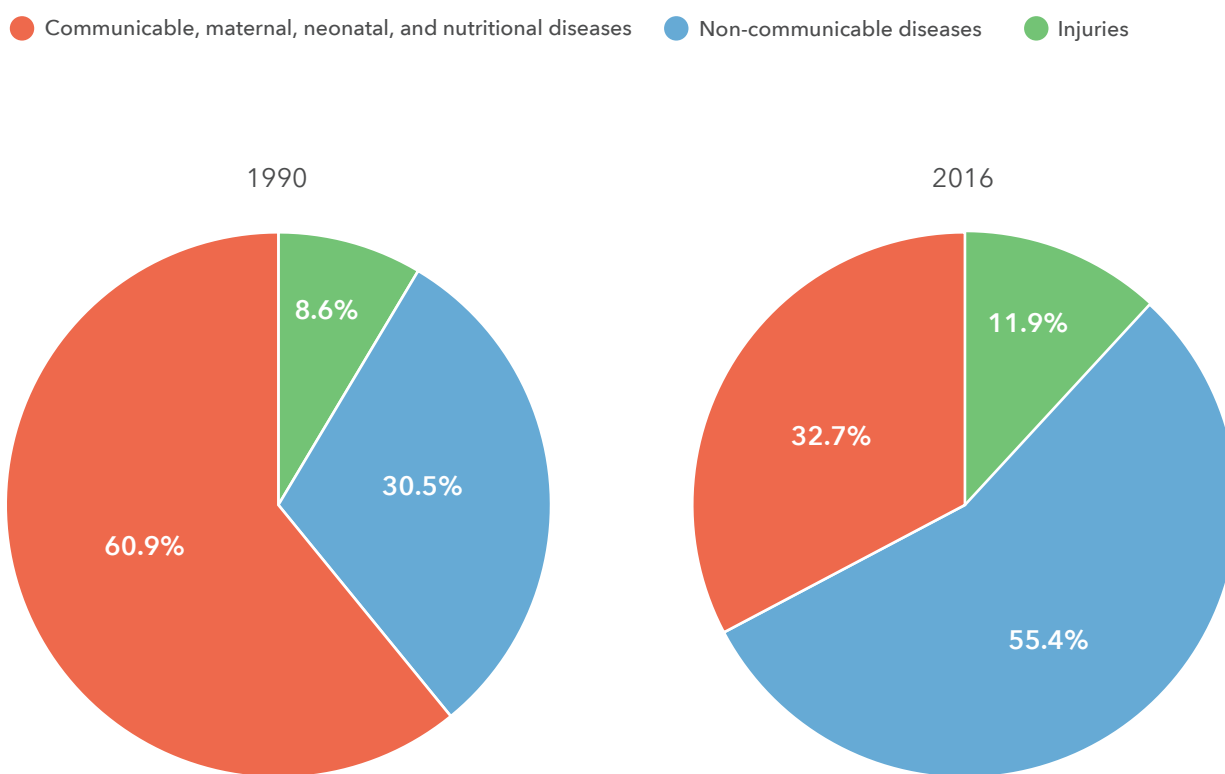
In tandem with its rapid social and economic development, India is undergoing a major epidemiological transition. Over the last 26 years, the country's disease patterns have shifted: mortality due to communicable, maternal, neonatal, and nutritional diseases (CMNNDs) has declined substantially and India's population is living longer, meaning that non-communicable diseases (NCDs) and injuries are increasingly contributing to overall disease burden.

India's health system therefore faces a dual challenge. Although the absolute burden from diseases such as diarrhoea, lower respiratory infections, tuberculosis, and neonatal disorders is being reduced, it remains high. At the same time, the contribution to health loss of non-communicable conditions such as heart disease, stroke, and diabetes is rising. The precise nature of this challenge, though, varies across the country. While all states have experienced a change in disease patterns to some degree, clear differences emerge both in terms of the extent of this change and the rate at which it has occurred.

Disability-adjusted life years (DALYs) are a summary measure of the health loss burden caused by different conditions, and take into account both premature mortality and disability in one combined measure.

**Figure 2**

Contribution of major disease groups to total DALYs in India, 1990 and 2016



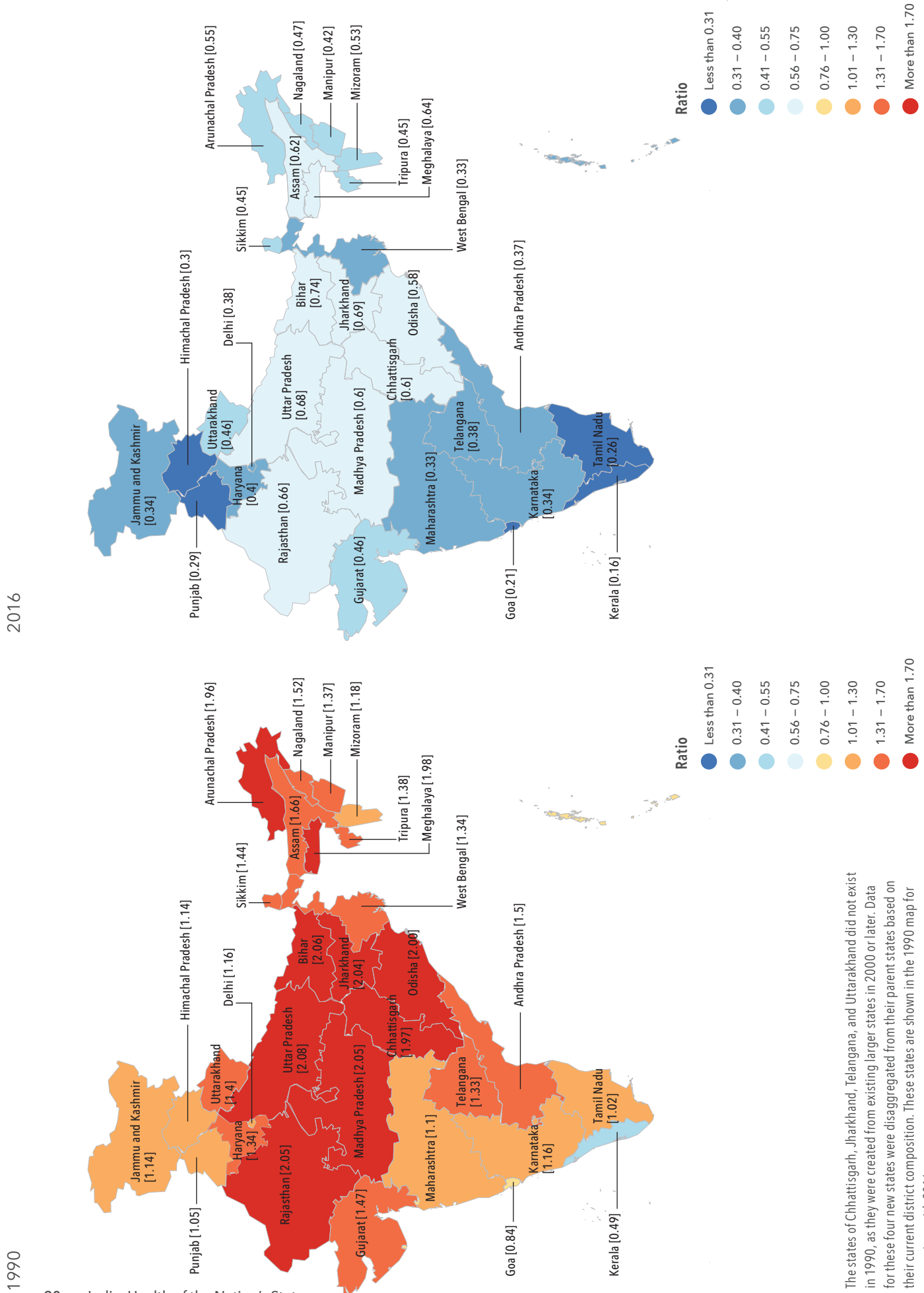
India had 33% of the total DALYs from CMNNDs, 55% from NCDs, and 12% from injuries in 2016. In 1990, this was 61%, 30%, and 9% of DALYs, respectively.



Epidemiological transition ratio is defined as the ratio of DALYs caused by CMNNDs to those caused by NCDs and injuries. A ratio greater than one indicates a higher burden of CMNNDs than NCDs and injuries, while a ratio less than one indicates the opposite. The lower the ratio, the greater the contribution of NCDs and injuries to a state's overall disease burden. Most of the states had ratios more than one in 1990, whereas all states had ratios less than one in 2016. This means that the proportion of DALYs caused by NCDs and injuries has increased heavily across the country since 1990, and in 2016 accounted for the majority of premature death and disability for all states – a major shift in drivers of health loss.

There are wide variations in the epidemiological transition ratio between individual states, ranging from 0.16 in Kerala, which is far along in this progression, to 0.74 in Bihar, where the challenge of the double burden of diseases is more acute. The states with ratio 0.56–0.75 in 2016 were considered as having the lowest epidemiological transition level (ETL), those with ratio 0.41–0.55 as lower-middle ETL, those with ratio 0.31–0.40 as higher-middle ETL, and those with ratio 0.30 or less as highest ETL.

**Figure 3**  
Epidemiological transition ratios of the states of India, 1990 and 2016



The states of Chhattisgarh, Jharkhand, Telangana, and Uttarakhand did not exist in 1990, as they were created from existing larger states in 2000 or later. Data for these four new states were disaggregated from their parent states based on their current district composition. These states are shown in the 1990 map for comparison with 2016.

These findings highlight the fact that India's states will require very different policy approaches according to the nature of the disease burden they are facing. The rest of this report takes a deeper look into the diseases and injuries that are driving these trends across the states, in order to help decision-makers determine just what those approaches should be.

The health planning for each state and union territory in India should ideally be based on its specific disease and risk factors profile. However, it is also useful to understand disease and risk factors trends among groups of states at similar levels of development and epidemiological transition.

In India the development efforts are often focused on the relatively less developed eight north Indian states and eight states in the hilly northeastern region. The former are referred to as the Empowered Action Group (EAG) states and the latter the North-East states. The remaining states and union territories are often referred to as the "Other" states. We provide the disease and risk factors profile of each state in this report, but also present trends by these state groups used in India. In addition, we subdivided states within these groups by their ETL, as described in the previous section. As the union territories other than Delhi have relatively smaller populations, these six union territories of Andaman and Nicobar Islands, Chandigarh, Dadra and Nagar Haveli, Daman and Diu, Lakshadweep, and Puducherry were considered together in the analysis.

The year in which health loss from NCDs and injuries exceeded that from CMNNDs varied widely between the state groups and sub-groups, ranging from 1986 to 2010 (Table 2). The epidemiological transition ratio dropped below one for the EAG states group in 2009, for the North-East states group in 2005, and for the other states group in 1995. This crossover year for India as a whole was 2003.

**Table 1**  
Grouping of states of India in this report

<b>Empowered Action Group (EAG) states</b>	
<b>Lowest ETL group</b>	Bihar
	Chhattisgarh
	Jharkhand
	Madhya Pradesh
	Odisha
	Rajasthan
	Uttar Pradesh
<b>Lower-middle ETL group</b>	Uttarakhand
<b>North-East states</b>	
<b>Lowest ETL group</b>	Assam
	Meghalaya
<b>Lower-middle ETL group</b>	Arunachal Pradesh
	Mizoram
	Nagaland
	Tripura
	Sikkim
	Manipur
<b>Other states</b>	
<b>Lower-middle ETL group</b>	Gujarat
<b>Higher-middle ETL group</b>	Andhra Pradesh
	Delhi
	Haryana
	Jammu and Kashmir
	Karnataka
	Maharashtra
	Telangana
	Union Territories other than Delhi
	West Bengal
<b>Highest ETL group</b>	Goa
	Himachal Pradesh
	Kerala
	Punjab
	Tamil Nadu

**Table 2**

Year of crossover to majority NCDs and injuries burden by the state groups

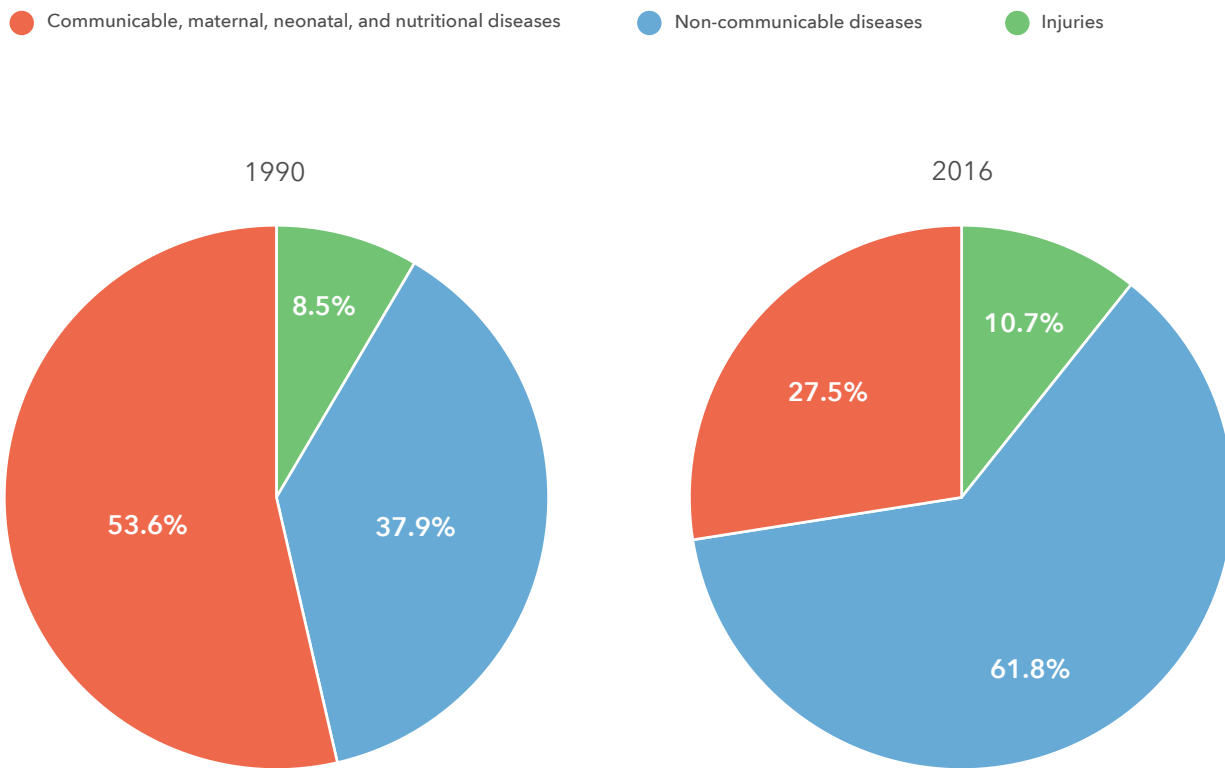
<b>State groups (population)</b>	<b>Crossover year</b>
<b>India (1,316 million)</b>	<b>2003</b>
<b>EAG states (599 million)</b>	<b>2009</b>
Lowest ETL group (588 million)	2010
Lower-middle ETL group (11 million)	2002
<b>North-East states (52 million)</b>	<b>2005</b>
Lowest ETL group (38 million)	2007
Lower-middle ETL group (14 million)	2001
<b>Other states (665 million)</b>	<b>1995</b>
Lower-middle ETL group (67 million)	2000
Higher-middle ETL group (446 million)	1996
Higher ETL group (152 million)	1986

## Deaths and their causes

India's epidemiological transition has been driven in part by the fact that fewer lives are cut short by CMNNDs, and hence more people survive to develop and die from NCDs or suffer injuries. What one is likely to die of, though, depends both on age and where one lives. As such, decision-makers need to understand trends in causes of death across age groups and states in order to enact effective policies.

**Figure 4**

Contribution of major disease groups to total deaths in India, 1990 and 2016



The proportion of all deaths in India due to CMNNDs reduced from 53.6% in 1990 to 27.5% in 2016, those due to NCDs increased from 37.9% to 61.8%, and those due to injuries changed from 8.5% to 10.7%.

**Table 3**

Distribution of deaths from major disease groups by age in the state groups, 2016

	Age group	Death rate per 100,000 [percent of total deaths in that age group]		
		Communicable, maternal, neonatal, and nutritional diseases	Non-communicable diseases	Injuries
EAG states group	0-14 years	277 [82.4]	37 [10.9]	23 [6.7]
	15-39 years	76 [34.4]	70 [31.6]	75 [34.0]
	40-69 years	278 [21.9]	873 [68.9]	116 [9.2]
	70 plus years	2609 [29.5]	5799 [65.5]	444 [5.0]
	All ages	268 [34.6]	426 [55.1]	79 [10.2]
North-East states group	0-14 years	261 [83.0]	32 [10.3]	21 [6.7]
	15-39 years	77 [33.8]	82 [35.8]	69 [30.3]
	40-69 years	238 [19.7]	881 [73.0]	88 [7.3]
	70 plus years	2466 [27.2]	6260 [69.2]	327 [3.6]
	All ages	236 [32.1]	433 [58.8]	67 [9.1]
Other states group	0-14 years	157.5 [77.2]	30 [14.6]	17 [8.2]
	15-39 years	41.9 [23.1]	68 [37.2]	72 [39.8]
	40-69 years	133.7 [13.1]	785 [77.2]	98 [9.7]
	70 plus years	1304.2 [17.3]	5784 [76.9]	435 [5.8]
	All ages	145.3 [20.2]	493 [68.5]	81 [11.3]
India	0-14 years	225.6 [80.8]	34 [12.0]	20 [7.2]
	15-39 years	58.4 [29.1]	69 [34.4]	73 [36.5]
	40-69 years	195.8 [17.4]	824 [73.2]	105 [9.4]
	70 plus years	1867.0 [23.0]	5805 [71.6]	435 [5.4]
	All ages	204.6 [27.5]	460 [61.8]	80 [10.7]

The death rate due to NCDs was over two times that due to CMNNDs in India in 2016. The proportion of deaths and the death rates due to CMNNDs were higher in EAG and North-East states group as compared with the Other states group, whereas the proportion of deaths and the death rates due to NCDs were highest in the Other states group. CMNNDs caused the predominant proportion of deaths in the age group 0-14 years in all the states groups. Injuries caused 34%–40% of the deaths in the age group 15-39 years across the three states groups. NCDs were the dominant cause of death in those 40 years or older. The proportion of deaths in the different age groups differed widely across the individual states of India: 3%–19% of total deaths in the 0-14 years age group, 7%–16% in the 15-39 years age group, 35%–44% in the 40-69 years age group, and 30%–52% in those 70 or more years old.

**Table 4**  
Contribution of disease categories to deaths in the state groups, 2016

Disease categories	Percent of deaths to total deaths			
	EAG states group (599 million)	North-East states group (52 million)	Other states group (665 million)	India (1316 million)
<b>Communicable, maternal, neonatal, and nutritional diseases</b>	<b>34.6</b>	<b>32.1</b>	<b>20.2</b>	<b>27.5</b>
HIV/AIDS and tuberculosis	6.4	6.1	4.3	5.4
Diarrhoea, lower respiratory, and other common infectious diseases	19.9	17	11.2	15.5
Neglected tropical diseases and malaria	1.1	1.2	0.6	0.8
Maternal disorders	0.6	0.7	0.3	0.5
Neonatal disorders	4.9	4.6	2.8	3.8
Nutritional deficiencies	0.7	0.5	0.3	0.5
Other communicable, maternal, neonatal, and nutritional diseases	1	2.1	0.8	0.9
<b>Non-communicable diseases</b>	<b>55.1</b>	<b>58.8</b>	<b>68.5</b>	<b>61.8</b>
Cancers	7.8	9.5	8.7	8.3
Cardiovascular diseases	21.9	23	34.5	28.1
Chronic respiratory diseases	12.4	9.6	9.6	10.9
Cirrhosis and other chronic liver diseases	1.7	3.8	2.4	2.1
Digestive diseases	2.6	3.3	1.7	2.2
Neurological disorders	1.8	1.8	2.4	2.1
Mental and substance use disorders	0.4	0.4	0.4	0.4
Diabetes, urogenital, blood, and endocrine diseases	5.2	6.2	7.9	6.5
Musculoskeletal disorders	0.1	0.1	0.1	0.1
Other non-communicable diseases	1.3	1.1	0.9	1.1
<b>Injuries</b>	<b>10.2</b>	<b>9.1</b>	<b>11.3</b>	<b>10.7</b>
Transport injuries	2.9	2.4	3	2.9
Unintentional injuries	5	3.9	4.9	4.9
Suicide and interpersonal violence	2.3	2.8	3.4	2.8
Other	0	0	0	0

The disease categories among CMNNDs that caused the highest proportion of death were diarrhoea, lower respiratory infections, and other common infectious diseases; HIV/AIDS and tuberculosis; and neonatal disorders. The proportion of deaths due to these categories were relatively higher in the EAG and North-East states group as compared with Other states group. Among NCDs, the category of cardiovascular diseases was the leading cause of death, followed by chronic respiratory diseases, cancers, and the category containing diabetes and urogenital disorders. The proportion of deaths due to cardiovascular diseases and the diabetes category were highest in the Other states group, whereas the proportion of deaths due to chronic respiratory diseases was highest in the EAG states group.





The leading individual cause of death in India in 2016 was ischaemic heart disease, the death rate from which was twice as much as the next leading cause. The other NCDs in the top 10 individual causes of death included chronic obstructive pulmonary disease (COPD), stroke, diabetes, and chronic kidney disease. Diarrhoeal diseases, lower respiratory infections, and tuberculosis were the leading CMNND individual causes of death, and road injuries and suicides were the leading injury individual causes of death among the top 10 in India. There were wide variations in death rates from the leading causes between the states. The highest death rate from ischaemic heart disease among the states was 12 times the lowest rate, and these death rates were generally higher among the states belonging to the higher epidemiological transition level groups. On the other hand, the death rate from COPD was generally higher in the EAG states, with the highest rate nine times the lowest rate across the states of India. The death rates from diarrhoeal diseases and tuberculosis were also higher in the EAG states and had a 12-fold and seven-fold variation in rates, respectively, between all the states. The range of death rates from suicide was six-fold across the states.

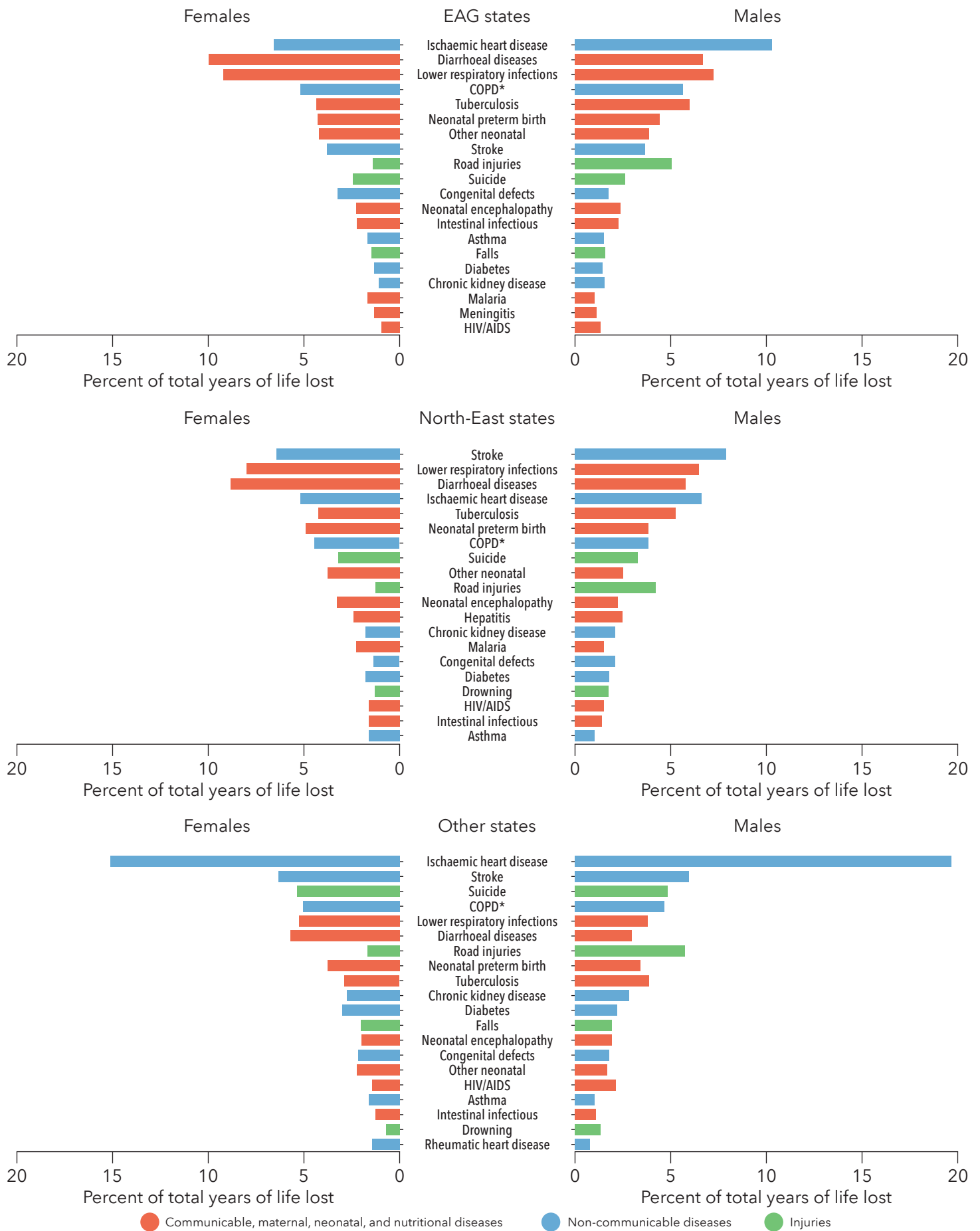
## Years of life lost due to premature death

While deaths are a useful metric for understanding some aspects of population health, they do not take into account the amount of life lost when a person dies. For example, a death at the age of 80 is given the same weight as a death at the age of 10. In addition to deaths, decision-makers also need to know how much premature mortality is caused by a particular disease or injury. Years of life lost (YLLs) is a measure that quantifies the number of years of life a person loses at the age of their death, based on the highest life expectancy for their age group anywhere in the world. YLLs therefore give greater weight to causes of death that kill people at younger ages, such as common childhood infections, than those that tend to occur later in life, such as heart disease or stroke.

Ischaemic heart disease was the leading cause of YLLs in the Other states group by a big margin and was also the leading cause in the EAG states group, but stroke was the leading cause of YLLs in the North-East states group. Infectious and neonatal causes were more prominent causes of YLLs in the EAG and North-East states group than in the Other states group. Suicide and road injuries were among the leading 10 causes of YLLs in all state groups, with suicide as a prominent third leading cause in the Other states group.

In order to ensure that health policies and interventions target those who need them most, it is also vital that decision-makers understand how specific diseases and injuries affect females and males differently. Across all three states groups, ischaemic heart disease caused a much greater proportion of total YLLs among males than among females, accounting for 14% of premature mortality for males in India as a whole compared to 10% for females. Road injuries also caused a higher proportion of YLLs among males than females. On the other hand, diarrhoeal diseases and lower respiratory infections were responsible for a higher proportion of YLLs among females. Policy efforts to address causes of premature mortality in India should therefore be responsive to these differences and the relative challenges that NCDs, injuries, and CMNNDs pose along the lines of both sex and different parts of the country.

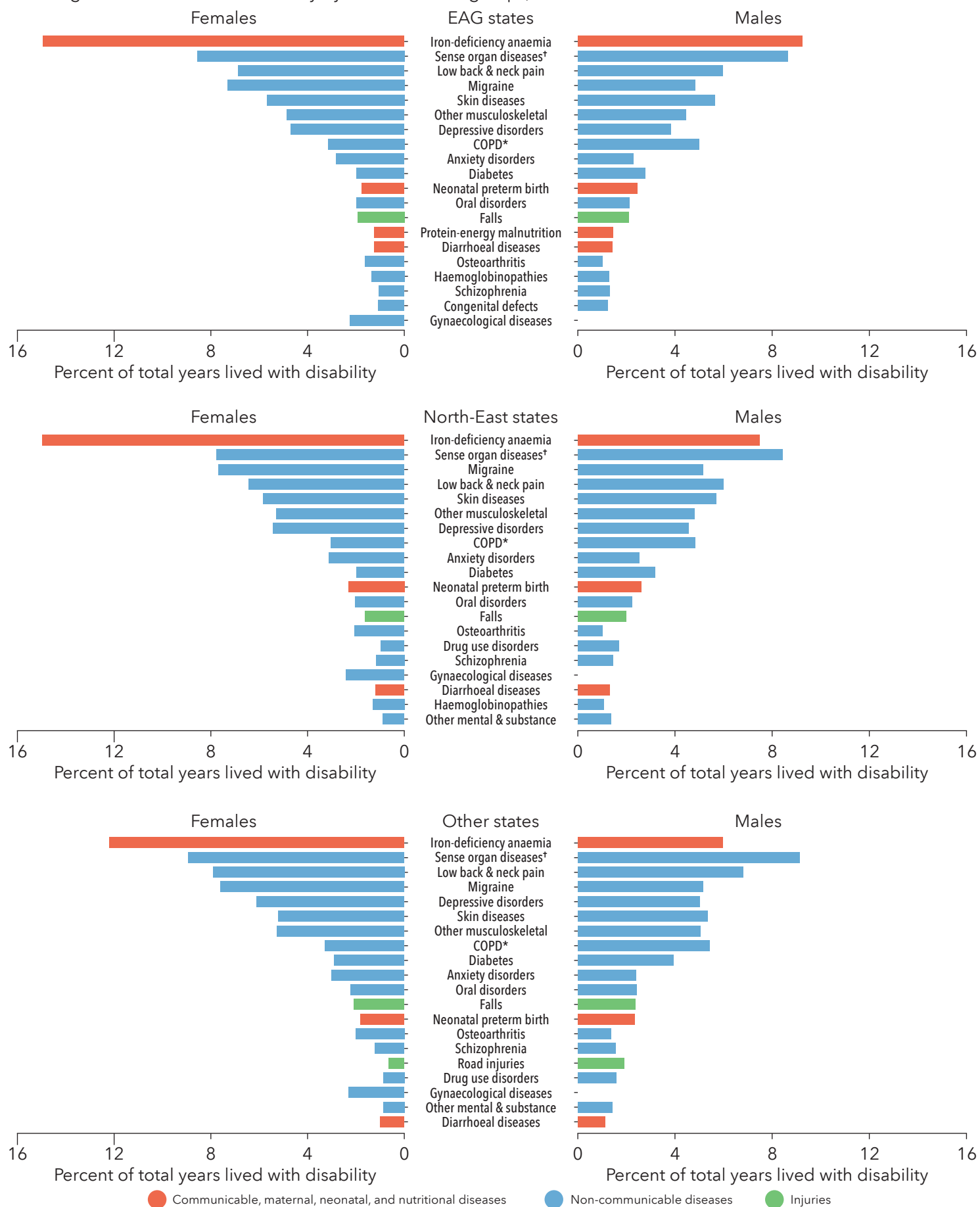
**Figure 6**  
Leading individual causes of years of life lost by sex in the state groups, 2016



## Years lived with disability

As more Indians live into adulthood and old age, they are increasingly likely to experience poor health from disabling conditions. This has important implications for the country's health system, which will have to care for a growing number of patients, many of them suffering from chronic conditions. Years lived with disability (YLDs) is a measure that takes into account both the number of individuals suffering from disability (or non-fatal poor health as a result of a particular disease or injury), and also the severity of the disability. The contribution of YLDs to the total disease burden (DALYs) increased in India from 17% in 1990 to 33% in 2016. The YLD proportion in 2016 was highest in the Other states group at 36% and lowest in the EAG states group at 30%.

**Figure 7**  
Leading individual causes of disability by sex in the state groups, 2016



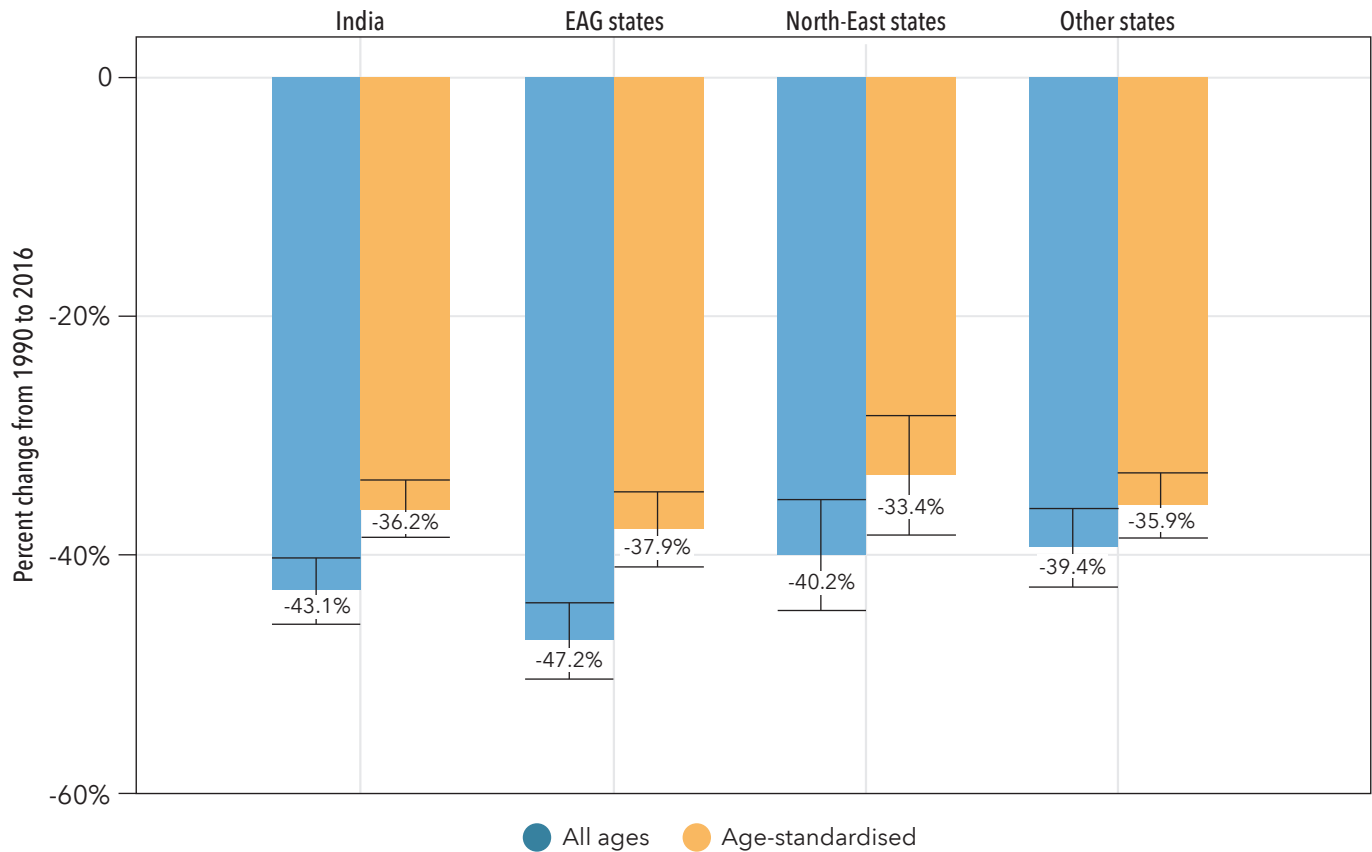
†Sense organ diseases includes mainly hearing and vision loss.  
\*COPD is chronic obstructive pulmonary disease.

The majority of the leading individual causes of YLDs in 2016 were NCDs, but iron-deficiency anaemia was the top cause across all three state groups, accounting for 11% of all disability in India in 2016. Its effects were most severe among females, contributing to 15% of YLDs in the EAG and North-East states group and 12% in the Other states group. The NCD conditions that were the leading contributors to disability burden in all three state groups included sense organ diseases (hearing and vision loss), lower back and neck pain, migraine, depressive disorders, skin diseases, and musculoskeletal disorders. Among these, migraine and depressive disorders were responsible for a higher proportion of YLDs among females than among males in all three state groups. As many of these diseases are not fatal, these rankings highlight the importance of looking specifically at YLDs to identify major individual causes of poor health in the population, as these may be overlooked by focusing on mortality. As India's population structure moves further toward a higher proportion of elderly, these diseases will likely make an increasingly important contribution to the country's disease burden and will require stronger efforts to address them.

## Total health loss and its causes

For a complete assessment of the burden caused by health problems, we can evaluate the impact of different diseases and injuries by taking into account both premature mortality and disability in one combined measure: disability-adjusted life years (DALYs). DALYs provide a more comprehensive look at the drivers of overall health loss in India and its states.

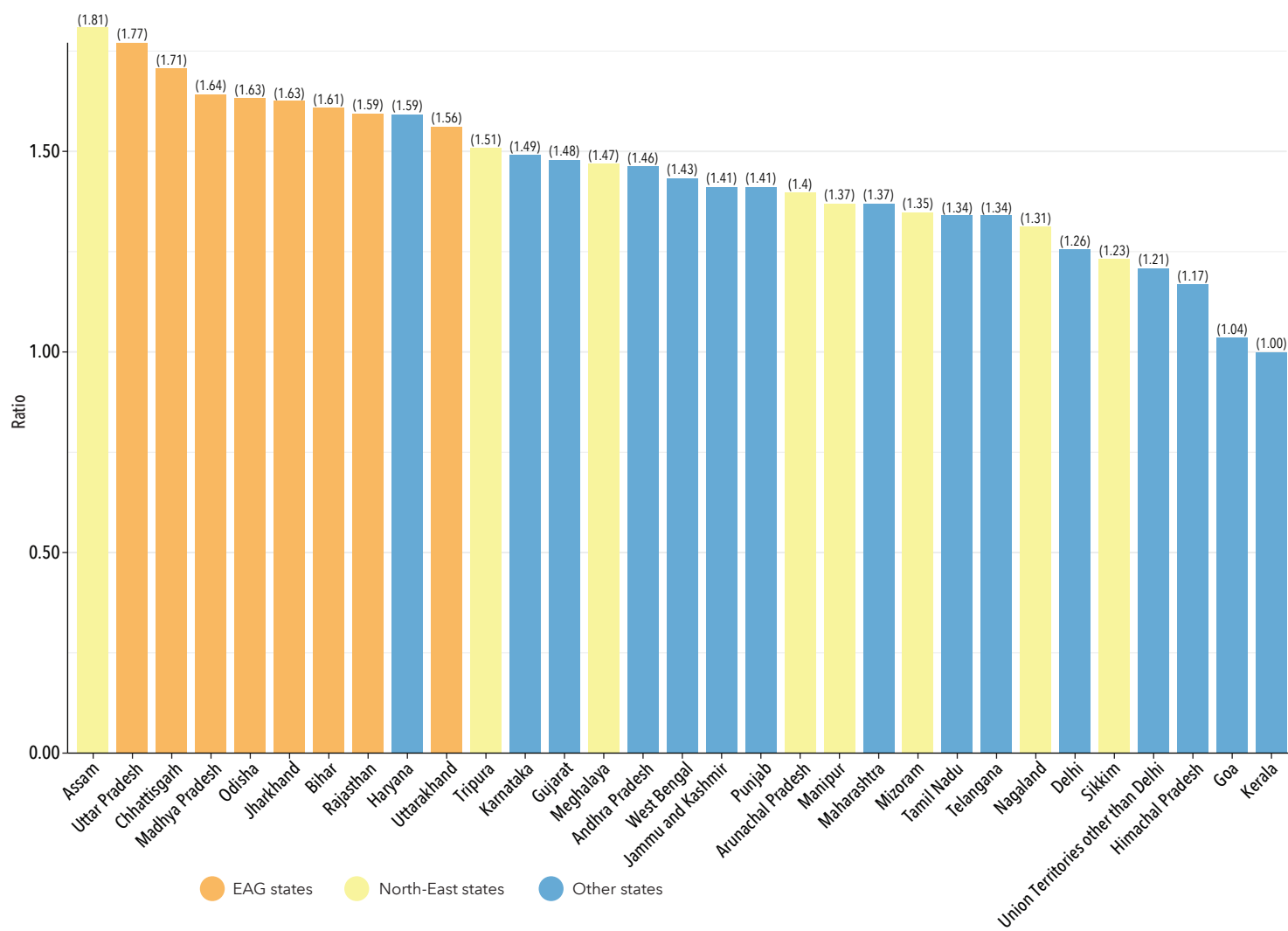
**Figure 8**  
Percent change in all-ages and age-standardised DALYs rate in the state groups, 1990 and 2016



The DALY rate reduced significantly by 43% in India from 1990 to 2016. This reduction was relatively higher in the EAG states group. After adjusting for the changes in population age structure during this period, the age-standardised DALY rate dropped by 36% in India, suggesting a reduction in the disease burden per person over this period.



**Figure 9**  
Relative age-standardised DALYs rate across the states of India, 2016



The ratio shown on the top of each bar is the ratio of each state age-standardised DALY rate to the DALY rate of Kerala.

The range of DALY rates varied almost two-fold across the states in 2016, after adjusting for the population structure of the states. Assam and the EAG states had the highest DALY rates. The lowest DALY rates were in Kerala and Goa.

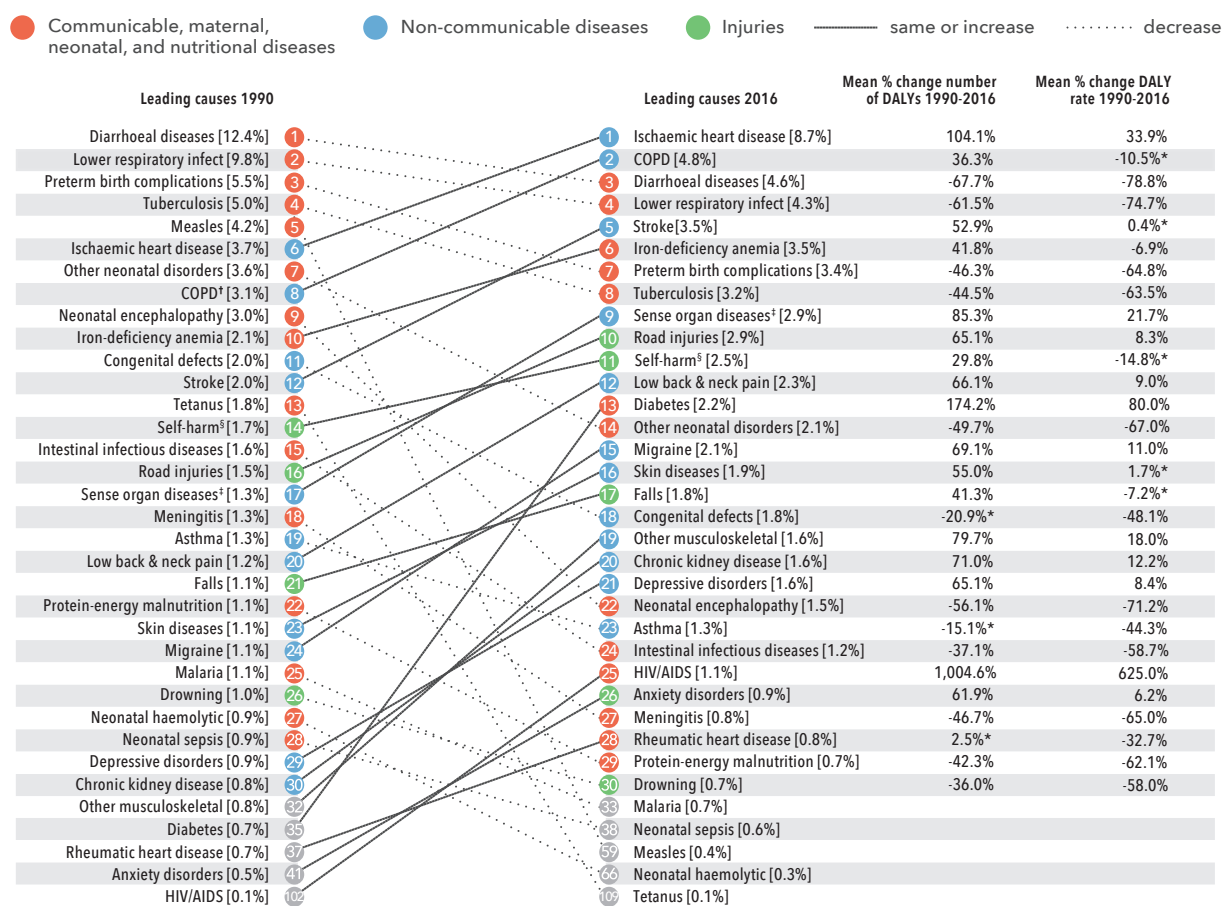
**Table 5**  
Contribution of disease categories to DALYs in the state groups, 1990 and 2016

	Percent of DALYs, 1990				Percent of DALYs, 2016			
	EAG states group (369 million)	North-East states group (32 million)	Other states group (463 million)	India (864 million)	EAG states group (599 million)	North-East states group (52 million)	Other states group (665 million)	India (1,316 million)
<b>Communicable, maternal, neonatal, and nutritional diseases</b>	<b>67.1</b>	<b>61.9</b>	<b>54.2</b>	<b>60.9</b>	<b>39.9</b>	<b>37</b>	<b>24.9</b>	<b>32.7</b>
HIV/AIDS and tuberculosis	5.3	5.5	4.8	5.1	4.8	4.7	3.6	4.2
Diarrhoea, lower respiratory, and other common infectious diseases	38.9	31.7	27.2	33.2	16.6	13.8	8.6	12.7
Neglected tropical diseases and malaria	2.8	2.7	1.3	2.1	2	1.9	1.1	1.5
Maternal disorders	1.4	2.3	1.3	1.4	0.8	0.9	0.4	0.6
Neonatal disorders	12.9	14	15	13.9	9.5	9.1	6.2	7.9
Nutritional deficiencies	4.2	3.6	3.4	3.8	5	4.5	4.2	4.6
Other communicable, maternal, neonatal, and nutritional diseases	1.6	2.1	1.3	1.5	1.2	2.2	0.9	1.1
<b>Non-communicable diseases</b>	<b>25.4</b>	<b>30.5</b>	<b>35.9</b>	<b>30.5</b>	<b>48.9</b>	<b>52.5</b>	<b>62.4</b>	<b>55.4</b>
Cancers	2	2.6	2.6	2.3	4.6	5.6	5.4	5
Cardiovascular diseases	4.9	5.9	9	6.9	10.9	11.5	17.7	14.1
Chronic respiratory diseases	4.4	4.8	4.6	4.5	6.7	5.5	6.1	6.4
Cirrhosis and other chronic liver diseases	0.6	1.7	1.1	0.9	1.2	2.8	1.8	1.6
Digestive diseases	1.4	1.9	1.1	1.3	1.8	2.3	1.2	1.5
Neurological disorders	1.7	1.9	2.3	2	3.2	3.4	4.1	3.6
Mental and substance use disorders	2.4	3	3.5	2.9	4.8	5.4	6.4	5.6
Diabetes, urogenital, blood, and endocrine diseases	2.1	2.6	3.2	2.6	4.6	5.2	6.7	5.6
Musculoskeletal disorders	1.9	2.1	2.7	2.3	3.9	4.1	5.4	4.6
Other non-communicable diseases	4.1	4.1	5.9	4.9	7.2	6.7	7.7	7.4
<b>Injuries</b>	<b>7.4</b>	<b>7.6</b>	<b>9.9</b>	<b>8.6</b>	<b>11.2</b>	<b>10.5</b>	<b>12.7</b>	<b>11.9</b>
Transport injuries	1.5	1.4	2	1.7	3.2	2.7	3.5	3.3
Unintentional injuries	4.4	3.9	4.9	4.6	5.5	4.7	5.4	5.4
Suicide and interpersonal violence	1.4	2.2	2.9	2.1	2.5	3.1	3.8	3.1
Other	0	0.1	0.1	0.1	0	0	0	0

The proportion of DALYs due to CMNNDs dropped substantially in all three state groups between 1990 and 2016, making up 25% to 40% of the total DALYs in 2016. There were large declines in the proportion of health loss from diarrhoea, lower respiratory infections, and other common infections, and from neonatal disorders. These proportions, however, continued to be higher in the EAG and North-East states groups than in the Other states group. Conversely, the proportion of DALYs due to NCDs increased substantially in all three state groups during this period to 49%-62% of the total DALYs in 2016. This proportion continued to be highest in the Other states group for most of the NCD categories. The proportion of DALYs due to injuries also increased in all three state groups, contributing to 11%-13% of the total DALYs in 2016. For India as whole, the disease categories that were responsible for more than 5% of the total DALYs in 2016 included cardiovascular diseases; diarrhoea, lower respiratory infections, and other common infectious diseases; neonatal disorders; chronic respiratory diseases; diabetes, urogenital and endocrine diseases; mental and substance abuse disorders; unintentional injuries; and cancers.

**Figure 10**

Change in DALYs number and rate for the leading individual causes in India from 1990 to 2016



\*Change not significant. The percent figure in bracket next to each cause is DALYs from that cause out of the total DALYs.

†COPD is chronic obstructive pulmonary disease. ‡Sense organ diseases includes mainly hearing and vision loss. §Self-harm refers to suicide and the nonfatal outcomes of self-harm.

When looking at the leading individual causes of DALYs in India, most NCDs have risen in rank since 1990. Ischaemic heart disease and COPD were the top two causes of DALYs in 2016, up from sixth and eighth place, respectively, in 1990. Diabetes showed a particularly dramatic increase, from 35th place to 13th. The number of DALYs caused by ischaemic heart disease rose by 104% over this period and those caused by diabetes a striking 174%. Large increases in DALYs are evident for the majority of non-communicable conditions, including sense organ diseases, low back and neck pain, and depressive disorders. Injuries have seen similar rises in their relative ranking, with road injuries the 10th leading individual cause of health loss in 2016, followed by self-harm in 11th place. Road injuries caused 65% more DALYs in 2016 than they did in 1990. These trends are indicative not just of a population that is increasing in age and therefore living long enough to develop and suffer from chronic diseases, but also of the impact of lifestyle changes that come with a rapidly industrialising, urbanising society – from changes in diet and activity levels to more traffic on the roads.

In contrast, the CMNNDs that led the rankings in 1990 have seen notable declines. Diarrhoeal disease and lower respiratory infections, which were India's top two individual causes of DALYs in 1990, dropped to third and fourth place in 2016. Other conditions, such as preterm birth complications, tuberculosis, and vaccine-preventable diseases like measles, also saw a drop

in rank. The number of DALYs caused by diarrhoeal diseases fell by 68% over this period, while preterm birth complications caused 46% less DALYs in 2016 than in 1990. This represents India's significant achievement in ensuring more children survive and thrive during their first weeks, months, and years of life. However, there is a striking outlier to this progress: Iron-deficiency anaemia showed an increase in both rank and health loss caused, suggesting a need for renewed policy attention to this cause.

**Figure 11**

Comparison of the leading individual causes of DALYs across the state groups, 2016

Rank	Leading causes EAG states	Leading causes North-East states	Leading causes Other states
1	Ischaemic heart disease [6.3%]	Diarrhoeal diseases [5.3%]	Ischaemic heart disease [11.5%]
2	Diarrhoeal diseases [6.2%]	Stroke [5.3%]	COPD* [4.6%]
3	Lower respiratory infect [5.8%]	Lower respiratory infect [5.0%]	Stroke [4.1%]
4	COPD* [5.0%]	Ischaemic heart disease [4.3%]	Iron-deficiency anaemia [3.4%]
5	Tuberculosis [3.9%]	COPD* [4.0%]	Sense organ diseases† [3.3%]
6	Neonatal preterm birth [3.7%]	Neonatal preterm birth [3.7%]	Self-harm° [3.2%]
7	Iron-deficiency anaemia [3.6%]	Tuberculosis [3.5%]	Road injuries [3.0%]
8	Other neonatal [2.9%]	Iron-deficiency anaemia [3.5%]	Neonatal preterm birth [3.0%]
9	Stroke [2.8%]	Sense organ diseases† [2.5%]	Diarrhoeal [3.0%]
10	Road injuries [2.7%]	Road injuries [2.4%]	Diabetes [2.8%]
11	Sense organ diseases† [2.6%]	Self-harm° [2.3%]	Lower respiratory infect [2.8%]
12	Congenital defects [2.1%]	Other neonatal [2.2%]	Low back & neck pain [2.7%]
13	Low back & neck pain [1.9%]	Diabetes [2.0%]	Tuberculosis [2.4%]
14	Skin diseases [1.8%]	Migraine [2.0%]	Migraine [2.3%]
15	Self-harm° [1.8%]	Neonatal encephalopathy [1.9%]	Chronic kidney disease [2.1%]
16	Migraine [1.8%]	Low back & neck pain [1.9%]	Falls [2.0%]
17	Falls [1.7%]	Skin diseases [1.9%]	Skin diseases [2.0%]
18	Diabetes [1.7%]	Hepatitis [1.8%]	Depressive disorders [2.0%]
19	Neonatal encephalopathy [1.7%]	Chronic kidney disease [1.6%]	Other musculoskeletal [1.9%]
20	Intestinal infectious [1.6%]	Other musculoskeletal [1.6%]	Congenital defects [1.5%]
21	Other musculoskeletal [1.4%]	Congenital defects [1.6%]	Neonatal encephalopathy [1.3%]
22	Asthma [1.4%]	Depressive disorders [1.5%]	HIV/AIDS [1.2%]
23	Depressive disorders [1.3%]	Malaria [1.3%]	Other neonatal [1.2%]
24	Chronic kidney disease [1.2%]	Falls [1.2%]	Asthma [1.1%]
25	Protein-energy malnutrition [1.0%]	Asthma [1.2%]	Anxiety disorders [1.0%]
26	Malaria [1.0%]	HIV/AIDS [1.1%]	Oral disorders [0.8%]
27	Meningitis [0.9%]	Drowning [1.1%]	Rheumatic heart disease [0.8%]
28	HIV/AIDS [0.9%]	Intestinal infectious [1.0%]	Intestinal infectious [0.7%]
29	Animal contact [0.9%]	Cirrhosis hepatitis B [0.9%]	Meningitis [0.7%]
30	Rheumatic heart disease [0.9%]	Anxiety disorders [0.9%]	Hypertensive heart disease [0.7%]

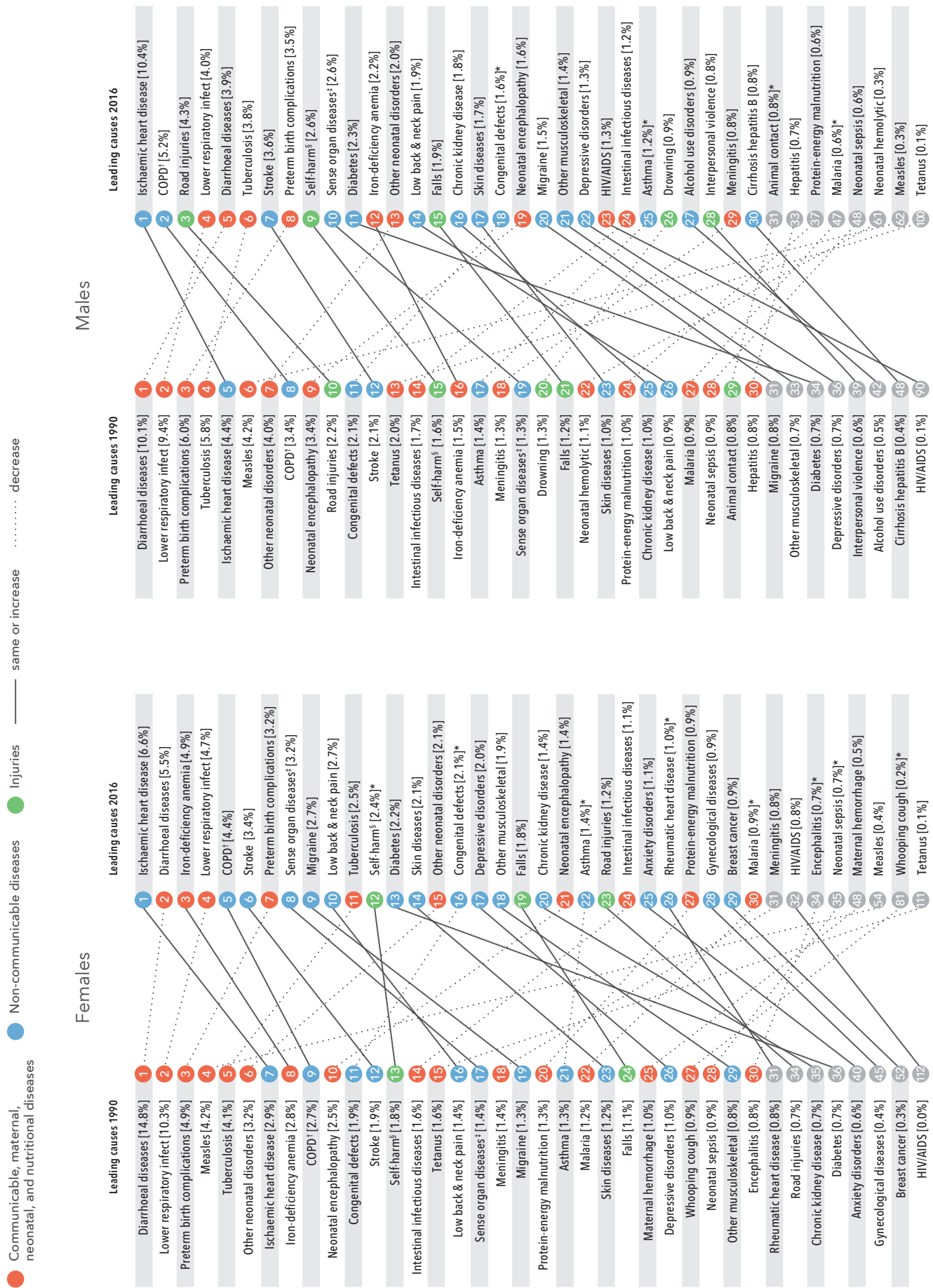
● Communicable, maternal, neonatal, and nutritional diseases    ● Non-communicable diseases    ● Injuries

\*COPD is chronic obstructive pulmonary disease.  
 †Sense organ diseases includes mainly hearing and vision loss.  
 °Self-harm refers to suicide and the nonfatal outcomes of self-harm.  
 The percent figure in bracket next to each cause is DALYs from that cause out of the total DALYs.

However, these trends have not been uniform throughout the country. The relative rankings of causes of disease burden vary markedly among the three state groups. CMNND causes have not been superseded by NCD causes to the same extent everywhere in India, and generally ranked much higher in the EAG and North-East states groups than they did in the Other states group. Diarrhoeal diseases remained the leading cause of health loss in the North-East states group and second in the EAG states group, with lower respiratory infections in third place for both of these groups. In contrast, these conditions were in ninth and eleventh place in the Other states group. Moreover, the proportion of health loss caused by CMNNDs tended to be greater in the EAG and North-East states groups than in the Other states group, with the heaviest burden in the EAG states group.

Alongside variations between state groups, decision-makers should also be aware of differences in the causes of health loss among females and males.

**Figure 12**  
Change in DALYs number for the leading individual causes by sex in India from 1990 to 2016



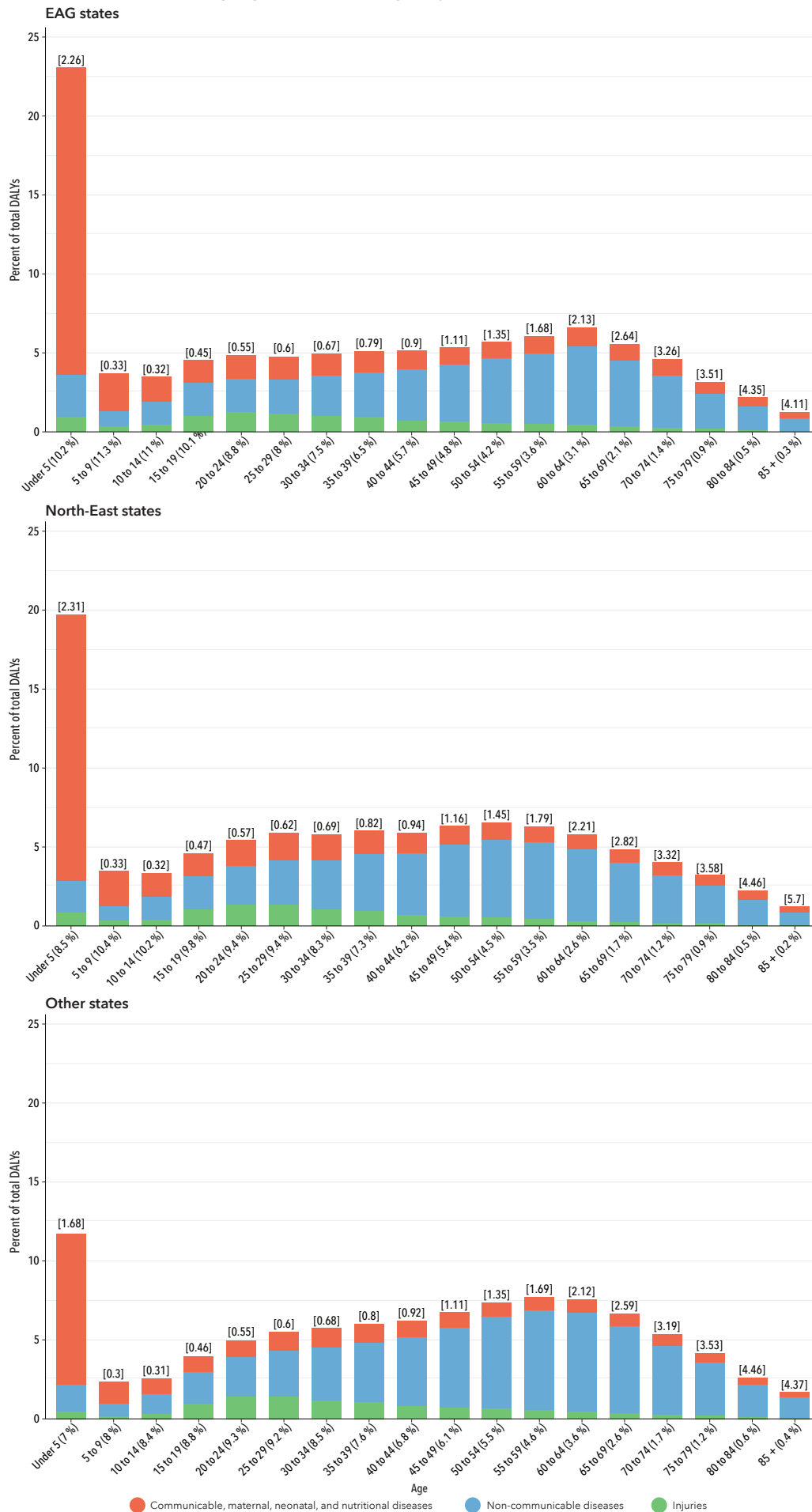
\*Change not significant.  
The percent figure in bracket next to each cause is DALYs from that cause out of the total DALYs.  
\*COPD is chronic obstructive pulmonary disease.  
\*Sense organ diseases includes mainly hearing and vision loss.  
\*Self-harm refers to suicide and the nonfatal outcomes of self-harm.

While ischaemic heart disease was the leading individual cause of DALYs for both sexes combined in 2016, for males this was followed by COPD and road injuries, with both conditions seeing rapid increases in ranking since 1990. For females, diarrhoeal diseases and iron-deficiency anaemia were in second and third place, with anaemia climbing from eighth place over this period. This shows that females continue to suffer a higher burden from CMNNDs, while several leading NCDs and injuries cause a higher burden among males. This is also evident when looking at the proportion of health loss caused by each condition. Anaemia, for example, caused 4.9% of DALYs among females in 2016 as compared with 2.2% among males, and the proportion of DALYs from diarrhoea and lower respiratory infections was responsible for a larger percent of DALYs among females. A notable exception to this trend is tuberculosis, which ranks as the sixth leading cause of DALYs for males and 11th for females, and also causes substantially more health loss for males than females. On the other hand, ischaemic heart disease caused 10.4% of DALYs among males and 6.6% among females in 2016 despite being the leading cause for both.

Different disease profiles are associated with different age groups, and so looking at the age structure of India's disease burden illuminates patterns that are of utility to policymakers as they seek to target interventions.



**Figure 13**  
Percent of DALYs by age in the state groups, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group.  
The number in parentheses after each age group on the x-axis is the percent of population in that age group.

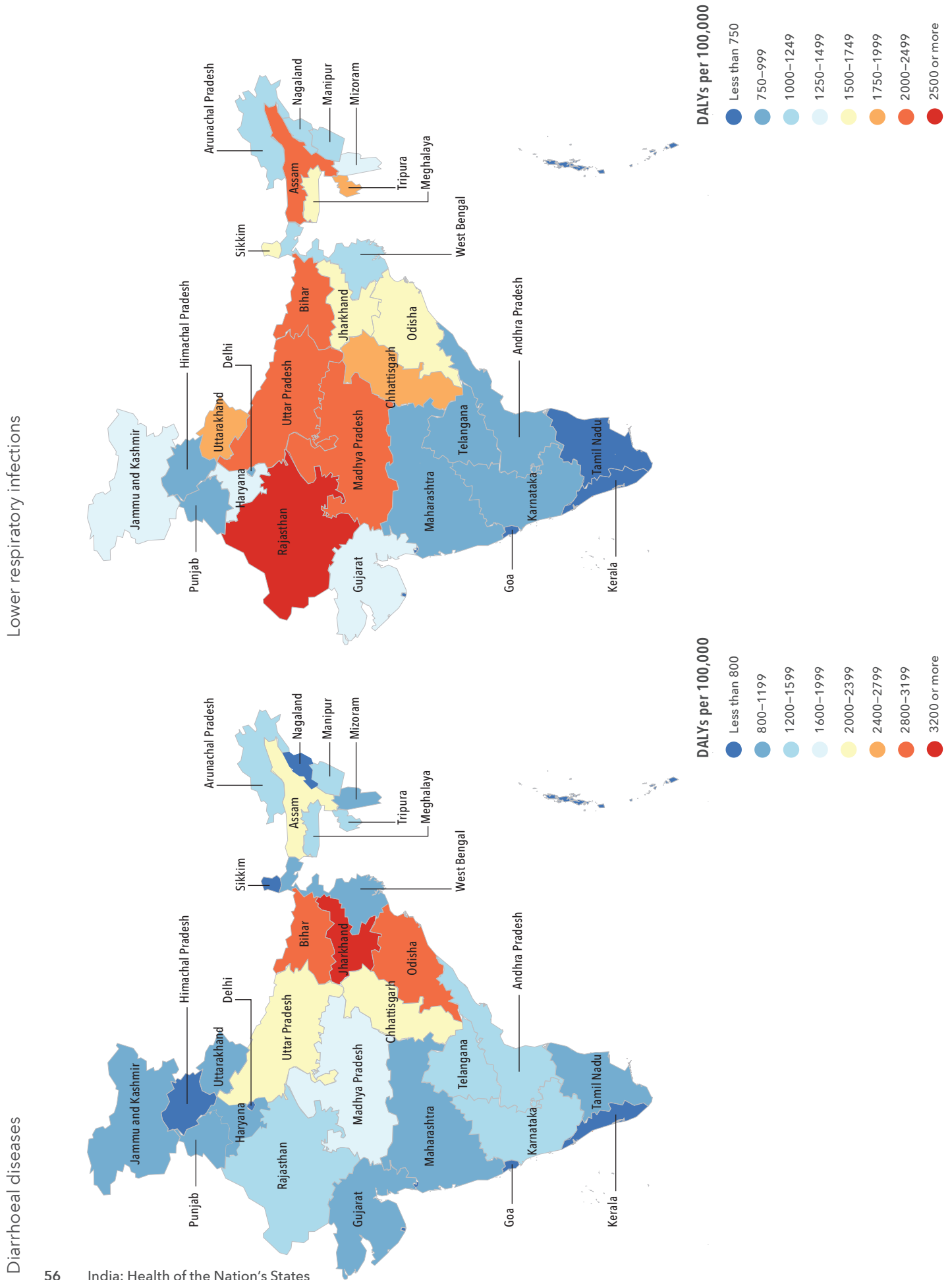
There are different patterns of health loss across the lifespan. Age groups under-5 and 45 plus years suffered a higher proportion of the total DALY burden as compared with their proportion in the population across all three state groups of India in 2016, as shown by the ratios in the figure. However, the relative magnitude of the disease burden across the age groups differs between the state groups. While the under-5 age group had the highest proportion of DALYs in all state groups, this ranged between 23% of the total DALYs in the EAG states group, 19% in the North-East states group, and 12% in the Other states group. On the other hand, the proportion of DALYs in the middle and older age groups was highest in the Other states group. CMNNDs were responsible for the vast majority of the DALYs proportion among children under 5, which reduced with increasing age up to the middle ages, followed by a modest increasing trend in the older age groups. For India as a whole, the proportion of DALYs due to NCDs was more than half of the total starting with the 30-34 year age group, increasing to 79% in the 65-69 year age group. The proportion of total DALYs due to injuries was highest in the 15-39 year age groups, ranging from 18% to 28%.

It is necessary to assess patterns of health loss across each state of India in order to inform health policy and interventions that address the specific situation of each state.



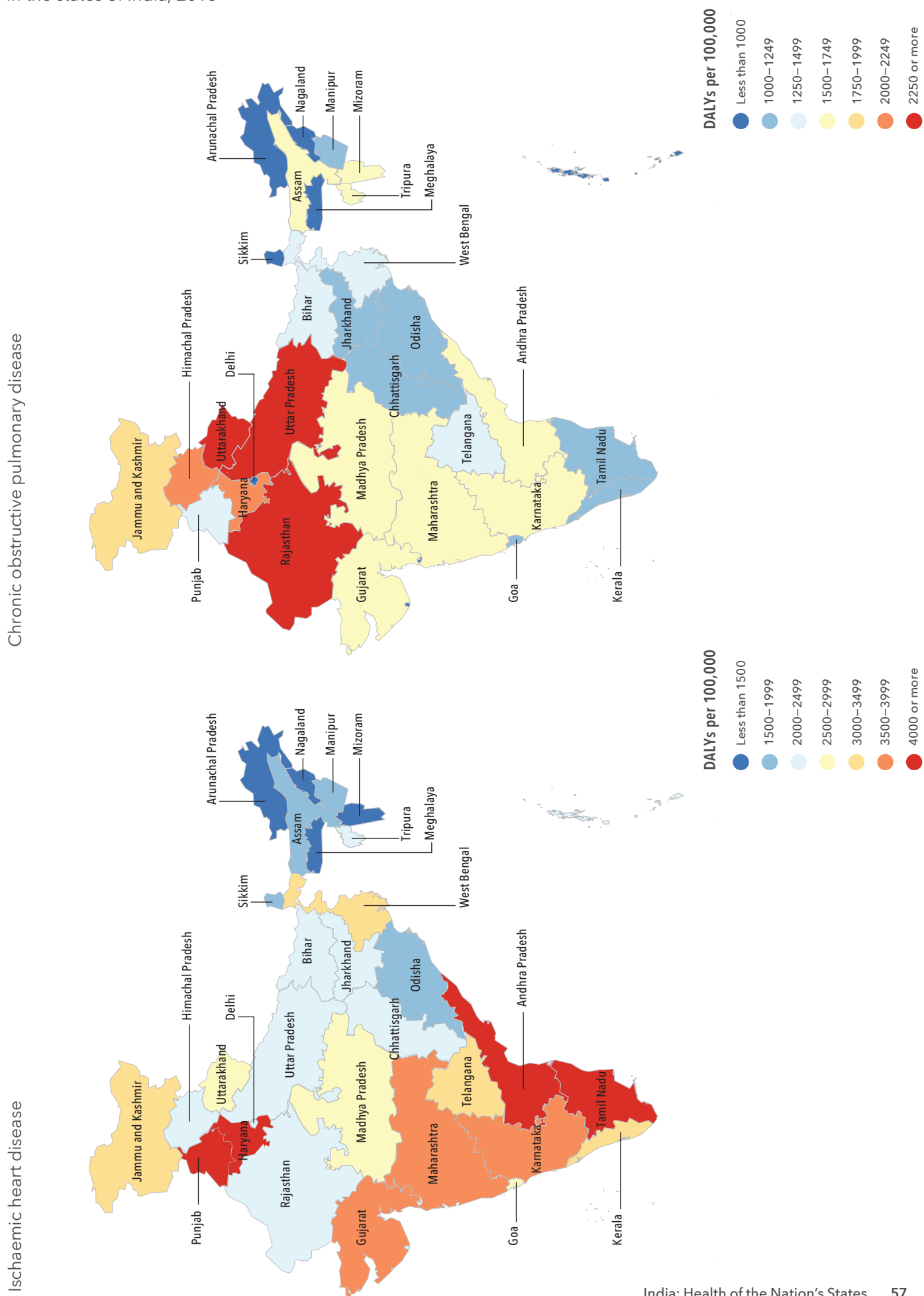
**Figure 15**

DALYs rate due to diarrhoeal diseases and lower respiratory infections in the states of India, 2016

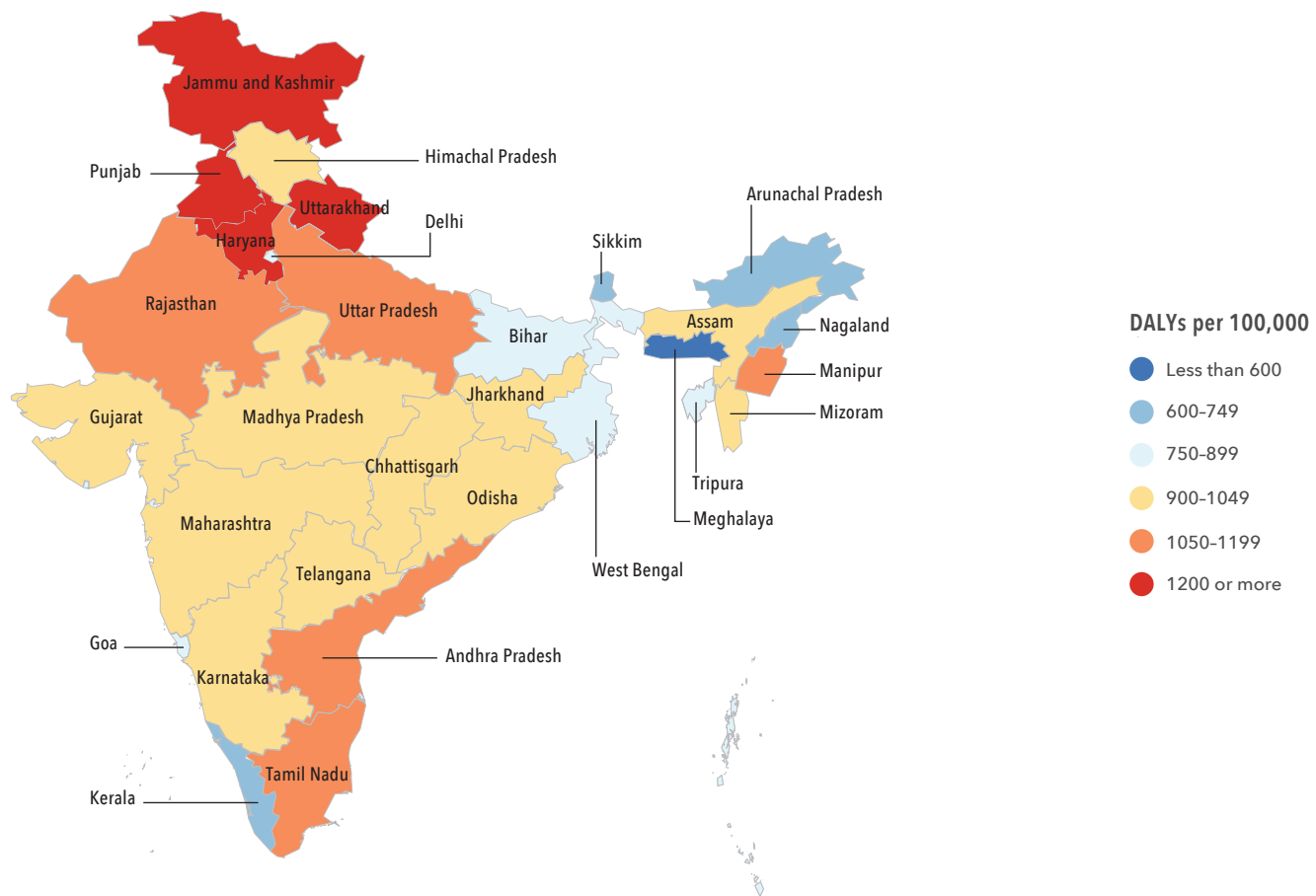


**Figure 16**

DALYs rate due to ischaemic heart disease and chronic obstructive pulmonary disease in the states of India, 2016



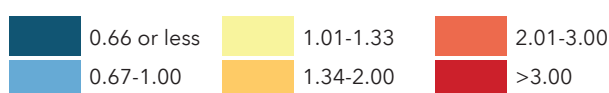
**Figure 17**  
DALYs rate due to road injuries in the states of India, 2016



**Figure 18**

Ratio of observed to expected DALYs rate for the leading individual causes in the states of India, 2016

	<i>Ischaemic heart disease</i>	<i>Chronic obstructive pulmonary disease</i>	<i>Diarrhoeal diseases</i>	<i>Lower respiratory infections</i>	<i>Stroke</i>	<i>Iron-deficiency anemia</i>	<i>Preterm birth complications</i>	<i>Tuberculosis</i>	<i>Sense organ diseases</i>	<i>Road injuries</i>	<i>Self-harm<sup>†</sup></i>	<i>Low back &amp; neck pain</i>	<i>Diabetes</i>	<i>Other neonatal</i>
<b>India</b>	<b>1.22</b>	<b>2.28</b>	<b>2.47</b>	<b>0.90</b>	<b>0.74</b>	<b>3.00</b>	<b>0.87</b>	<b>3.61</b>	<b>1.30</b>	<b>0.69</b>	<b>1.78</b>	<b>0.83</b>	<b>0.95</b>	<b>2.41</b>
Bihar	1.12	1.87	0.91	0.49	0.60	2.19	0.51	0.91	1.26	0.49	0.83	0.89	0.81	1.67
Chhattisgarh	0.96	1.61	2.41	0.94	1.26	2.59	1.04	3.52	1.39	0.61	2.08	0.86	0.93	3.14
Jharkhand	0.98	1.49	2.56	0.59	0.54	2.75	0.63	2.56	1.19	0.66	1.00	0.83	0.76	1.86
Madhya Pradesh	1.21	2.09	1.44	0.81	0.76	2.54	0.89	2.61	1.27	0.65	1.93	0.87	0.89	2.90
Odisha	0.73	1.55	2.75	0.68	1.33	2.53	0.59	3.15	1.39	0.60	1.61	0.94	0.87	2.03
Rajasthan	0.99	3.35	1.17	1.05	0.45	2.66	0.92	2.82	1.25	0.76	1.32	0.75	0.53	2.77
Uttar Pradesh	0.99	3.11	1.54	0.74	0.43	2.32	0.75	3.43	1.24	0.75	1.72	0.84	0.79	2.44
Uttarakhand	1.04	3.37	3.00	1.77	0.49	3.19	1.04	6.82	1.25	1.10	1.22	0.75	0.99	2.81
Meghalaya	0.38	1.03	2.02	0.88	0.47	2.96	0.70	4.03	0.97	0.40	0.87	0.68	0.56	1.41
Assam	0.67	2.19	2.54	0.98	1.32	3.19	0.99	3.96	1.18	0.61	1.78	0.73	0.94	2.71
Arunachal Pradesh	0.38	1.06	1.92	0.74	0.44	2.21	0.76	2.98	0.96	0.49	1.64	0.69	0.63	1.79
Mizoram	0.25	2.25	2.33	1.09	0.28	2.04	0.86	3.09	1.11	0.66	0.63	0.72	0.63	2.65
Nagaland	0.43	0.92	1.83	1.14	0.62	1.89	0.82	4.90	0.96	0.56	0.46	0.61	0.56	1.35
Tripura	0.94	2.24	1.94	1.01	1.34	2.78	0.98	1.60	1.28	0.55	3.16	0.85	0.88	1.77
Sikkim	0.58	1.33	1.53	1.28	0.30	2.87	0.83	3.11	1.02	0.52	1.19	0.67	0.68	2.11
Manipur	0.61	1.39	2.76	0.83	0.90	1.27	0.69	4.12	1.20	0.80	1.28	0.78	1.15	1.23
Gujarat	1.45	2.32	2.05	0.93	0.50	3.44	1.18	6.11	1.25	0.66	1.68	0.81	0.89	2.61
Haryana	1.57	2.97	3.67	1.33	0.50	4.43	1.02	7.09	1.19	1.13	1.44	0.72	1.04	3.72
Delhi	0.85	1.45	3.71	1.47	0.37	5.19	1.78	13.09	1.03	0.79	0.62	0.51	1.26	6.55
Telangana	1.27	1.97	2.81	0.56	0.63	2.88	0.95	2.35	1.35	0.66	2.17	0.86	0.89	1.08
Andhra Pradesh	1.61	2.13	1.94	0.56	0.72	3.14	0.84	1.96	1.35	0.73	2.51	0.91	1.01	1.05
Jammu and Kashmir	1.28	2.68	1.48	0.84	0.54	2.48	0.64	2.14	1.20	1.13	0.92	0.78	0.71	1.75
Karnataka	1.51	2.37	2.63	0.58	0.82	3.10	1.03	3.14	1.42	0.68	2.95	0.85	1.47	1.76
West Bengal	1.28	1.84	1.40	0.61	1.68	2.75	0.63	2.06	1.36	0.58	2.45	0.91	0.72	1.33
Maharashtra	1.34	2.35	3.40	1.02	0.84	3.89	1.19	5.46	1.34	0.72	1.64	0.78	1.01	2.19
UTs other than Delhi	0.82	1.22	2.28	0.85	0.40	4.35	1.24	6.60	1.11	0.73	1.50	0.66	1.06	1.49
Himachal Pradesh	0.90	3.13	2.89	0.93	0.41	3.01	0.83	4.77	1.38	0.72	1.11	0.79	0.66	2.14
Punjab	2.15	1.88	2.77	0.86	0.60	3.64	0.68	3.83	1.36	1.08	0.88	0.81	1.66	2.04
Goa	0.98	1.70	2.84	1.07	0.69	3.42	1.00	4.92	1.37	0.71	0.88	0.71	1.56	2.60
Tamil Nadu	1.78	1.76	2.89	0.70	0.58	4.00	0.76	4.41	1.49	0.85	2.62	0.85	2.05	0.80
Kerala	1.18	1.74	1.96	0.48	0.73	2.07	0.71	1.88	1.59	0.58	1.59	0.86	1.45	0.52



<sup>†</sup>Self-harm refers to suicide and the nonfatal outcomes of self-harm.

Among the leading CMNND individual causes, the DALY rate for diarrhoeal diseases was highest in Jharkhand, Odisha, and Bihar, followed by Uttar Pradesh and Assam in 2016. The DALY rate for lower respiratory infections was highest in Rajasthan, Bihar, Uttar Pradesh, Madhya Pradesh, and Assam, followed by Uttarakhand and Chhattisgarh. Bihar, Assam, and Jharkhand had the highest DALY rate for iron-deficiency anaemia, followed by Rajasthan, Madhya Pradesh, and Uttar Pradesh. The DALY rate for neonatal preterm birth complications was highest in Rajasthan, Chhattisgarh, Madhya Pradesh, and Assam. For tuberculosis the DALY rate was highest in Uttar Pradesh, followed by Assam, Gujarat, Rajasthan, Odisha, Chhattisgarh, Jharkhand, and Madhya Pradesh. The wide range of DALY rates for the leading CMNND causes across the states of India are highlighted by the finding that the range of DALY rates was nine-fold for diarrhoeal diseases, seven-fold for lower respiratory infections, and nine-fold for tuberculosis.

Another way in which policymakers can assess the relative success of a state or country in confronting the burden of a particular disease is by comparing its observed DALY rate with the DALY rate that would be expected on average for geographic units globally that are at a similar level of development. This can be done using the Socio-demographic Index (SDI) level as a measure of development, which is based on income level, educational attainment, and fertility level. Diarrhoeal diseases, iron-deficiency anaemia, tuberculosis, and other neonatal disorders had higher DALY rates in almost all states as compared with the average globally for their respective SDI levels. For India as a whole, the DALY rate for diarrhoeal diseases was 2.5 times, for iron-deficiency anaemia 3.0 times, for tuberculosis 3.5 times, and for other neonatal disorders 2.4 times higher than the average globally for its SDI level.

Among the leading NCD individual causes, the DALY rate for ischaemic heart disease was highest in Punjab and Tamil Nadu, followed by Haryana, Andhra Pradesh, Karnataka, Gujarat, and Maharashtra. For COPD, the highest DALY rates were in Rajasthan, Uttarakhand, and Uttar Pradesh, followed by Himachal Pradesh, Haryana, and Jammu and Kashmir. The DALY rate for stroke was highest in West Bengal, followed by Odisha, Tripura, Assam, and Chhattisgarh. Tamil Nadu had the highest DALY rate for diabetes, followed by Punjab, Karnataka, Kerala, Goa, and Manipur. The range of DALY rates across the states of India was nine-fold for ischaemic heart disease, four-fold for COPD, six-fold for stroke, and four-fold for diabetes. The DALY rate for COPD was higher in most states as compared with the average globally for their respective SDI levels, and it was 2.3 times higher in India than the average globally for its SDI level. Punjab stood out as having over two times the DALY rate for ischaemic heart disease than the average globally for its SDI level.

Among the leading injuries individual causes, the DALY rate for road injuries was highest in Jammu and Kashmir, Uttarakhand, Haryana, and Punjab, followed by Rajasthan and Uttar Pradesh. For self-harm, the highest DALY rates were in Tripura, Karnataka, and Tamil Nadu, followed by Andhra Pradesh, West Bengal and Telangana. The range of DALY rates across the states of India was three-fold for road injuries and six-fold for self-harm. The DALY rate for suicide in India as a whole was 1.8 times higher than the average globally for its SDI level.



These state-specific DALY rates highlight that there are some broad trends across the EAG, North-East, and Other states groupings, and across the various epidemiological transition level groupings. However, there are many variations within these groupings. This points to the utility of these groupings as an intermediate step in understanding broad disease trends in groups of states, but at the same time emphasises the need for titrating health policy and interventions to the specific disease burden situation in each state.

## Rate of occurrence of diseases

The net changes in disease burden over time are influenced by several factors, including (i) ageing of the population that can lead to higher numbers of persons with conditions that are more common in the older age groups, (ii) changes in exposure to risk factors that could influence the rate of occurrence of diseases or injuries, and (iii) improvements in development and health care that could reduce the likelihood of premature mortality or disability once a disease or injury has occurred. It is therefore useful to compare the changes in the rate of occurrence of diseases or injuries on the one hand, and the changes in the final disease burden caused by them over time. This is particularly useful in understanding the increasing overall disease burden due to NCDs and injuries.

**Table 6**

Comparison of the percent change in prevalence of leading NCDs and incidence rate of leading injuries with the percent change in their DALYs rate in India from 1990 to 2016

Non-communicable diseases	Percent change from 1990 to 2016			
	Prevalence	DALY rate	Age-standardised prevalence	Age-standardised DALY rate
Ischaemic heart disease	53	33.9	9.4	2.2
COPD	29.2	-10.5	-5	-35.9
Cerebrovascular disease	53.9	0.4	12.2	-25.7
Sense organ diseases	21.2	21.7	-0.9	-4.4
Low back & neck pain	9.3	9	-11.2	-11.6
Diabetes	64.3	80	29.3	39.6
Migraine	8.5	11	-2.7	-0.7
Skin diseases	4.9	1.7	4.5	5.3
Congenital defects	-13.6	-48.1	-8.1	-20.3
Other musculoskeletal	17.8	18	-2	-1.3
Chronic kidney disease	26.1	12.2	-4.3	-8.3
Depressive disorders	11.1	8.4	-6.2	-7.9
Asthma	8.6	-44.3	-3.8	-53.6
Anxiety disorders	6.4	6.2	-4	-3.6
Rheumatic heart disease	-1.1	-32.7	-10.8	-39.8
Injuries	Percent change from 1990 to 2016			
	Incidence rate	DALY rate	Age-standardised incidence rate	Age-standardised DALY rate
Road injuries	55.8	8.3	43.4	3.9
Self-harm	4.8	-14.8	-3.2	-19.5
Falls	6.3	-7.2	-0.4	-12.6
Drowning	-27.3	-58	-20.4	-48.2

The prevalence of most leading NCDs increased in India from 1990 to 2016, but the age-standardised prevalence remained similar for many NCDs and increased for diabetes, cerebrovascular disease, ischaemic heart disease, and skin diseases. This indicates that the overall increase in NCD prevalence in India is a mixed phenomenon, with ageing of the population causing an increase in many NCDs, along with an additional increase due to exposure to risk factors for the causes that have an age-standardised increase in prevalence. The percent increase in prevalence was more than or similar to the percent change in the DALY rates for most of the leading NCDs, indicating that while the prevalence has been increasing on the one hand, the improvements in health interventions have countered the increase in disease burden to some degree. However, progress in the control of NCDs needs a much bigger and more organised effort in order to achieve stronger declining trends in the DALY rates of most NCDs.

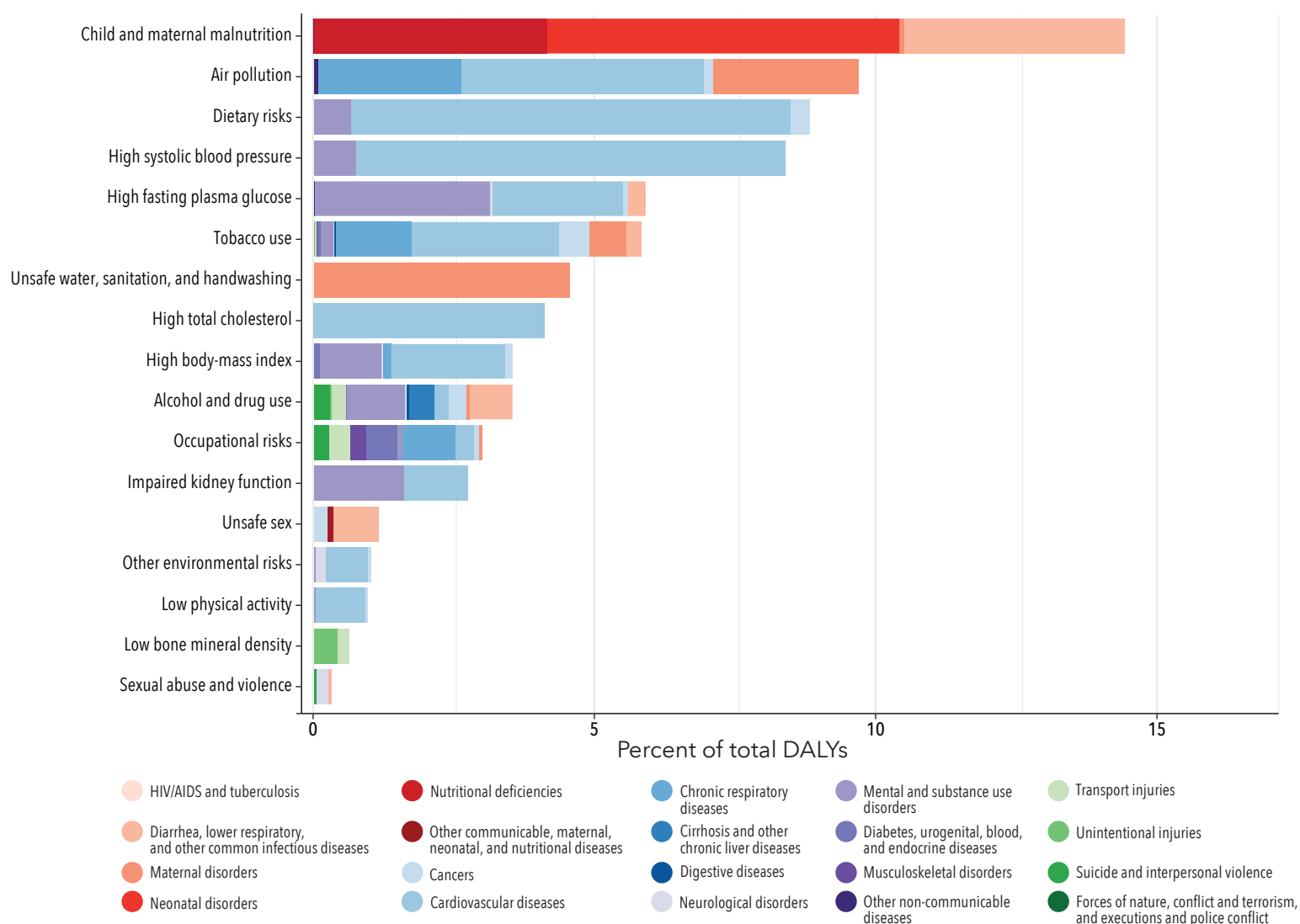
Among the leading causes of injuries, the percent increase in the incidence rate of road injuries from 1990 to 2016 was quite high even after adjusting for the changes in the population age structure during this period. However, the increase the DALY rate for road injuries was quite modest. There was a slight increase in the prevalence of suicide and falls, but a decrease in the DALY rate. This again indicates the impact of improving health interventions.

## Risk factors causing disease burden

Risk factors are the drivers of diseases and injuries that cause premature death and disability. If the relevant risk factors are addressed successfully, much of India's disease burden could be reduced.

**Figure 19**

Percent DALYs attributable to risk factors in India, 2016



Child and maternal malnutrition was India's leading risk factor for health loss in 2016, causing 14.6% of the country's total DALYs. This is due largely to the contribution that malnutrition makes to the high-burden conditions such as neonatal disorders and nutritional deficiencies as well as diarrhoea, lower respiratory infections, and other common infections.

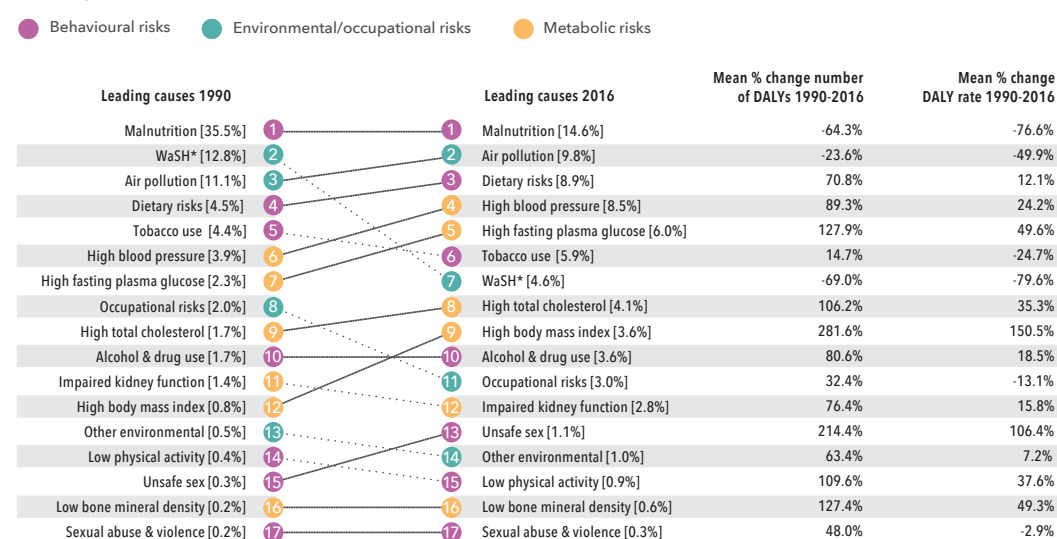
Air pollution was the second leading risk factor in India as a whole. This risk factor encompasses both outdoor air pollution from a variety of sources as well as household air pollution that mainly results from burning solid fuels in the home for cooking and heat. Outdoor air pollution caused 6.4% of India's total DALYs in 2016, while household air pollution caused 4.8%. Combined, they make a substantial contribution to India's burden of cardiovascular diseases, chronic respiratory diseases, and lower respiratory infections.

The behavioural and metabolic risk factors associated with the rising burden of NCDs have become quite prominent in India. Dietary risks, which include diets low in fruit, vegetables, and whole grains, but high in salt and fat, were India's third leading risk factor, followed closely by high blood pressure and high blood sugar (high fasting plasma glucose). These risks drive health loss mainly from cardiovascular disease and diabetes, and also from cancer in the case of dietary risks. Despite the increasing global awareness of the health risks it poses, tobacco use, including smoking, secondhand smoke, and smokeless tobacco, remains a major risk factor in India and caused 5.9% of the total DALYs in 2016.

Unsafe water, sanitation, and handwashing was the second leading risk factor in 1990, but its ranking dropped to seventh in 2016. However, it is even now responsible for 4.6% of the disease burden through diarrhoeal diseases and other infections.

In line with India's epidemiological transition, the composition of risk factors that drives its disease burden has also changed over time. This is a process linked to socioeconomic development. While the burden of poor health attributable to risks such as malnutrition and unsafe water, sanitation, and handwashing has fallen since 1990, it still remains quite high. At the same time, the burden caused by risks such as unhealthy diets, high blood pressure, high blood sugar, high cholesterol, and high body mass index is on the rise.

**Figure 20**  
Change in DALYs number and rate attributable to risk factors in India from 1990 to 2016



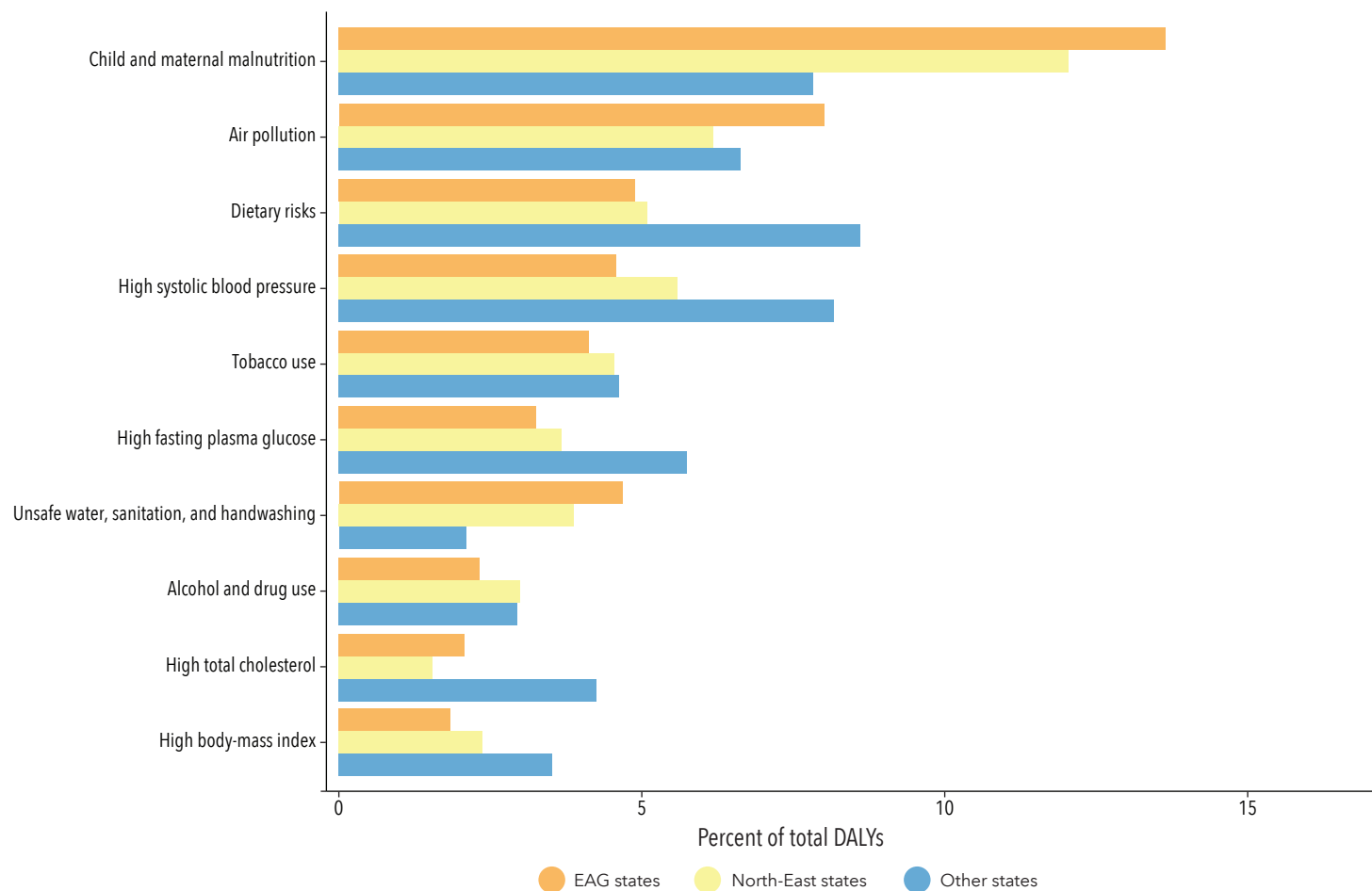
The percent figure in bracket next to each risk factor is DALYs attributable to that risk factor out of the total DALYs.  
\*WaSH is unsafe water, sanitation, and handwashing.

The large increases in DALYs caused by metabolic risks such as high blood pressure, high blood sugar, and high body mass index, alongside behavioural ones such as dietary risks, warrant serious attention from policymakers. These trends indicate that strong strategies will need to be implemented to curb their trajectory, in order to prevent and control NCDs in India. Tackling environmental risk factors, such as outdoor air pollution, will also be an important part of this effort. While the total burden from air pollution in India declined between 1990 and 2016, this was largely driven by efforts to reduce the use of solid fuels in households. Outdoor air pollution continues to pose a significant and growing challenge to population health.

Given that India's states differ widely in both their level of development and disease burden, it follows that the profile of health risks their populations face would also be very different. In order to more effectively reduce the disease burden in India, it is necessary to understand the variations in health risk factors across the states of India and also how these differ between the two sexes.

**Figure 21**

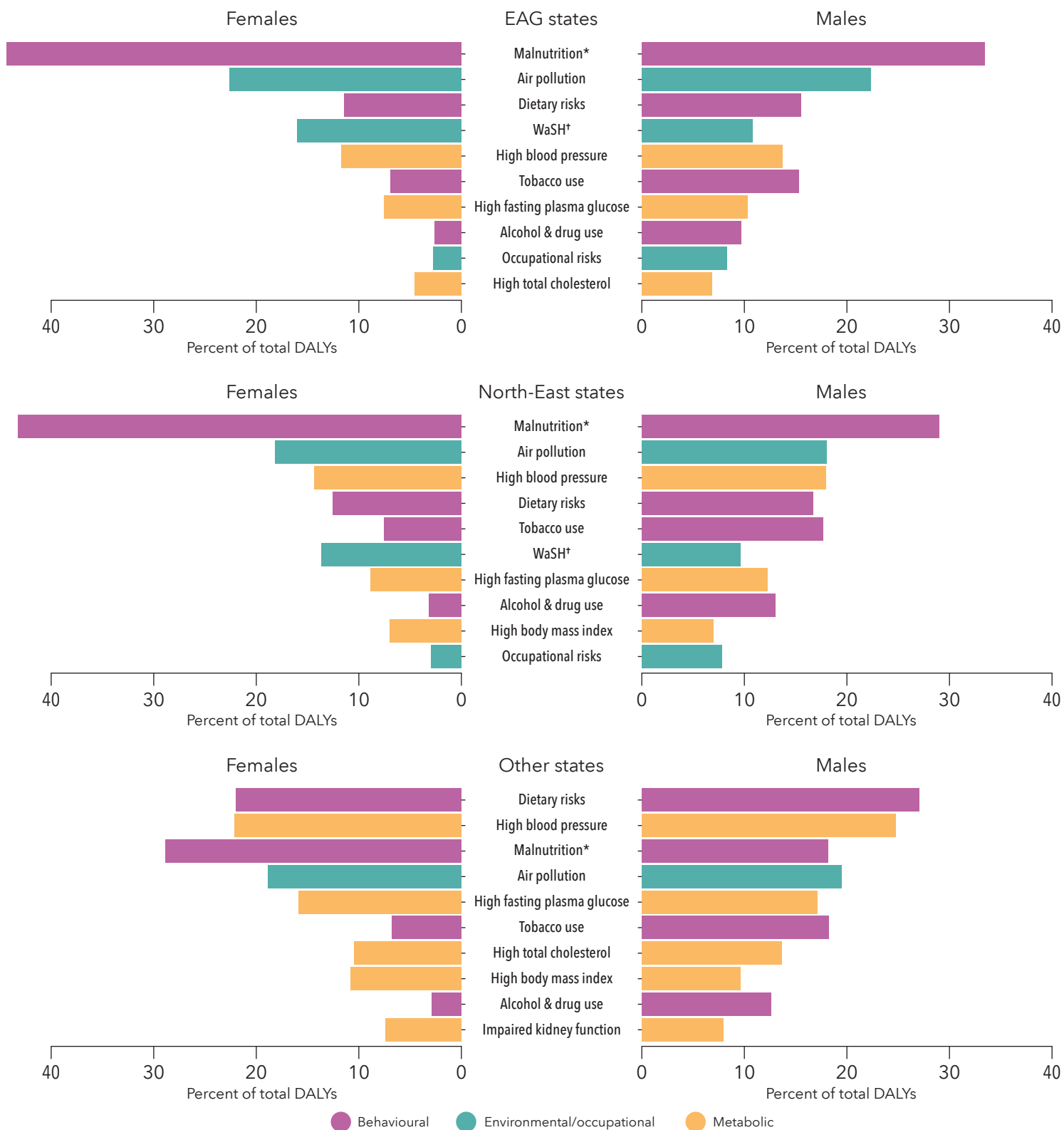
Percent DALYs attributable to risk factors in the state groups, 2016



Considering broad state groupings, the proportion of total DALYs due to child and maternal malnutrition was much higher in the EAG and North-East states groups than in the Other states group in 2016. The proportion for air pollution was also higher in the EAG states group. On the other hand, the proportion of total DALYs due to dietary risks, high systolic blood pressure, high fasting plasma glucose, high cholesterol, and high body mass index was highest in the Other states group in 2016.

**Figure 22**

Percent DALYs attributable to leading risk factors by sex in the state groups, 2016



\*Malnutrition is child and maternal malnutrition.  
 †WaSH is unsafe water, sanitation, and handwashing.

While child and maternal malnutrition was the leading risk factor in the EAG and North-East states groups in 2016, it was third in the Other states group, overtaken by dietary risks and high blood pressure. Unsafe sanitation remained the fourth leading risk in the EAG and sixth in the North-East, but did not feature in the top 10 risks for Other states. Though malnutrition is a serious risk for both sexes, it was a much bigger contributor to health loss for females than for males across all three state groups. Similarly, unsafe water, sanitation, and handwashing, another risk factor associated with lower levels of socioeconomic development, was a much more significant risk for females. India has had a long history of efforts to reduce malnutrition and improve sanitation, and these findings bolster the case for further strengthening programmes that provide focused nutritional support and safe sanitation to women and children, particularly girls.

Conversely, dietary risks, high blood pressure, high blood sugar, high cholesterol, and high body mass index all ranked higher and caused considerably more health loss in the Other states group than in the EAG and North-East states groups. Males tend to face a relatively higher burden from risk factors associated with NCDs, with a greater proportion of their health loss caused by dietary risks and high blood pressure, blood sugar, and cholesterol as compared with females. Alcohol and drug use and tobacco use were also much larger contributors to disease burden among males, suggesting a need for more targeted preventive measures for these risks. These trends can be seen across all three state groups.



**Table 7**

Change in summary exposure value of the leading individual risk factors in the state groups from 1990 to 2016

Risk factor	Percent contribution to DALYs in India, 2016	Summary exposure value 2016				Percent change from 1990 to 2016			
		EAG states group	North-East states group	Other states group	India	EAG states group	North-East states group	Other states group	India
Short gestation for birth weight	6.5	11.6	11.5	12.2	11.9	2.3	3.4	2.8	2.5
Low birth weight for gestation	3.4	8.7	8.7	8.3	8.5	-0.6	-0.7	-1.8	-1.1
Child wasting	3.3	8.5	8.4	9.7	9.1	-31.8	-28.9	-22.9	-27.3
Iron deficiency	3.6	14.8	14.8	13.8	14.3	1.6	-1.1	0.9	1.3
Unsafe water source	3.3	38.2	26.2	26.9	32	-11.2	-20.8	-23.9	-16.9
Unsafe sanitation	2.5	59.9	47.2	36	47.3	-32.1	-40.7	-55.1	-43.5
Ambient particulate matter pollution	6.4	78	54.4	60.5	68.2	14.7	21.6	16.7	16.6
Household air pollution from solid fuels	4.8	38.4	28.2	17.9	27.6	-40.1	-52.9	-66	-52.2
High systolic blood pressure	8.5	22.2	24.3	24.2	23.3	0.6	3.5	7.7	4.3
High fasting plasma glucose	6	2.8	2.7	4.1	3.5	46.3	19.9	36.8	37.4
High total cholesterol	4.1	9.8	8.7	13.3	11.5	11	16.6	19	14.8
High body mass index	3.6	3.7	5.2	5.7	4.8	87.3	105.9	148.2	119.8
Impaired kidney function	2.8	4.8	4.8	5.3	5	4.8	5.1	4.1	4.1
Diet low in fruits	2.8	74.4	71.7	71.9	73	-16.4	-19.1	-16.2	-16.4
Diet low in nuts and seeds	2.3	88.2	88.9	64.7	76.4	-3.9	-3.1	-22	-12.2
Smoking	4.5	9.1	11.4	8.8	9	-20.8	-19.9	-24.8	-22.9
Alcohol use	2.9	3.1	3.6	4	3.6	71.6	86.5	84.5	76.7

This list includes the individual risk factors that contributed more than 2% of DALYs in India, 2016

It is useful to understand the changes in people's exposure to health risk factors that have taken place over time in different parts of the country in order to set priorities for interventions and tailor appropriate policy responses. Summary exposure value is a measure that estimates exposure to a particular risk, taking into account both the severity of exposure and the size of the population that is exposed to it. Instead of classifying exposure to a risk as either present or not present, summary exposure value allows for the estimation of continuous risk exposure, or exposure that happens at different times and in different amounts. This is important because in reality people are exposed to many risk factors intermittently or continuously, rather than all at once or not at all. The summary exposure value metric also takes into account the severity of exposure to a risk factor, since some risk factors are more likely to lead to health problems than others.

Among the leading components of child and maternal malnutrition, the summary exposure value for child wasting reduced from 1990 to 2016 in India by 27%. On the other hand, the summary exposure values for short gestation, low birth weight, and iron deficiency did not change much during this period in any of the three states groups. The summary exposure value of unsafe sanitation reduced from 1990 to 2016 in India by 44% and that of unsafe water by 17%. This reduction was least in the EAG states group where the magnitude of exposure to these risks continued to be the highest.




Looking at the two different types of air pollution, there were divergent trends in the summary exposure value. Exposure to household air pollution from solid fuels has dropped by 52% in India since 1990. This decrease was lowest in the EAG states group and intermediate in the North-East states group, and the magnitude of this exposure also remained highest in the EAG states groups and intermediate in the North-East states group in 2016. On the other hand, the summary exposure value of outdoor air pollution increased by 17% in India from 1990 to 2016. The magnitude of this exposure was higher in the EAG states group as compared with the North-East and Other states groups.

The summary exposure value for high body mass index increased by 120%, for high blood sugar increased by 37%, and for cholesterol by 15% for India as a whole from 1990 to 2016. These increases were observed in all three state groups. The exposure level of high blood pressure was relatively higher than these risks in 2016, but the change in its level since 1990 was modest. The exposure level of smoking decreased during this period in all three state groups, but that of alcohol use increased across all three state groups.

It is important to understand the scale of health loss attributable to individual risk factors across states. Looking at the rate of DALYs caused by each risk factor for each state gives a better sense of exactly how much health loss each causes.

**Figure 23**  
DALYs rate attributable to risk factors in the states of India, 2016

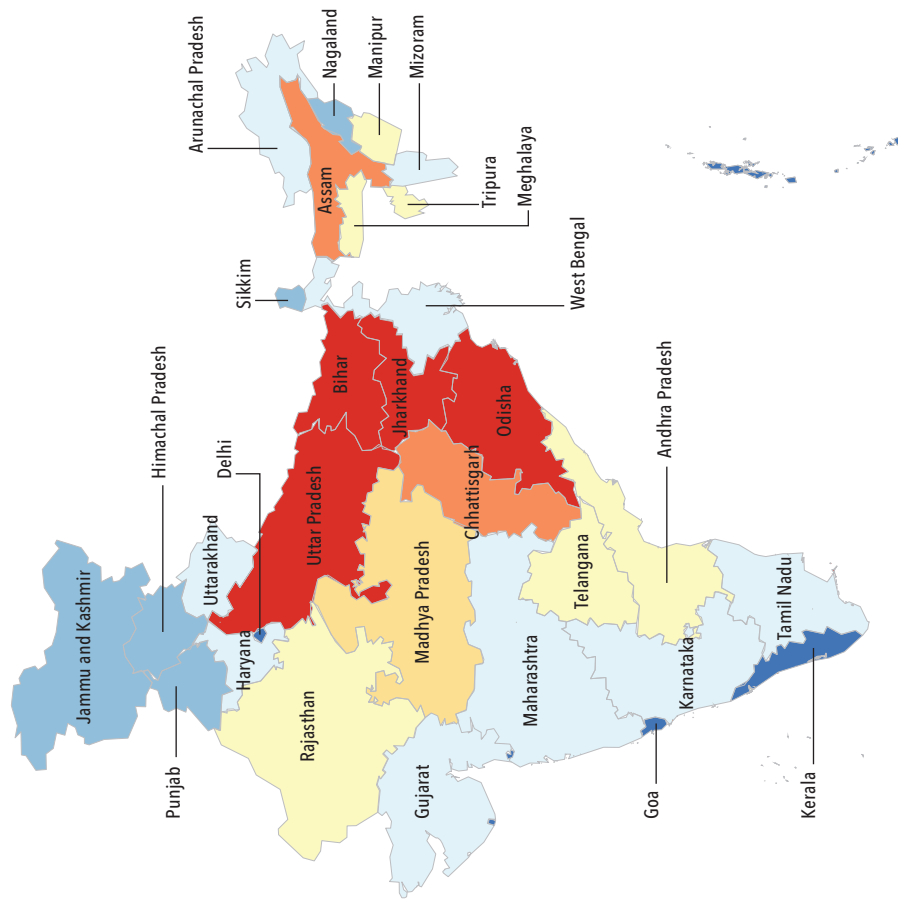
	<i>Child and maternal malnutrition</i>	<i>Air pollution</i>	<i>Dietary risks</i>	<i>High systolic blood pressure</i>	<i>High fasting plasma glucose</i>	<i>Tobacco use</i>	<i>Unsafe water, sanitation, and handwashing</i>	<i>High total cholesterol</i>	<i>High body mass index</i>	<i>Alcohol and drug use</i>	<i>Occupational risks</i>	<i>Impaired kidney function</i>	<i>Unsafe sex</i>	<i>Other environmental risks</i>	<i>Low physical activity</i>	<i>Low bone mineral density</i>	<i>Sexual abuse and violence</i>
<b>India</b>	<b>5169</b>	<b>3469</b>	<b>3159</b>	<b>3000</b>	<b>2112</b>	<b>2081</b>	<b>1626</b>	<b>1464</b>	<b>1262</b>	<b>1260</b>	<b>1069</b>	<b>978</b>	<b>403</b>	<b>358</b>	<b>336</b>	<b>217</b>	<b>105</b>
<b>EAG States</b>	<b>6978</b>	<b>4099</b>	<b>2498</b>	<b>2338</b>	<b>1662</b>	<b>2108</b>	<b>2389</b>	<b>1061</b>	<b>940</b>	<b>1192</b>	<b>1062</b>	<b>754</b>	<b>363</b>	<b>346</b>	<b>256</b>	<b>201</b>	<b>96</b>
<b>Lowest ETL group</b>	<b>7344</b>	<b>4337</b>	<b>2702</b>	<b>2563</b>	<b>1808</b>	<b>2206</b>	<b>2617</b>	<b>1121</b>	<b>1022</b>	<b>1302</b>	<b>1136</b>	<b>844</b>	<b>405</b>	<b>374</b>	<b>272</b>	<b>222</b>	<b>107</b>
Bihar	8045	4308	2580	2362	1407	1780	2928	1006	564	862	982	737	439	367	241	161	102
Chhattisgarh	6364	3667	3054	3085	2093	1735	2224	1154	1224	988	957	439	384	280	210	103	
Jharkhand	6005	3117	2407	2405	1564	1023	3332	804	835	902	927	772	440	314	230	171	98
Madhya Pradesh	6663	3809	2899	2760	2150	2214	1879	1375	956	1285	1041	810	413	351	372	200	100
Odisha	4960	3201	2720	2979	2018	1565	2904	821	1234	1472	965	1188	562	383	249	276	150
Rajasthan	7331	4528	2292	2052	1289	2317	1570	1309	969	1186	1128	622	312	253	217	168	79
Uttar Pradesh	7195	4390	2273	2013	1613	2445	2421	935	1005	1303	1136	663	256	358	230	217	85
<b>Lower-middle ETL group</b>	<b>4818</b>	<b>3300</b>	<b>2622</b>	<b>2680</b>	<b>1958</b>	<b>3141</b>	<b>970</b>	<b>1381</b>	<b>1691</b>	<b>1302</b>	<b>1140</b>	<b>831</b>	<b>432</b>	<b>314</b>	<b>405</b>	<b>253</b>	<b>94</b>
Uttarakhand	4818	3300	2622	2680	1958	3141	970	1381	1691	1302	1140	831	432	314	405	253	94
<b>North-East states</b>	<b>5946</b>	<b>3052</b>	<b>2509</b>	<b>2762</b>	<b>1814</b>	<b>2242</b>	<b>1914</b>	<b>762</b>	<b>1172</b>	<b>1471</b>	<b>958</b>	<b>923</b>	<b>396</b>	<b>309</b>	<b>193</b>	<b>136</b>	<b>100</b>
<b>Lowest ETL group</b>	<b>6749</b>	<b>3329</b>	<b>2634</b>	<b>2903</b>	<b>1849</b>	<b>2258</b>	<b>2205</b>	<b>737</b>	<b>1328</b>	<b>1537</b>	<b>978</b>	<b>951</b>	<b>345</b>	<b>326</b>	<b>190</b>	<b>136</b>	<b>102</b>
Meghalaya	4720	1798	1416	1431	1064	1878	1294	466	490	1331	726	593	197	194	112	101	71
Assam	6928	3464	2741	3032	1918	2292	2285	761	1402	1555	1000	983	358	338	196	139	104
<b>Lower-middle ETL group</b>	<b>3746</b>	<b>2293</b>	<b>2169</b>	<b>2374</b>	<b>1719</b>	<b>2198</b>	<b>1118</b>	<b>830</b>	<b>747</b>	<b>1291</b>	<b>905</b>	<b>843</b>	<b>535</b>	<b>261</b>	<b>202</b>	<b>136</b>	<b>94</b>
Arunachal Pradesh	4139	1436	1308	1394	1108	1375	1099	426	557	1097	721	565	531	179	111	125	120
Mizoram	3408	1585	1070	983	1030	3255	848	301	510	1200	891	575	575	166	125	169	87
Nagaland	2607	1408	1546	1893	1063	1129	510	663	504	1347	695	646	621	184	139	118	69
Tripura	5131	3598	3069	3363	2303	2746	1478	1157	849	1254	1092	1079	298	327	286	134	93
Sikkim	3703	1620	1473	1803	1232	1472	478	747	996	1095	847	634	220	200	157	160	68
Manipur	2494	1822	2264	2369	1993	2316	1287	876	905	1469	889	916	878	307	204	139	109
<b>Other states</b>	<b>3478</b>	<b>2933</b>	<b>3805</b>	<b>3615</b>	<b>2540</b>	<b>2043</b>	<b>917</b>	<b>1881</b>	<b>1558</b>	<b>1305</b>	<b>1084</b>	<b>1184</b>	<b>440</b>	<b>373</b>	<b>419</b>	<b>239</b>	<b>113</b>
<b>Lower-middle ETL group</b>	<b>5013</b>	<b>3102</b>	<b>3544</b>	<b>3090</b>	<b>1987</b>	<b>2108</b>	<b>879</b>	<b>1844</b>	<b>786</b>	<b>1364</b>	<b>1079</b>	<b>930</b>	<b>456</b>	<b>302</b>	<b>343</b>	<b>217</b>	<b>79</b>
Gujarat	5013	3102	3544	3090	1987	2108	879	1844	786	1364	1079	930	456	302	343	217	79
<b>Higher-middle ETL group</b>	<b>3556</b>	<b>3016</b>	<b>3697</b>	<b>3540</b>	<b>2247</b>	<b>2048</b>	<b>993</b>	<b>1753</b>	<b>1327</b>	<b>1312</b>	<b>1079</b>	<b>1142</b>	<b>472</b>	<b>361</b>	<b>376</b>	<b>220</b>	<b>116</b>
Haryana	4603	3928	3587	3298	2189	3032	981	2281	1701	1658	1166	1031	320	289	391	214	111
Delhi	3473	1890	2246	2118	2281	1619	370	1364	1532	1243	894	796	291	230	244	149	77
Telangana	3596	2710	3134	2747	1871	1578	1330	1598	1446	974	1064	894	627	372	322	255	124
Andhra Pradesh	4050	3007	3992	3655	2234	2085	1238	2044	1858	1146	1099	1049	546	401	572	259	140
Jammu and Kashmir	3296	3029	3162	3001	1634	3039	787	1551	1580	1003	1072	1070	209	258	300	185	66
Karnataka	3766	2871	3392	3692	2931	1946	1149	1885	849	1463	1167	1156	541	466	398	232	110
West Bengal	3445	3761	4311	4252	1945	2834	1010	1731	1054	1261	1097	1319	440	328	301	172	111
Maharashtra	3382	2816	3745	3387	2316	1570	835	1728	1474	1487	1052	1173	444	350	395	243	124
Union Territories other than Delhi	2760	1355	2196	2409	1991	1336	830	1181	1845	1374	833	983	378	207	230	233	98
<b>Highest ETL group</b>	<b>2375</b>	<b>2443</b>	<b>4260</b>	<b>4113</b>	<b>3657</b>	<b>1815</b>	<b>712</b>	<b>2177</b>	<b>2507</b>	<b>1192</b>	<b>1087</b>	<b>1440</b>	<b>366</b>	<b>451</b>	<b>578</b>	<b>304</b>	<b>120</b>
Himachal Pradesh	2614	2318	2251	2470	1321	1838	678	1255	967	1153	1126	793	380	249	242	256	68
Punjab	3016	3523	4920	5167	3370	1633	793	2232	2971	1228	1222	1482	415	325	545	242	85
Goa	1945	1482	2552	2938	2400	825	272	1432	1915	1306	937	994	375	226	318	254	88
Tamil Nadu	2676	2412	4815	4106	4336	1878	862	2396	2699	1278	1069	1557	369	592	654	354	159
Kerala	1212	1698	3060	3646	3015	1867	363	1896	2070	991	1016	1313	318	316	526	263	80

 Significantly lower than national mean  
 Indistinguishable from national mean  
 Significantly higher than national mean

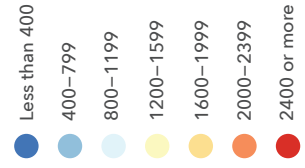
**Figure 24**

DALYs rate attributable to child and maternal malnutrition and attributable to unsafe water, sanitation, and handwashing in the states of India, 2016

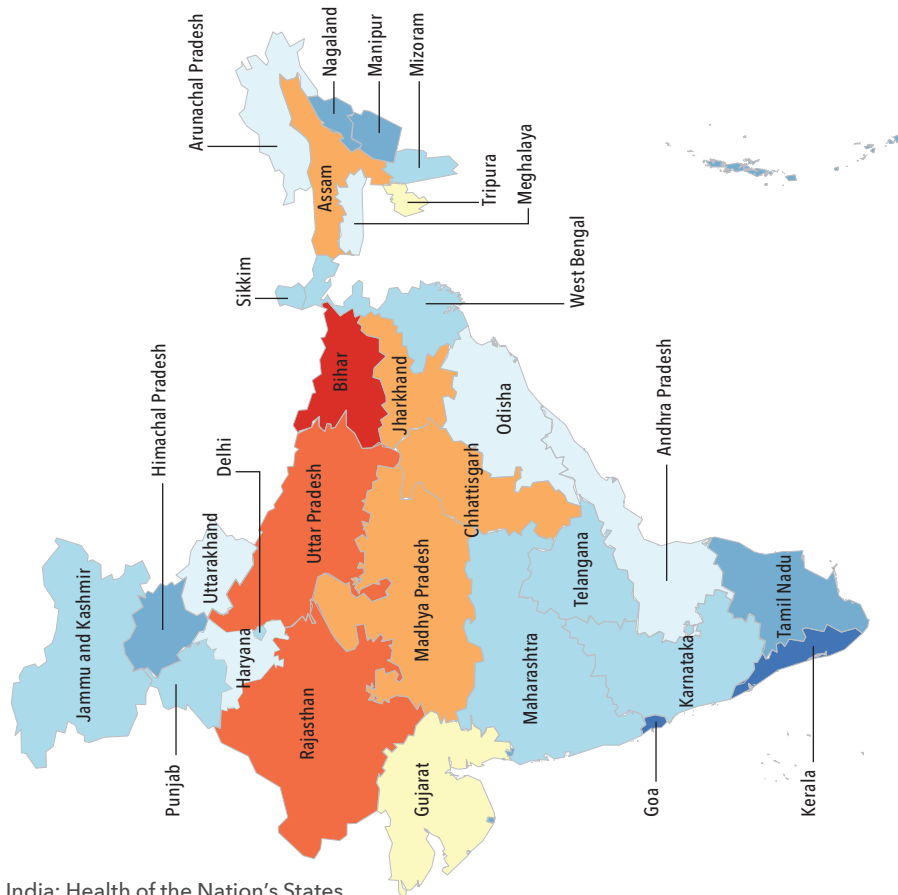
Unsafe water, sanitation, and handwashing



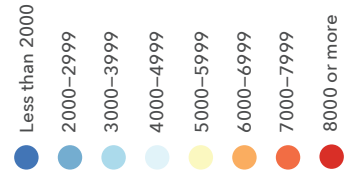
DALYs per 100,000



Child and maternal malnutrition

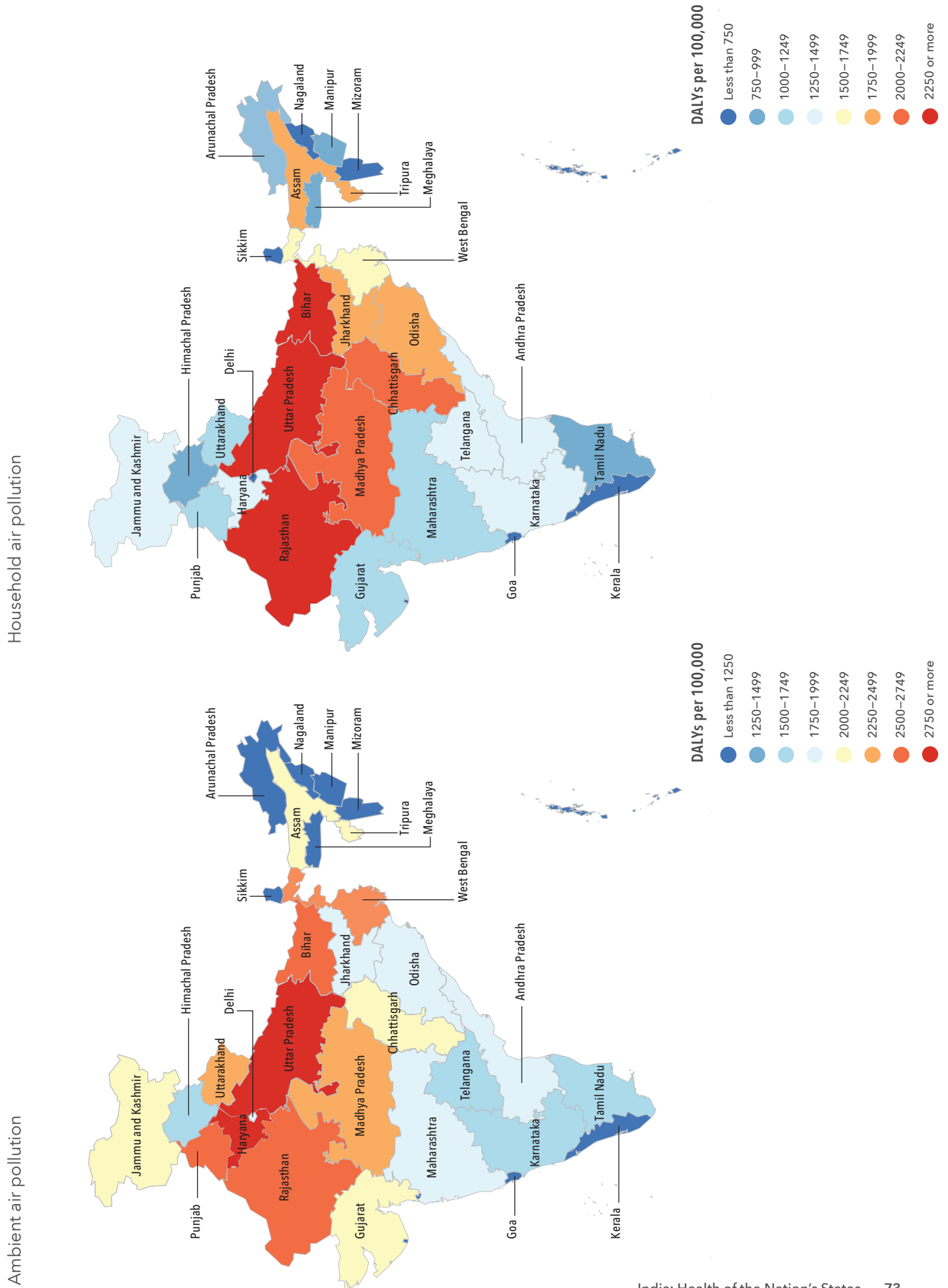


DALYs per 100,000



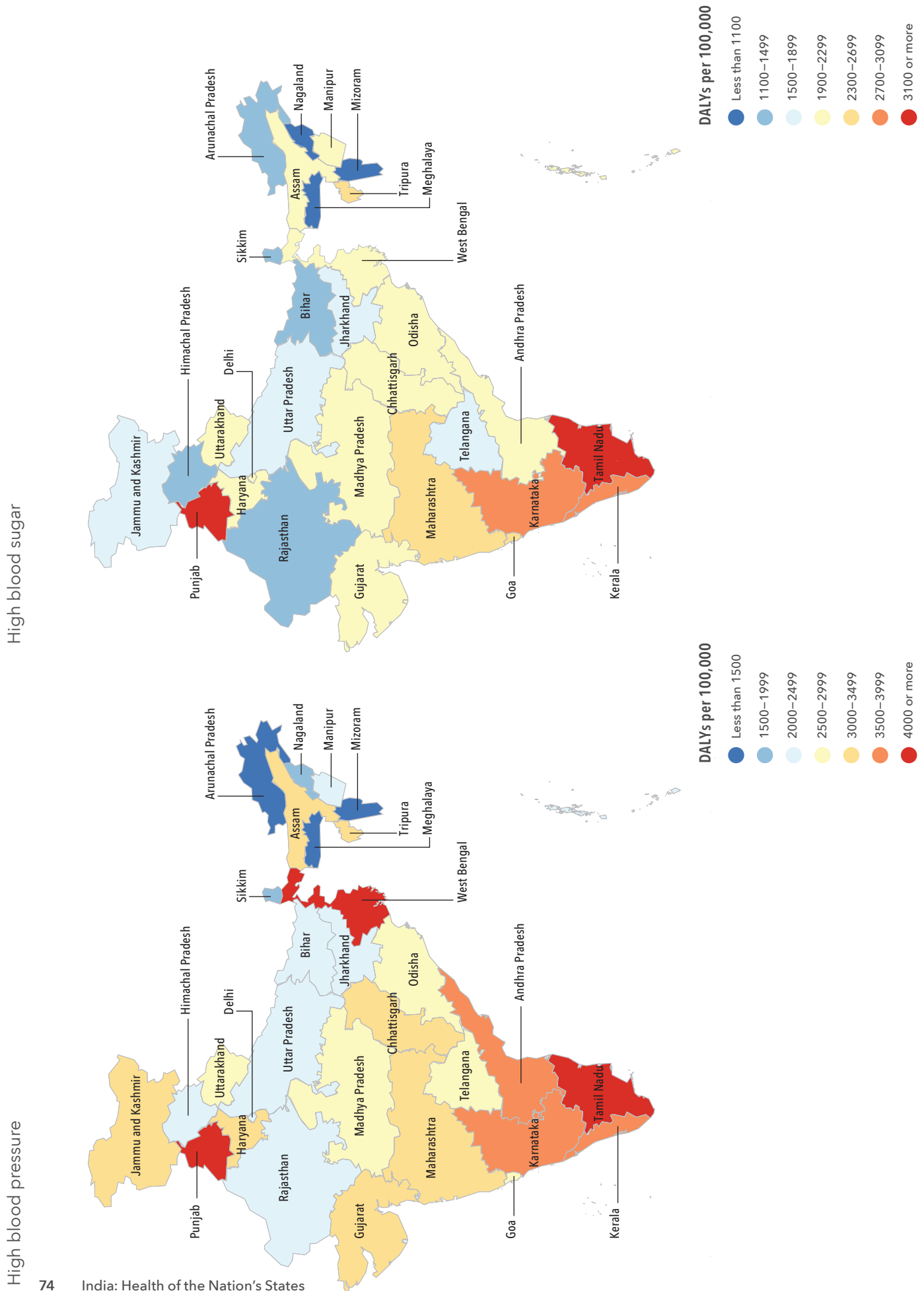
**Figure 25**

DALYs rate attributable to ambient air pollution and attributable to household air pollution in the states of India, 2016



**Figure 26**

DALYs rate attributable to high blood pressure and attributable to high blood sugar in the states of India, 2016



The DALY rates attributable to child and maternal malnutrition and to unsafe water and sanitation tended to be higher in the EAG states group and Assam. The rate for malnutrition was highest in Bihar, Rajasthan, and Uttar Pradesh, and for unsafe water and sanitation was highest in Jharkhand, Bihar, and Odisha in 2016.

For household air pollution, too, the DALY rate in 2016 was higher in the EAG states and Assam, with the highest rates in Rajasthan, Bihar, and Uttar Pradesh. The DALY rate pattern for outdoor air pollution was more mixed, with the highest rates in Haryana and Uttar Pradesh, followed by Punjab, Rajasthan, Bihar, and West Bengal.

Considering the DALY rates attributable to unhealthy diet, high blood pressure, high blood sugar, high cholesterol, and high body mass index in 2016, all of these were among the highest in Punjab and Tamil Nadu; four of these were high in Kerala, Andhra Pradesh, and Maharashtra; three of these were high in Karnataka and West Bengal; and two of these were high in Goa and Haryana. The DALY rate attributable to tobacco use was highest in Mizoram, Uttarakhand, Jammu and Kashmir, Haryana, West Bengal, and Tripura.





## Disease burden and risk factors profile of each state

The following key findings are illustrated for each state of India and the union territory of Delhi to inform policymakers of the most pressing disease burden and risk factors that need to be addressed to improve population health:

1. Life expectancy by sex in 1990 and 2016
2. Under-5 mortality rate from 1990 to 2016
3. Leading causes of death by age in 2016
4. Leading causes of years of life lost due to premature death by sex in 2016
5. Leading causes of years lived with disability by sex in 2016
6. Changes in leading individual causes of DALYs from 1990 to 2016
7. Age-distribution of DALYs in 2016
8. Changes in risk factors contributing to DALYs from 1990 to 2016
9. Leading risk factors contributing to DALYs by sex in 2016



# Andhra Pradesh

## 1990 life expectancy

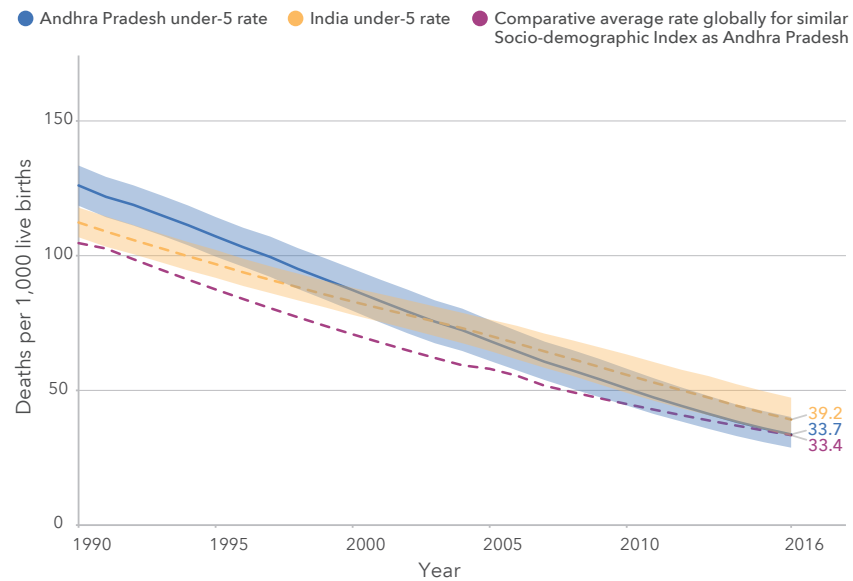
Females: 58.4 years Males: 57.7 years

## 2016 life expectancy

Females: 71.9 years Males: 67.3 years

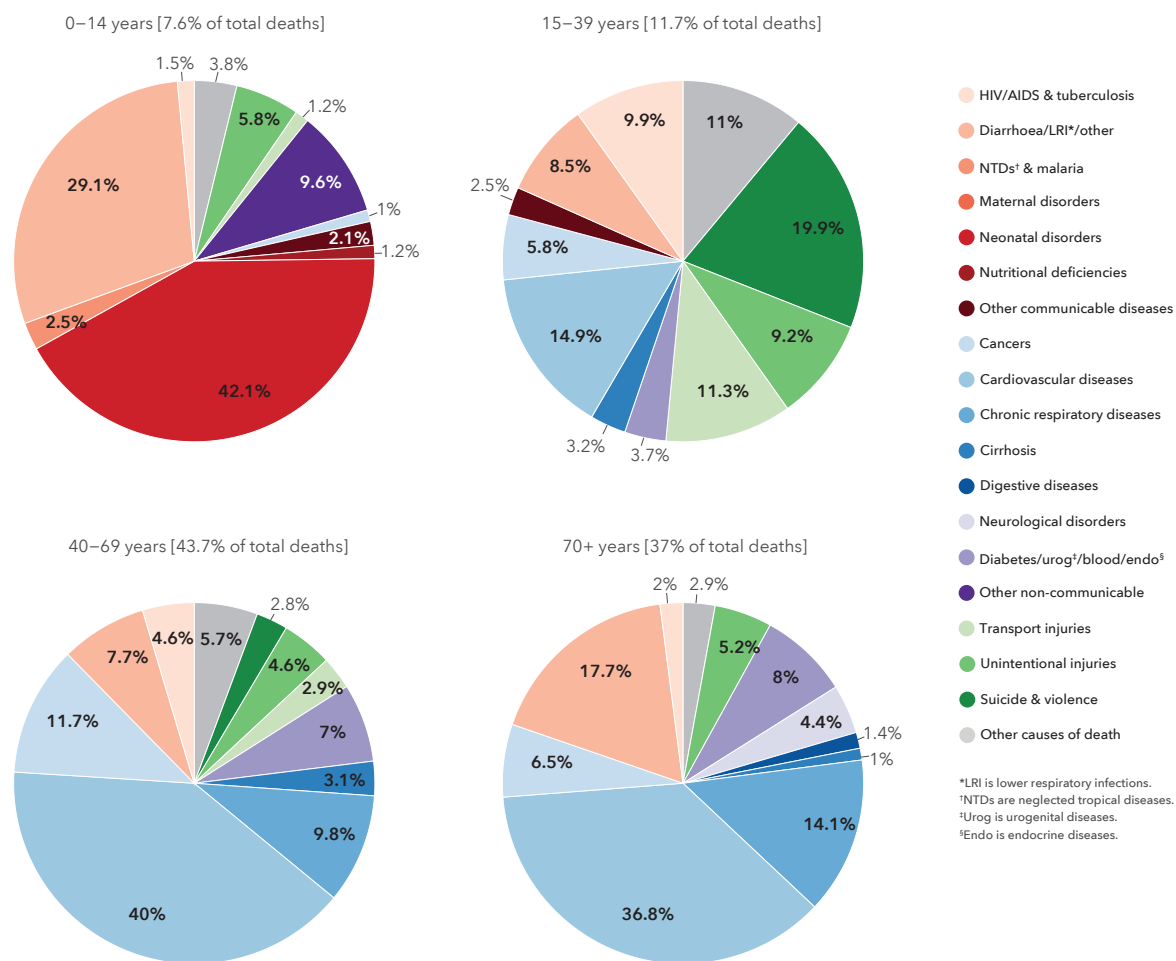
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

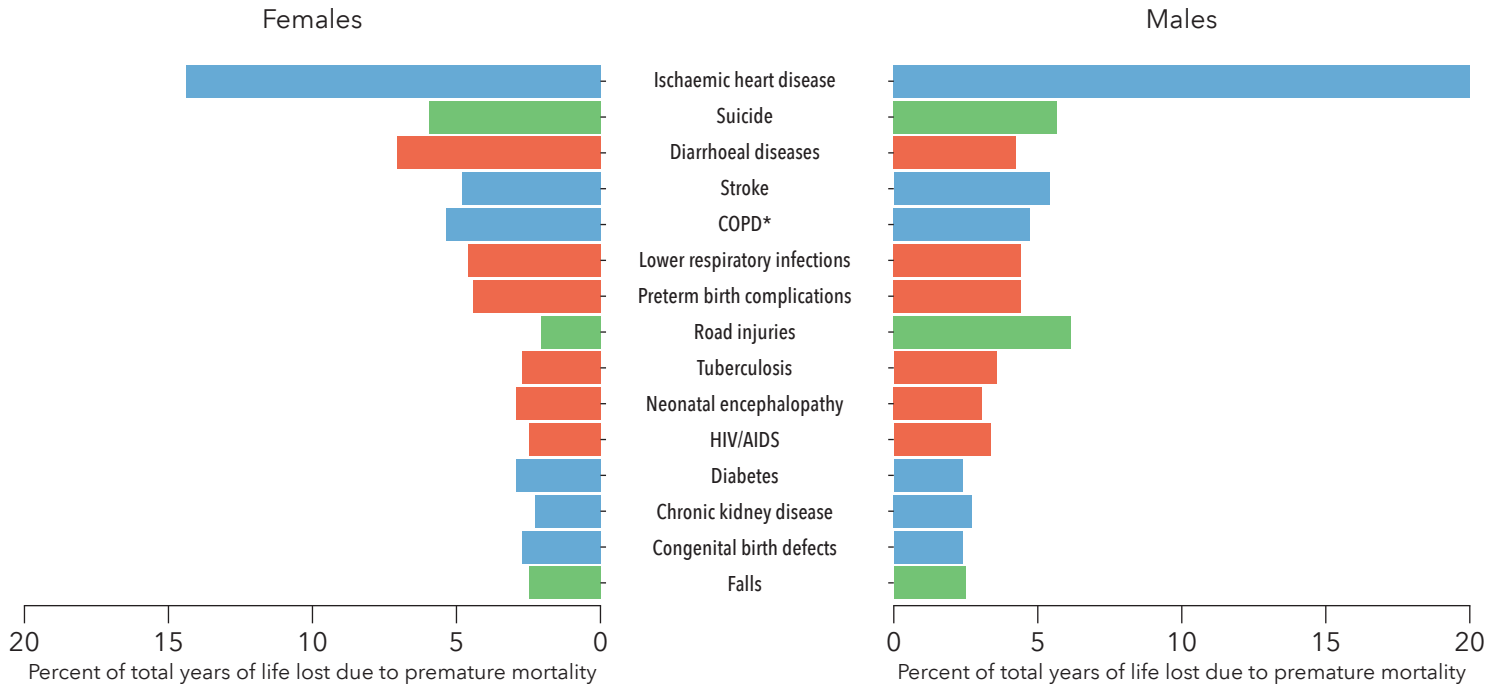
Percent contribution of top 10 causes of death by age group, both sexes, 2016



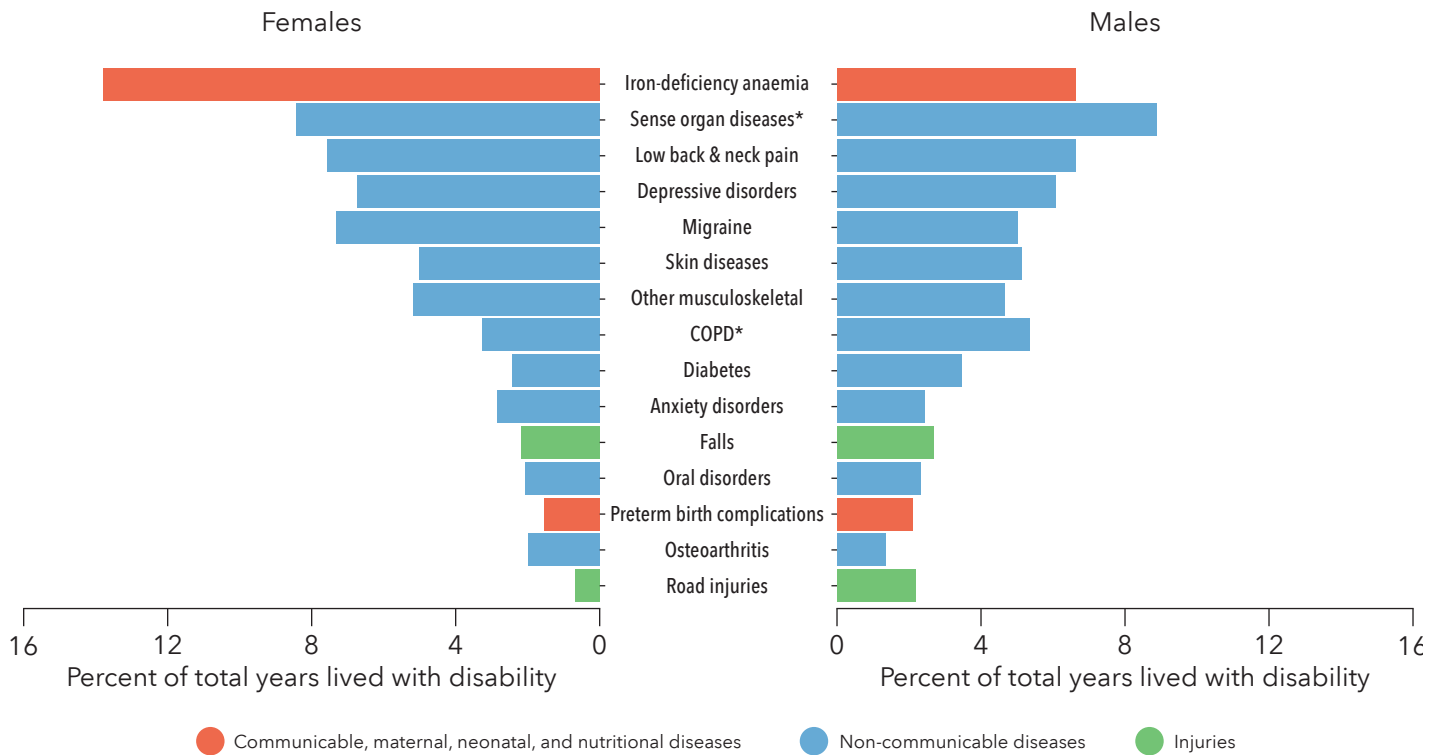
\*LRI is lower respiratory infections.   
 †NTDs are neglected tropical diseases.   
 ‡Urog is urogenital diseases.   
 §Endo is endocrine diseases.

**Proportion of total disease burden from:**  
 Premature death: 64.4% | Disability or morbidity: 35.6%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



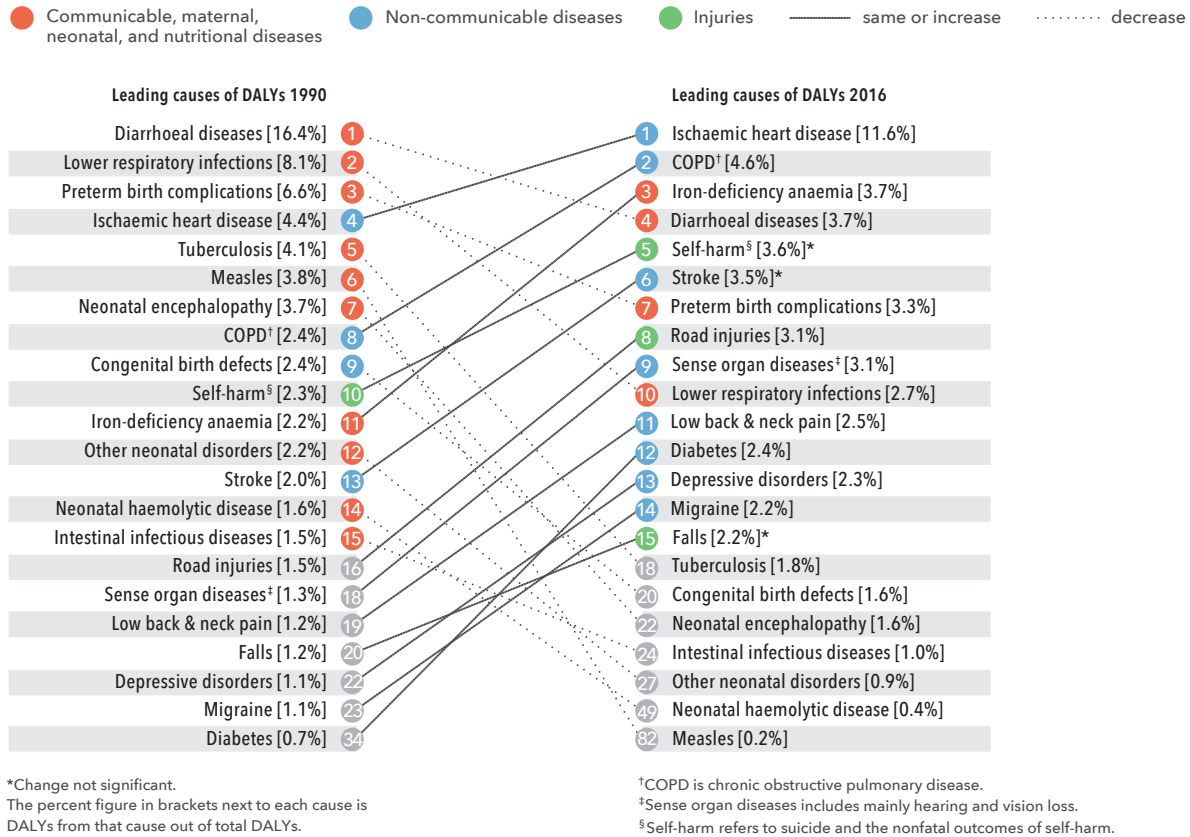
**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



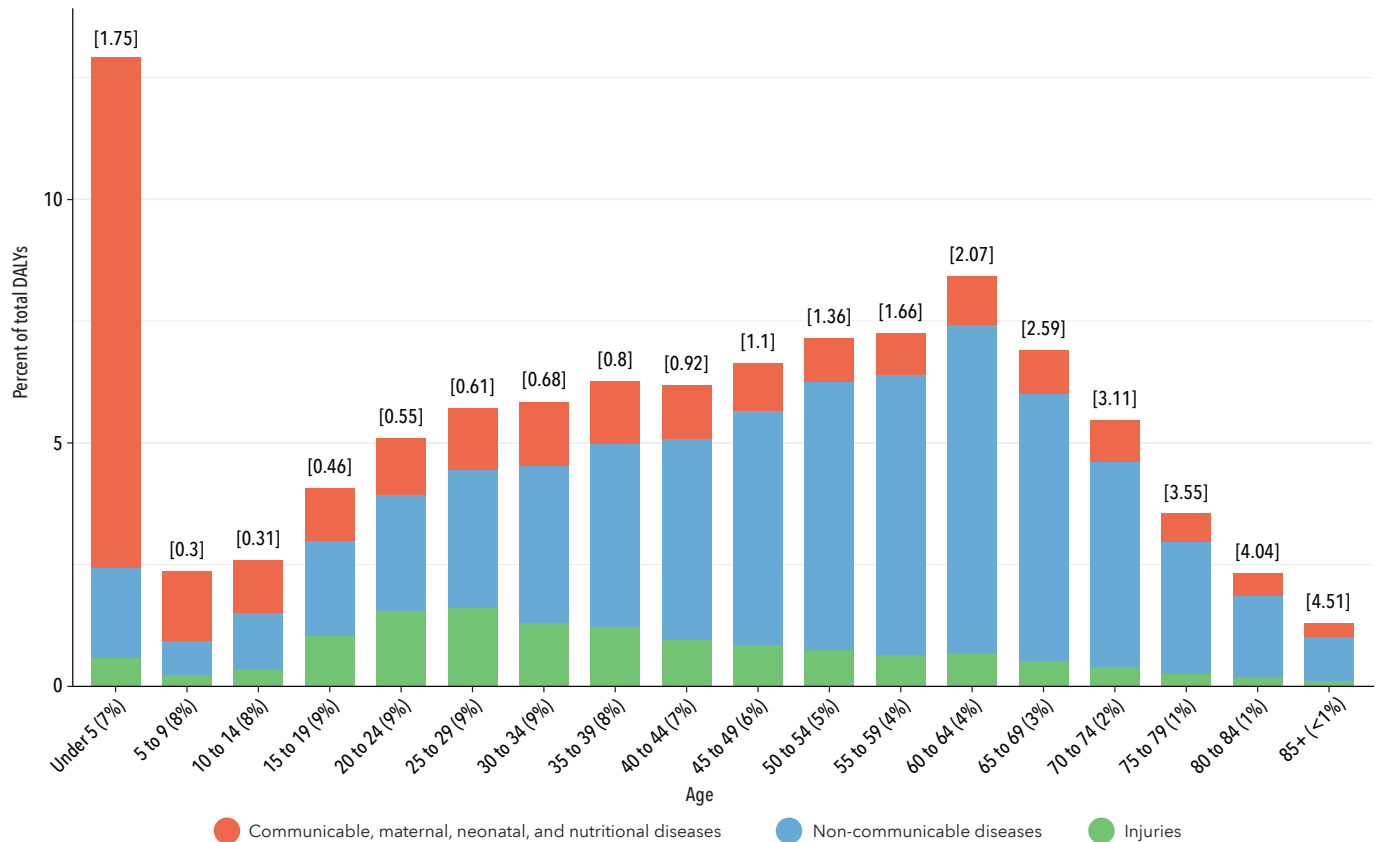
\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 27.0% | NCDs: 59.7% | Injuries: 13.3%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990–2016



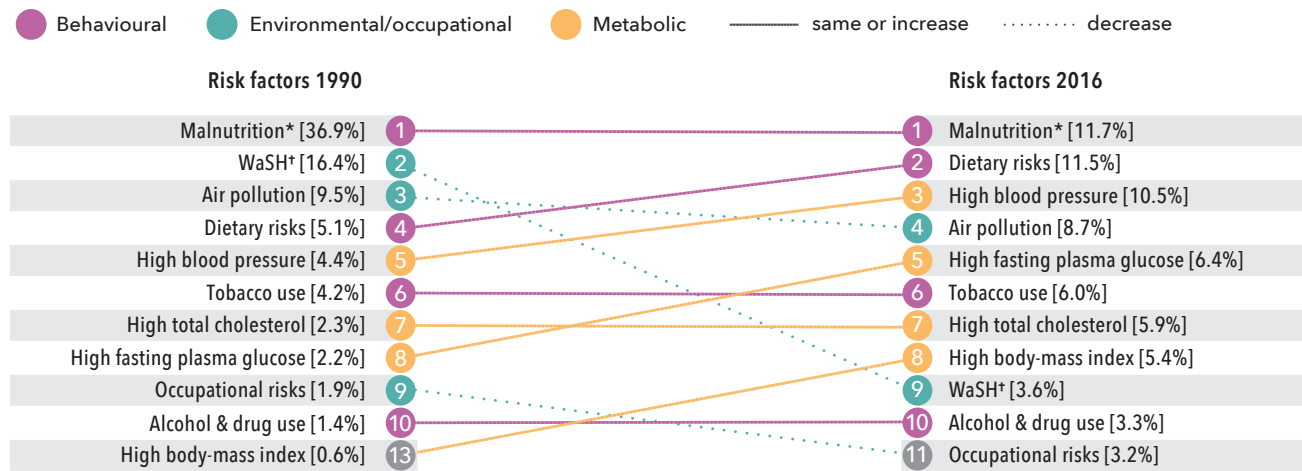
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

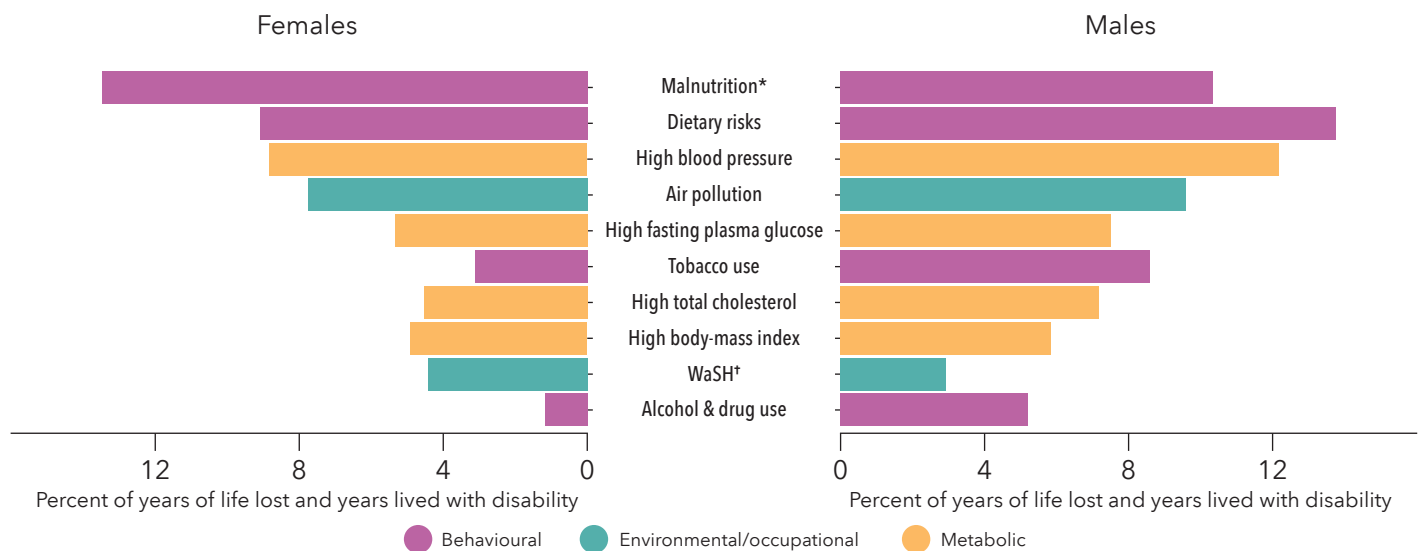


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Arunachal Pradesh

## 1990 life expectancy

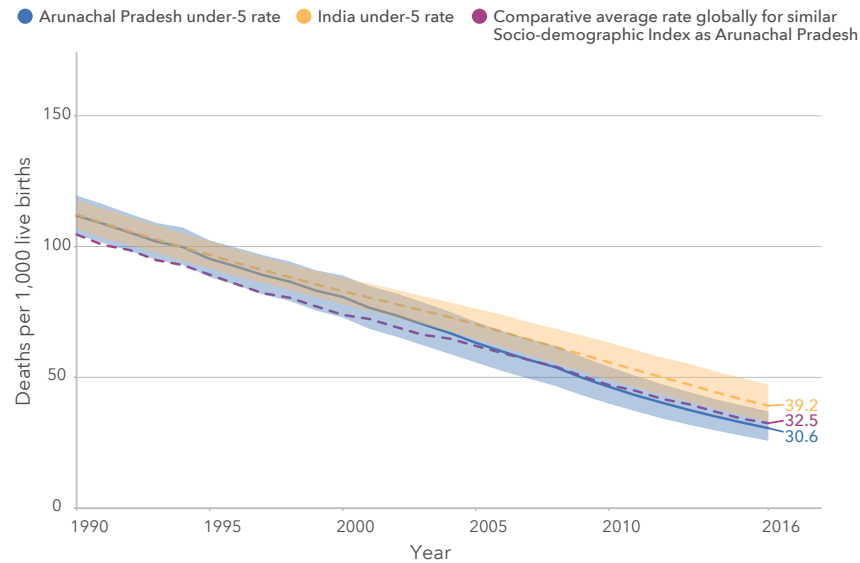
Females: 60.8 years Males: 59.4 years

## 2016 life expectancy

Females: 72.7 years Males: 68.2 years

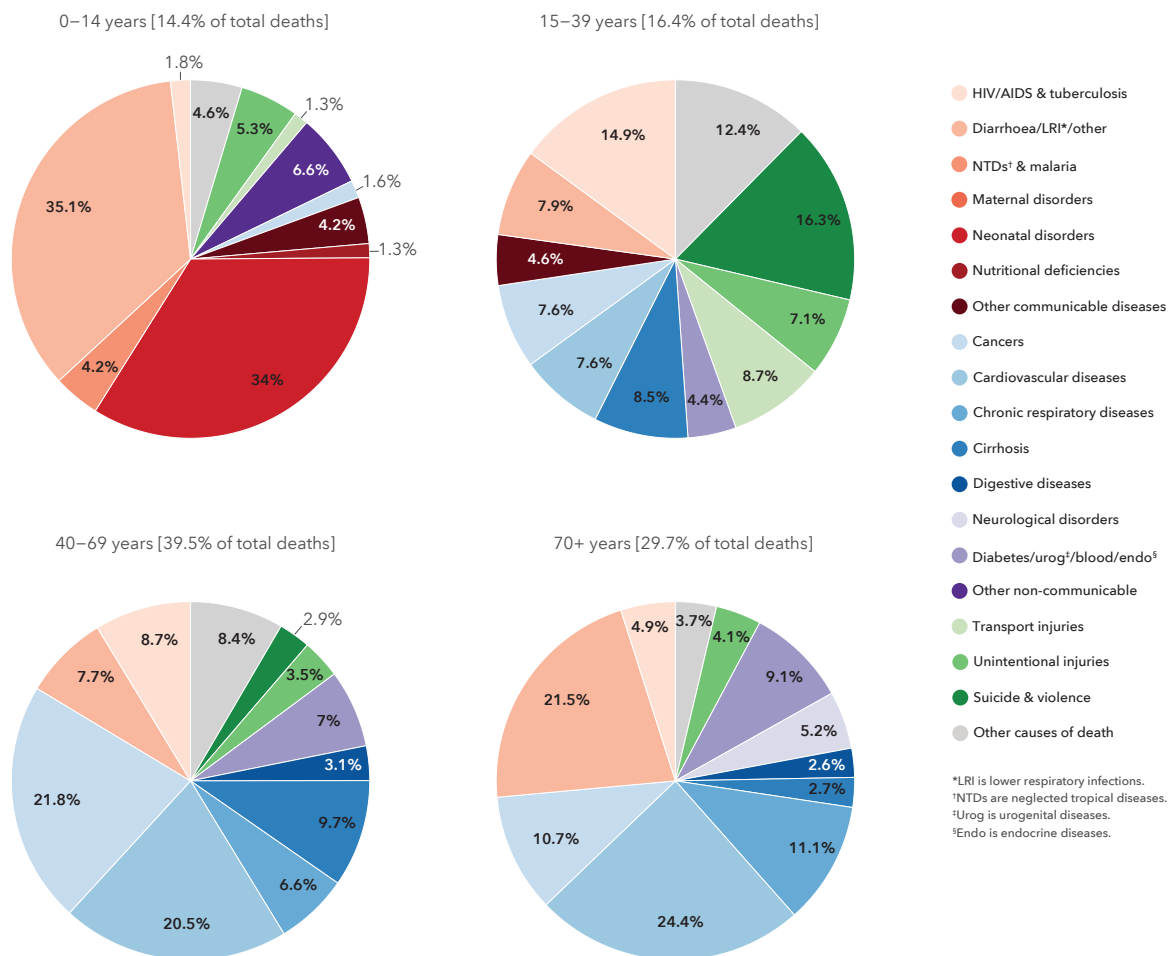
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



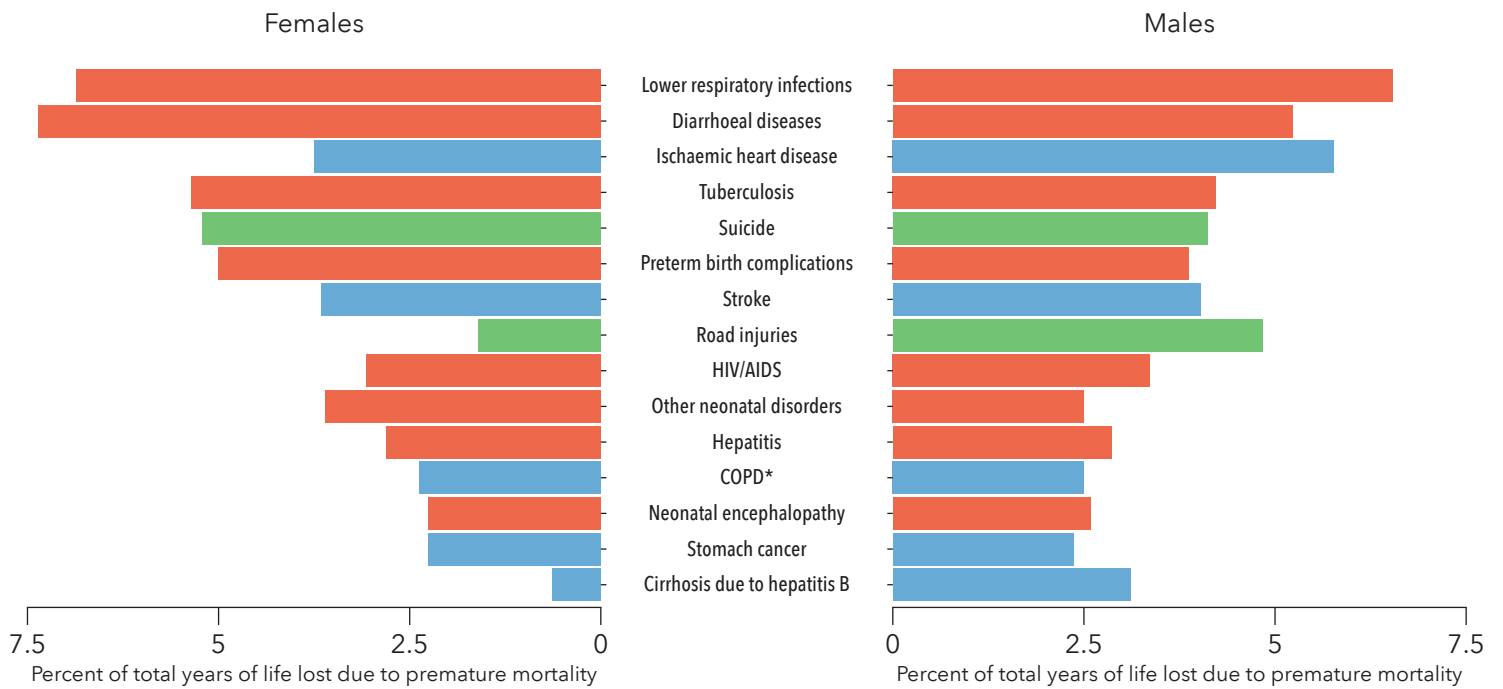
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

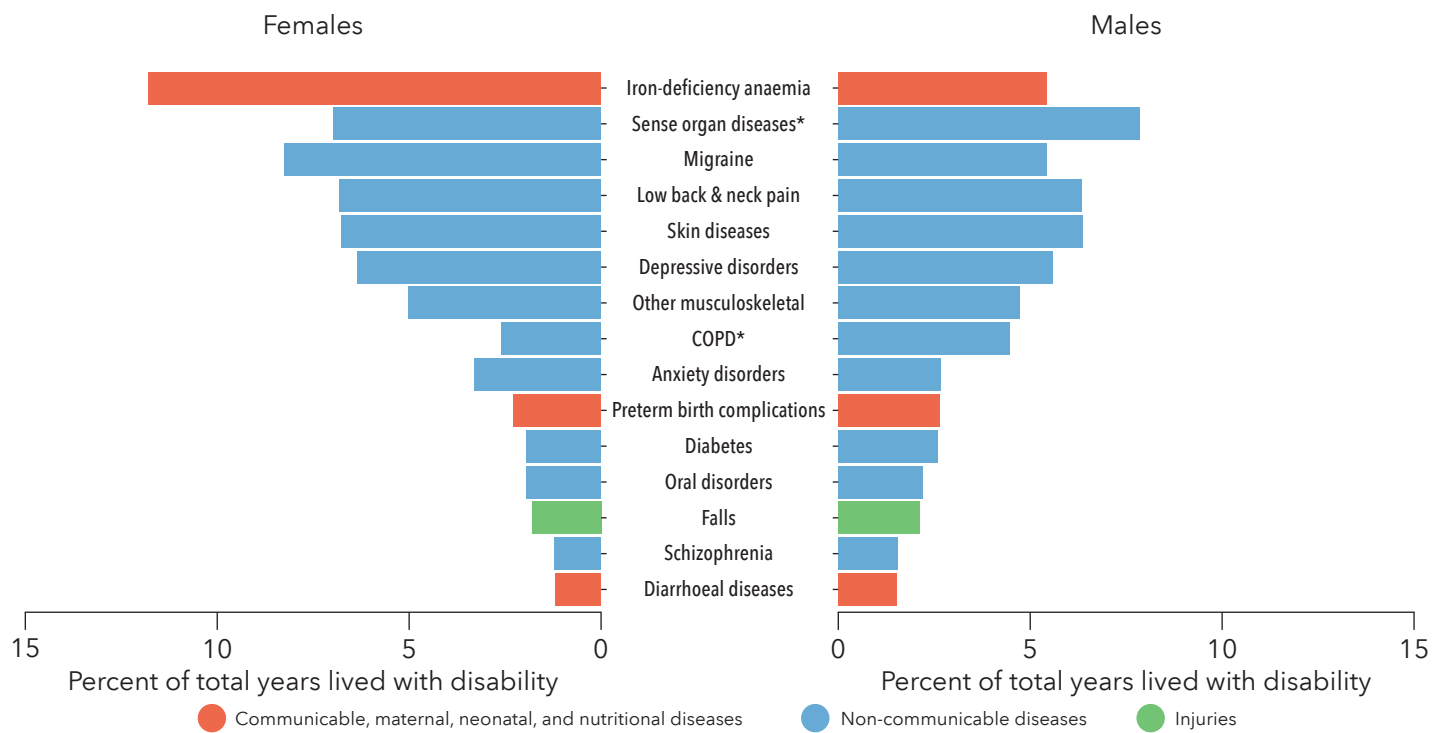


**Proportion of total disease burden from:**  
 Premature death: 63.7% | Disability or morbidity: 36.3%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

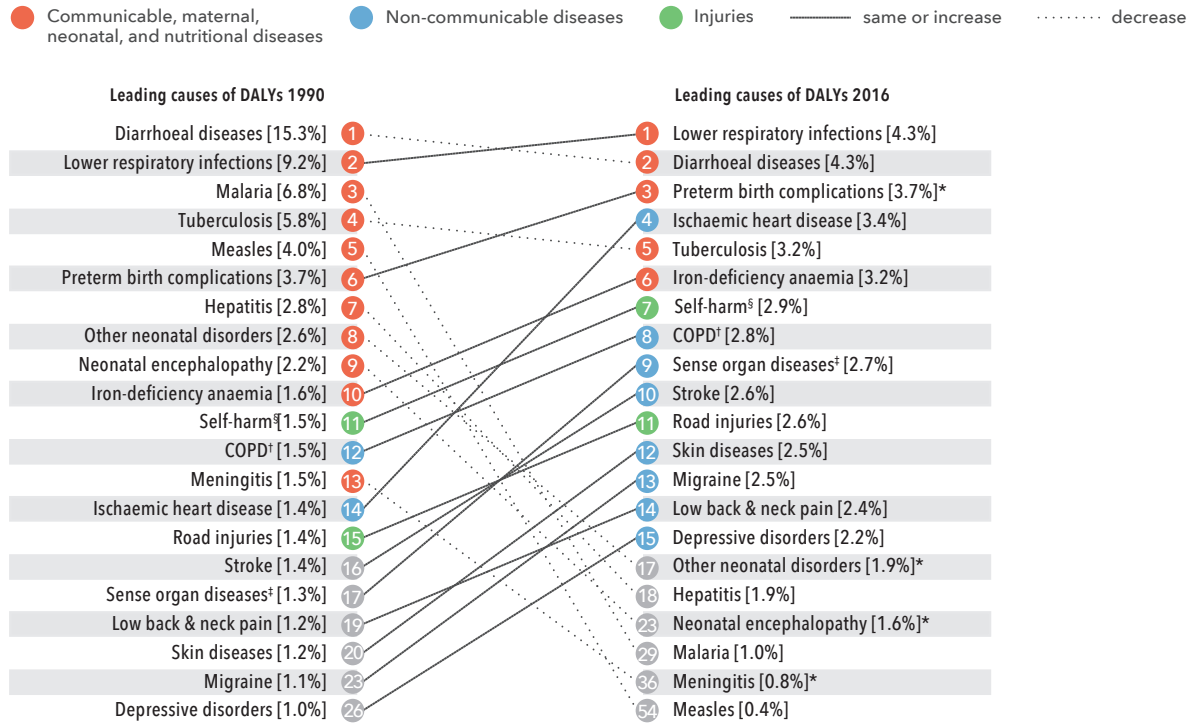


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.



## Proportion of total disease burden from: CMNNDs: 35.5% | NCDs: 52.9% | Injuries: 11.6%

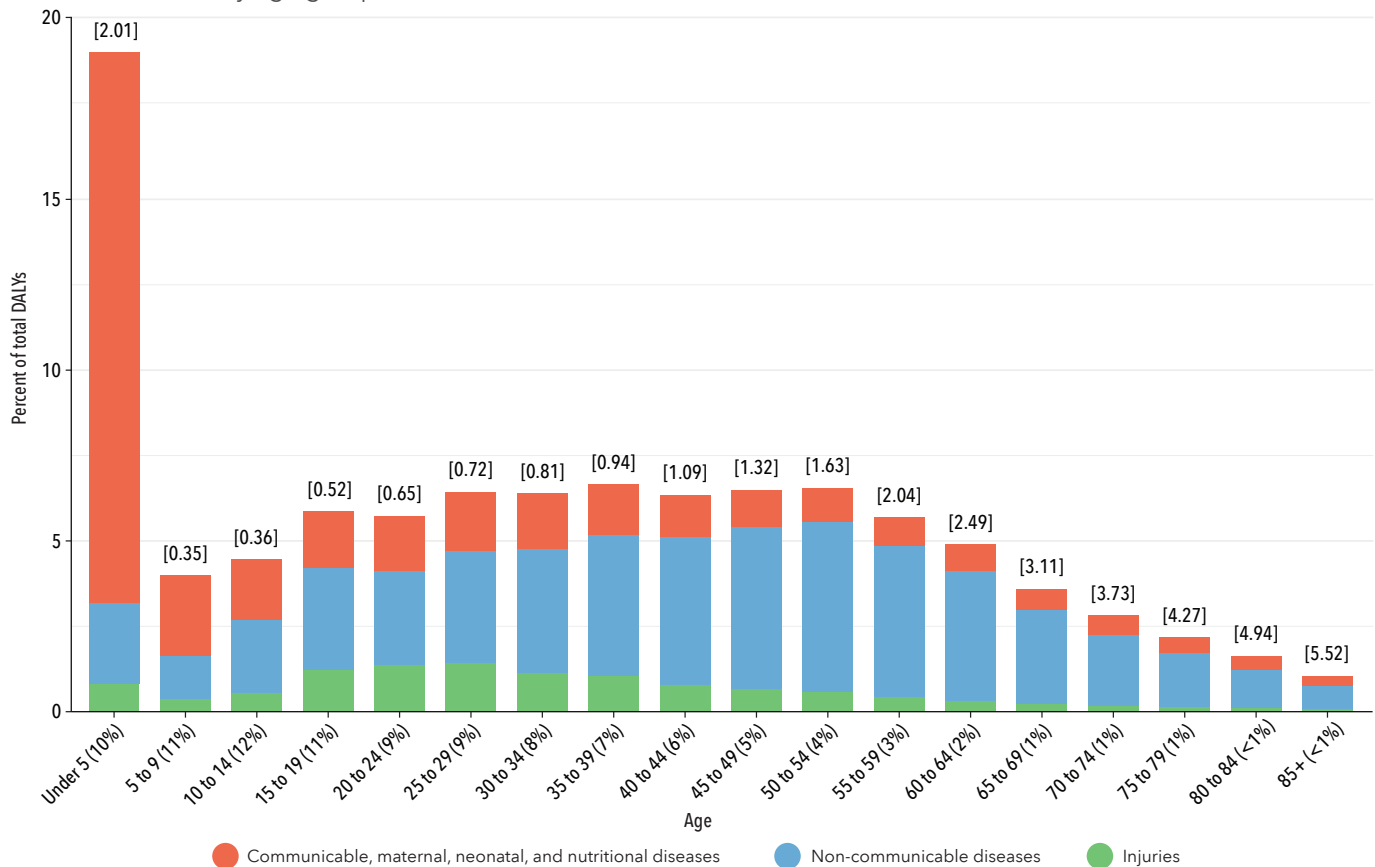
How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990–2016



\*Change not significant.  
The percent figure in brackets next to each cause is DALYs from that cause out of total DALYs.

†COPD is chronic obstructive pulmonary disease.  
‡Sense organ diseases includes mainly hearing and vision loss.  
§Self-harm refers to suicide and the nonfatal outcomes of self-harm.

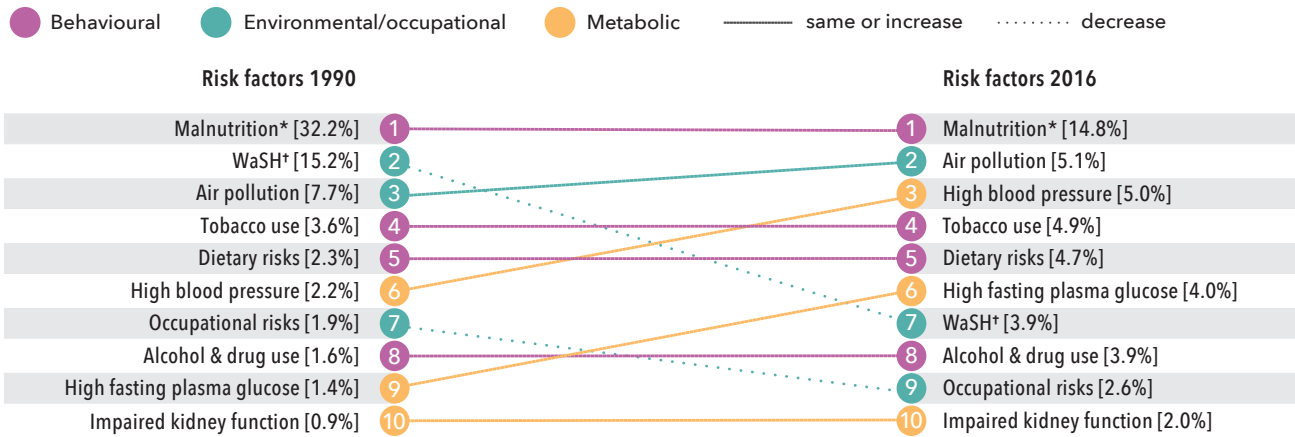
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

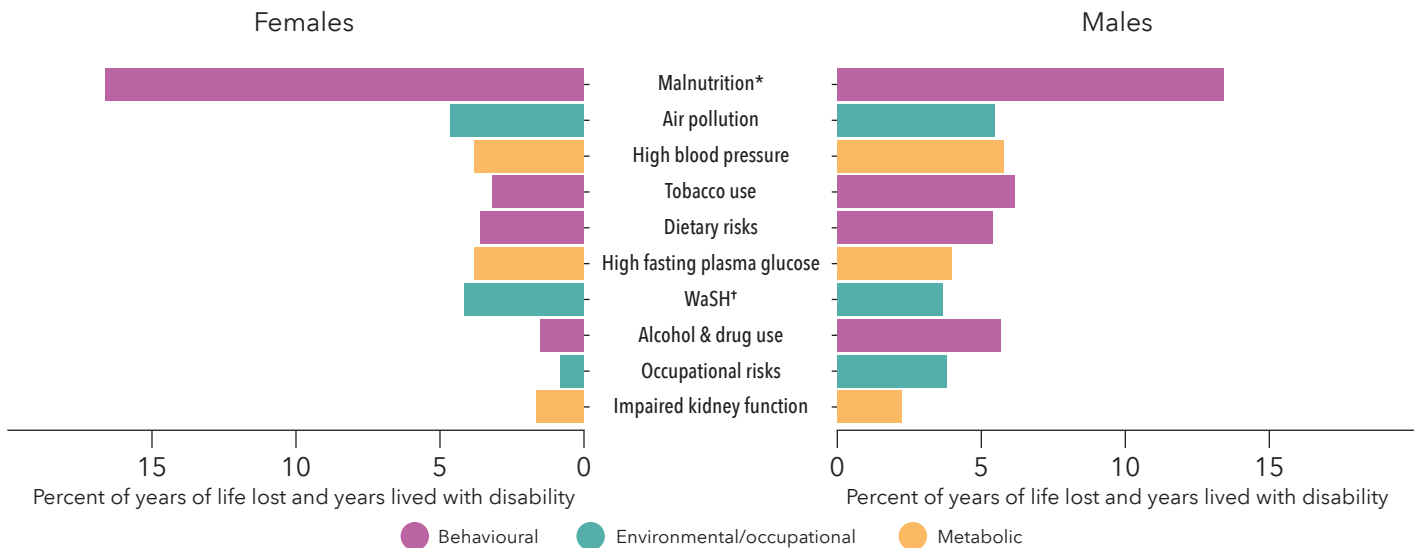


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Assam

**1990 life expectancy**

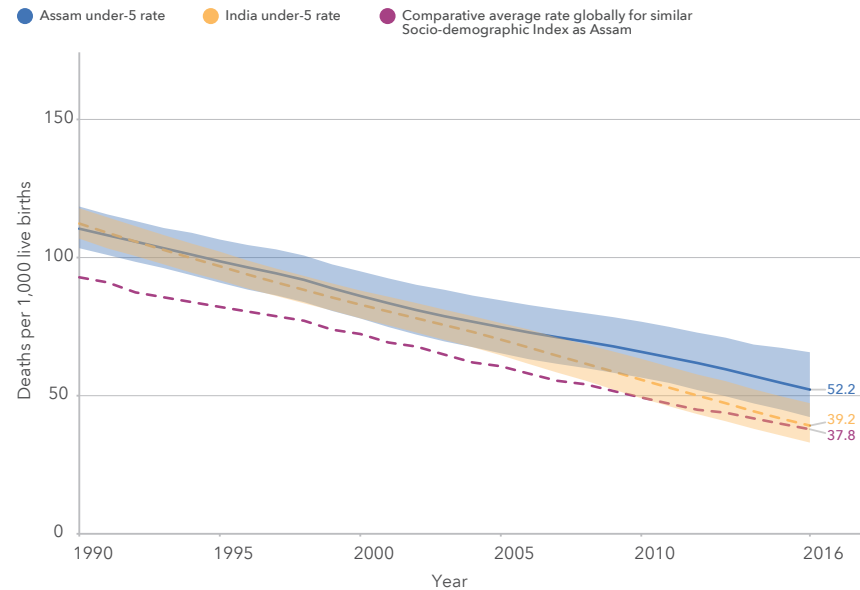
Females: 56.6 years Males: 55.6 years

**2016 life expectancy**

Females: 66.9 years Males: 63.5 years

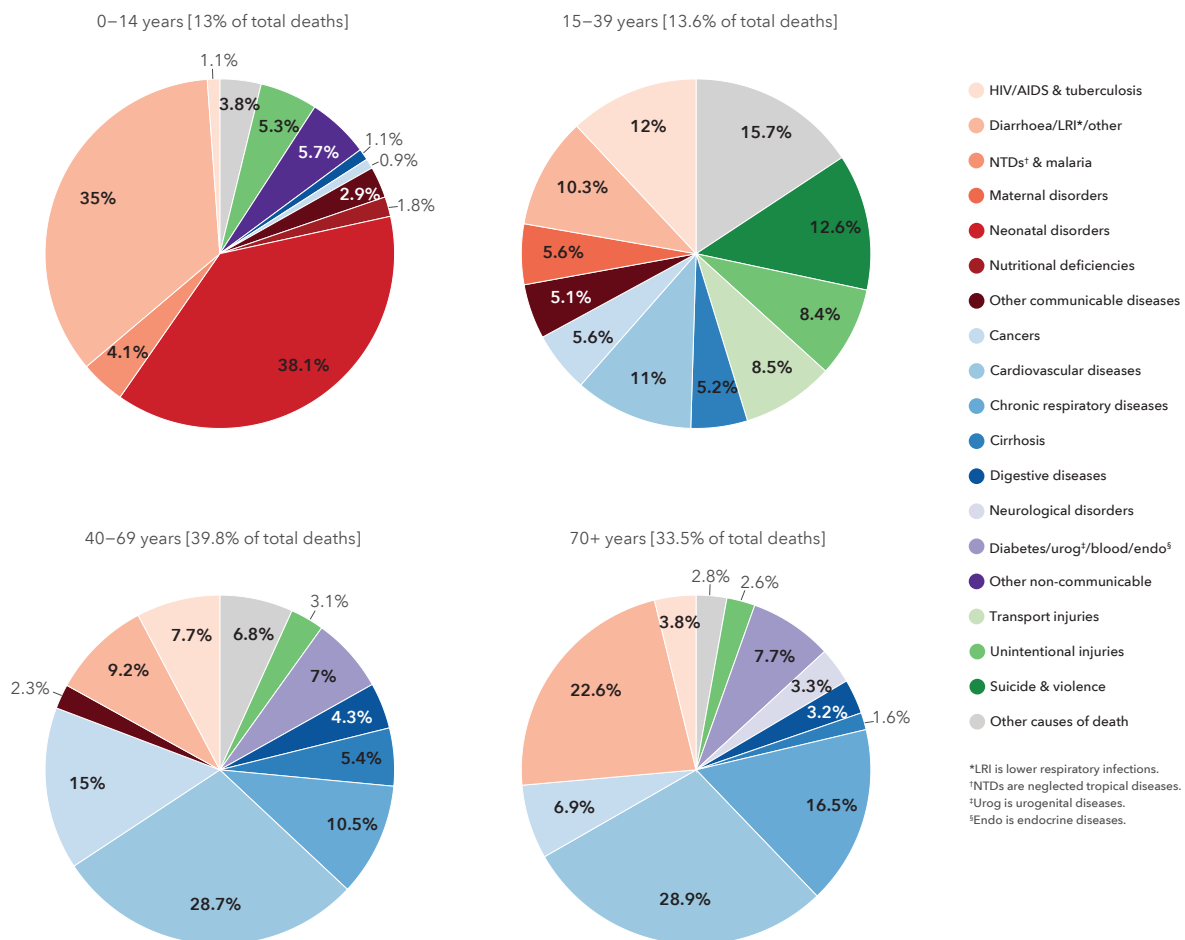
## How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



## What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

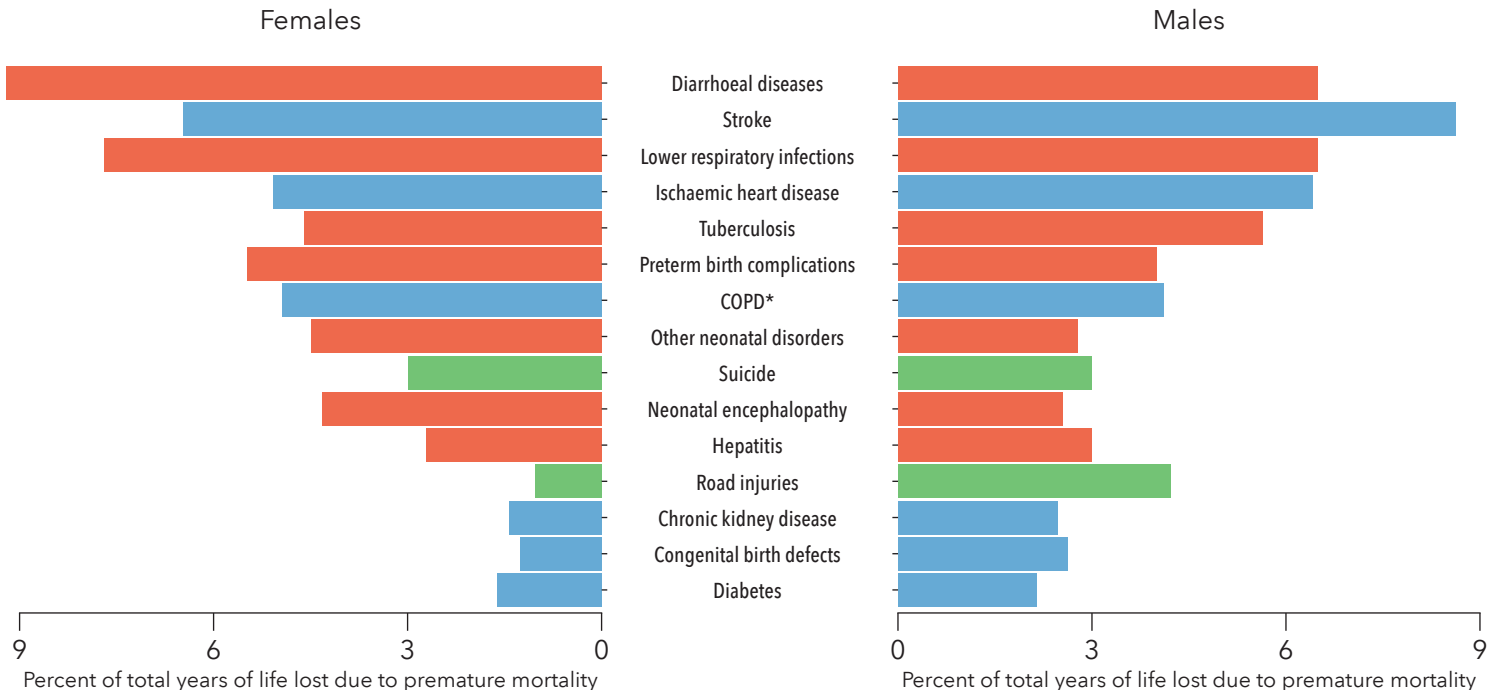


**Proportion of total disease burden from:**

Premature death: 71.3% | Disability or morbidity: 28.7%

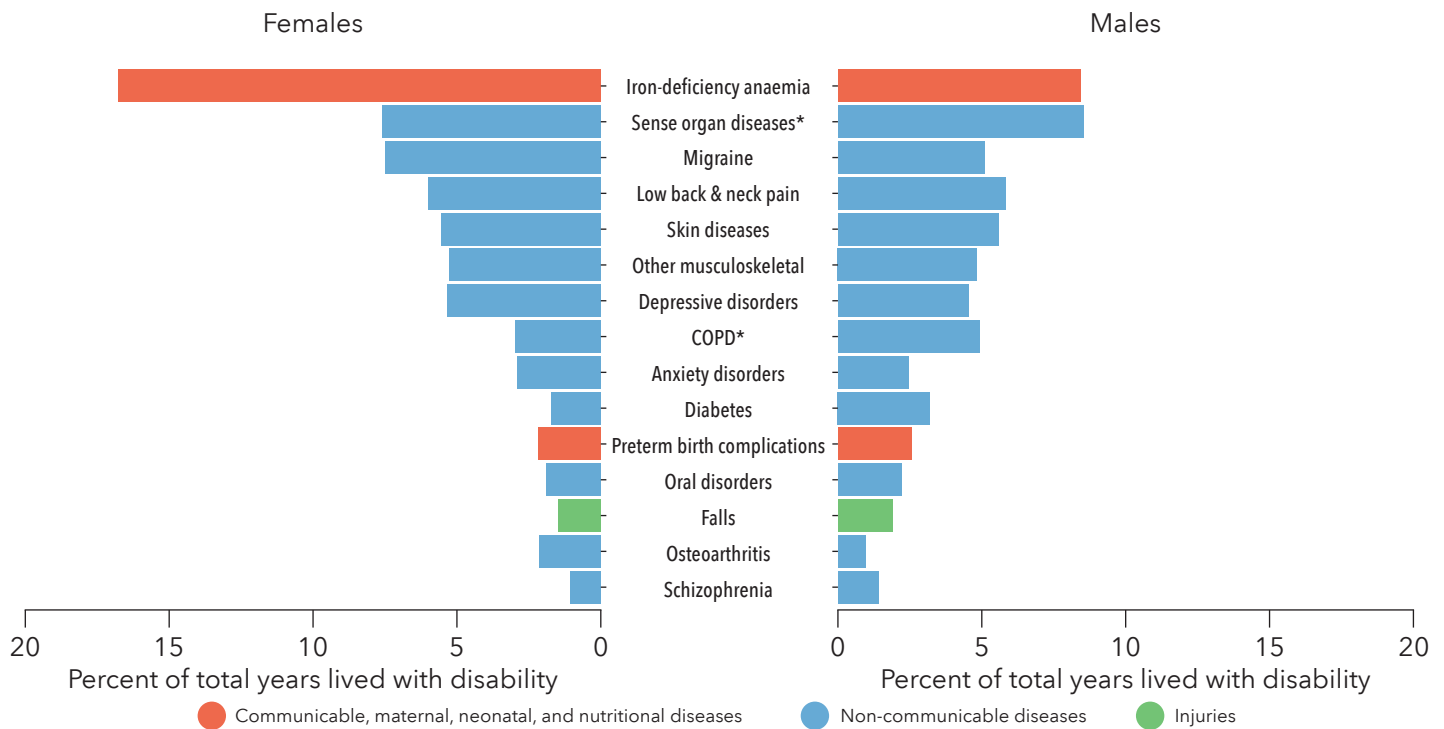
**What caused the most years of life lost, by sex, in 2016?**

Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**

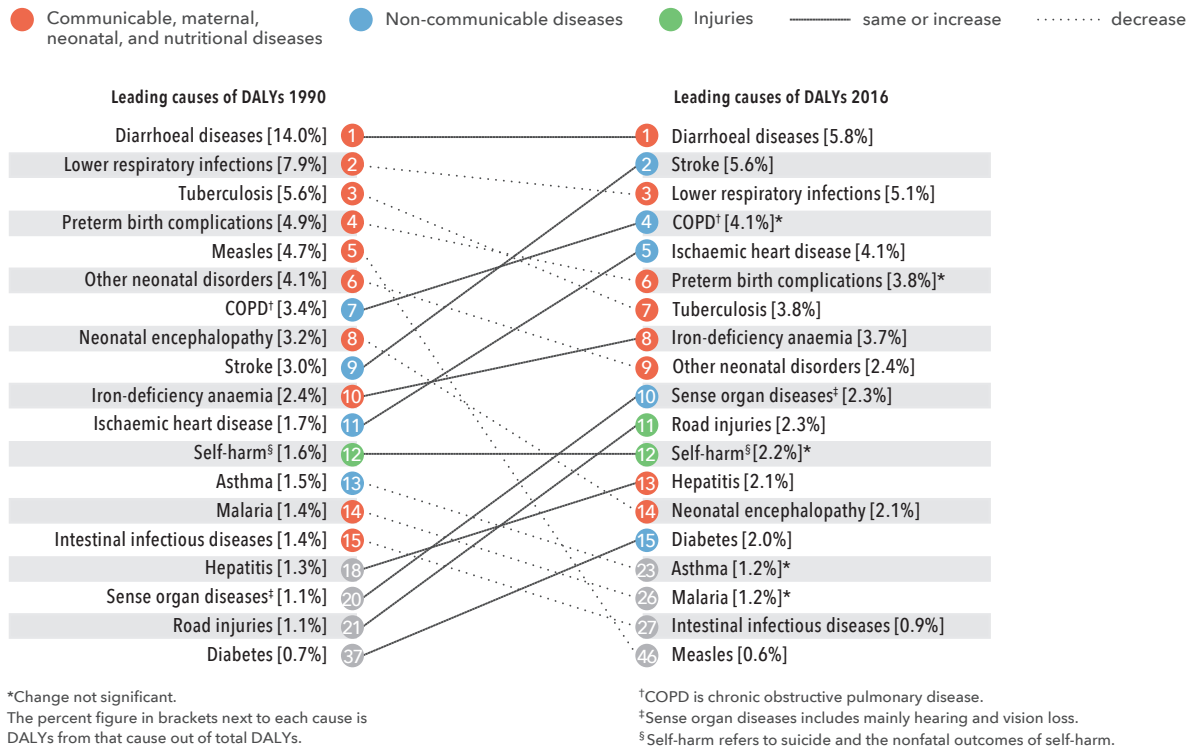
Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



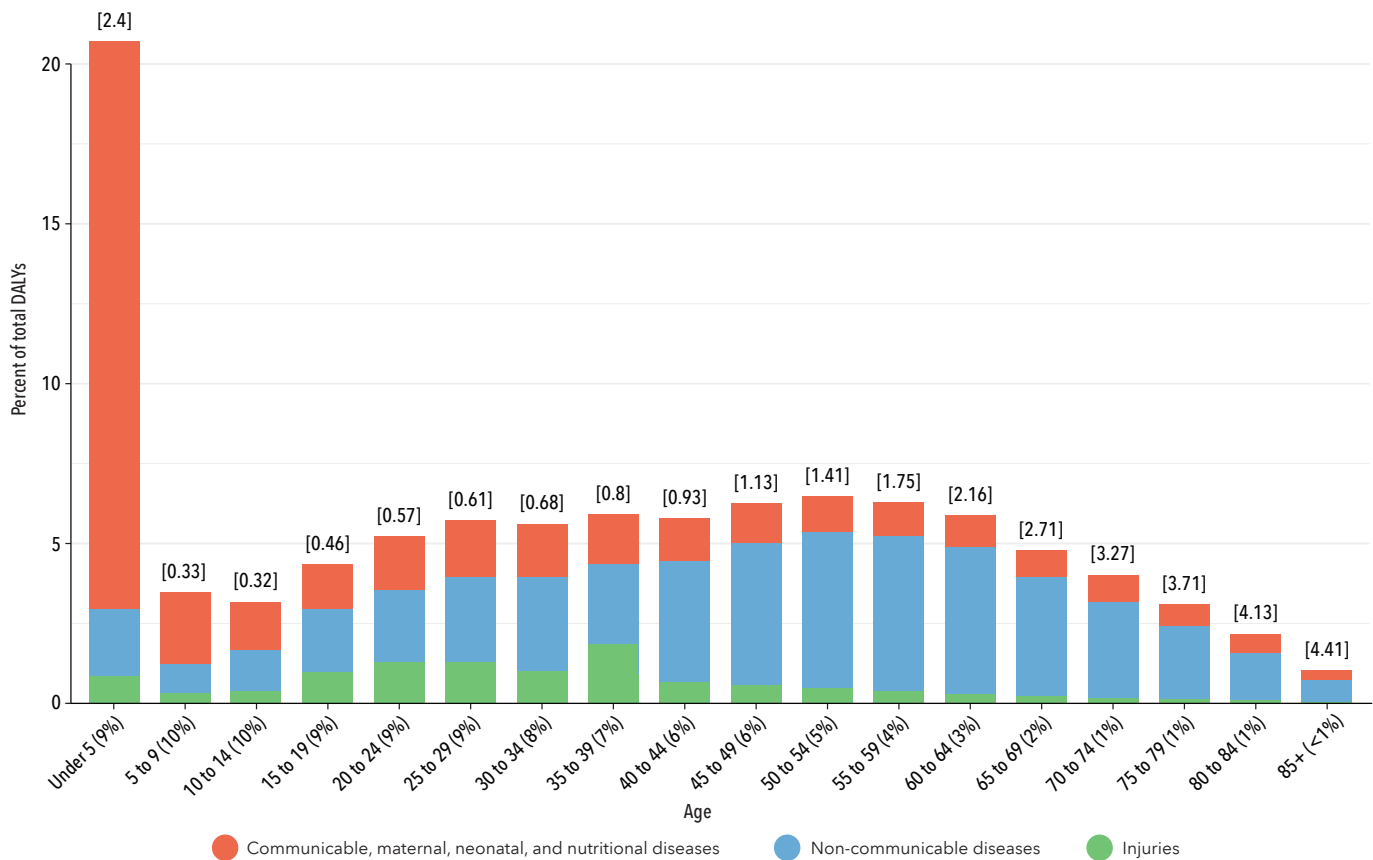
\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 38.5% | NCDs: 51.2% | Injuries: 10.3%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990–2016



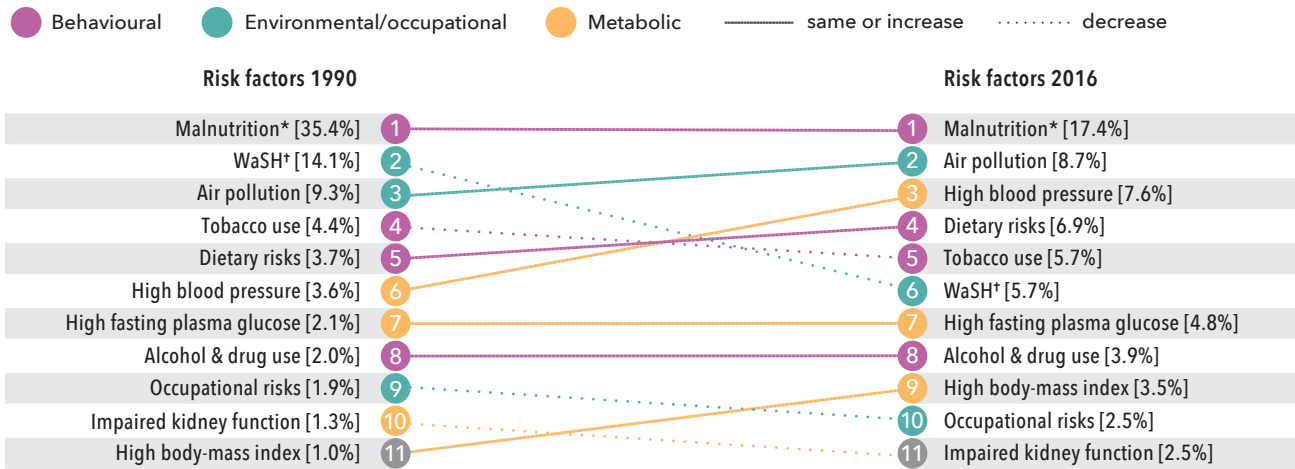
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

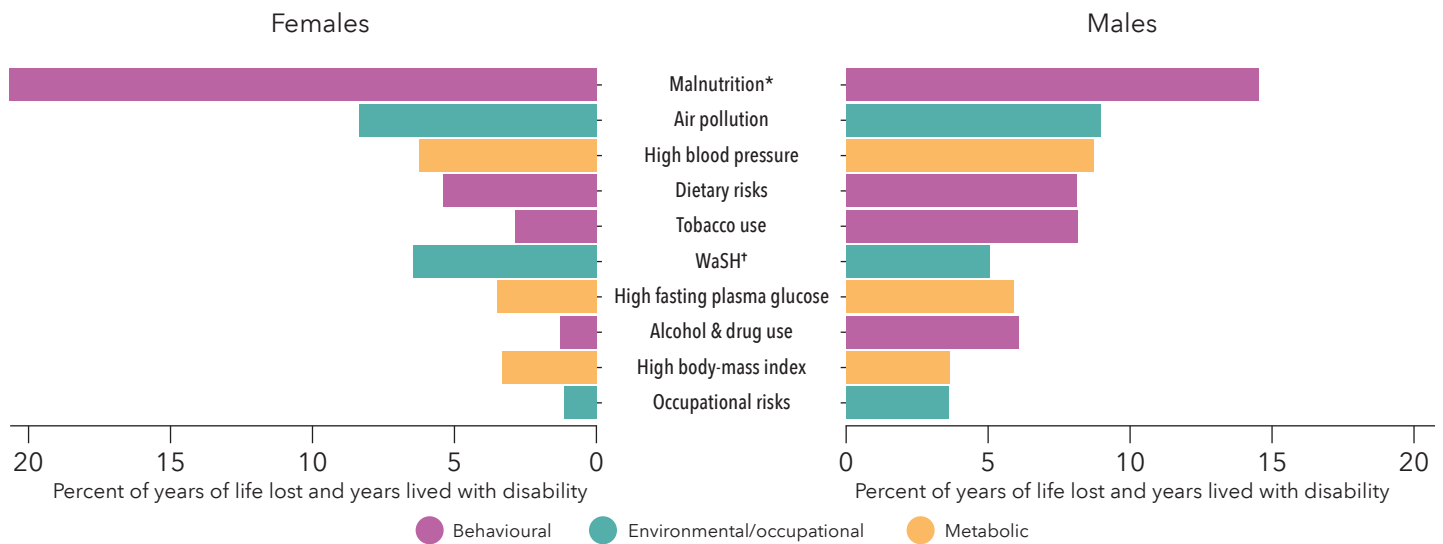


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Bihar

## 1990 life expectancy

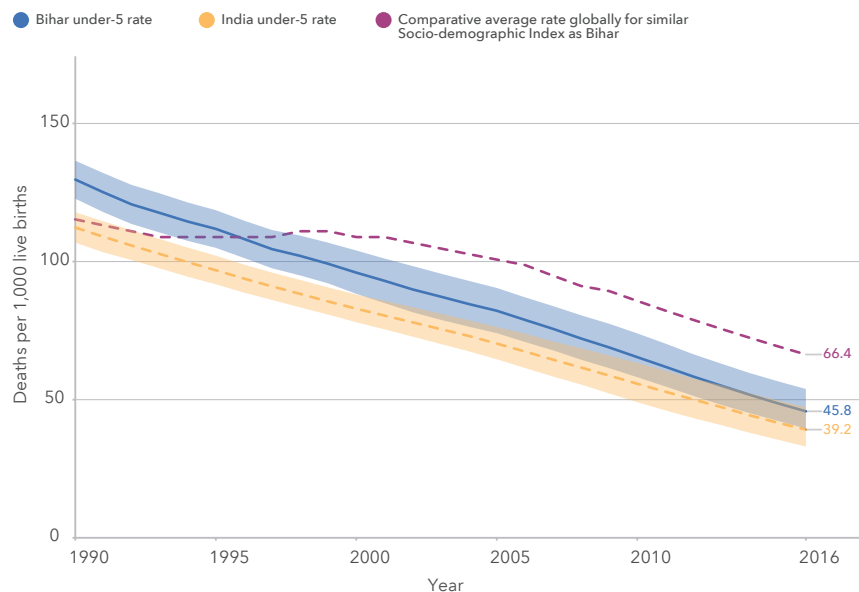
Females: 57.9 years Males: 58.9 years

## 2016 life expectancy

Females: 67.7 years Males: 67.7 years

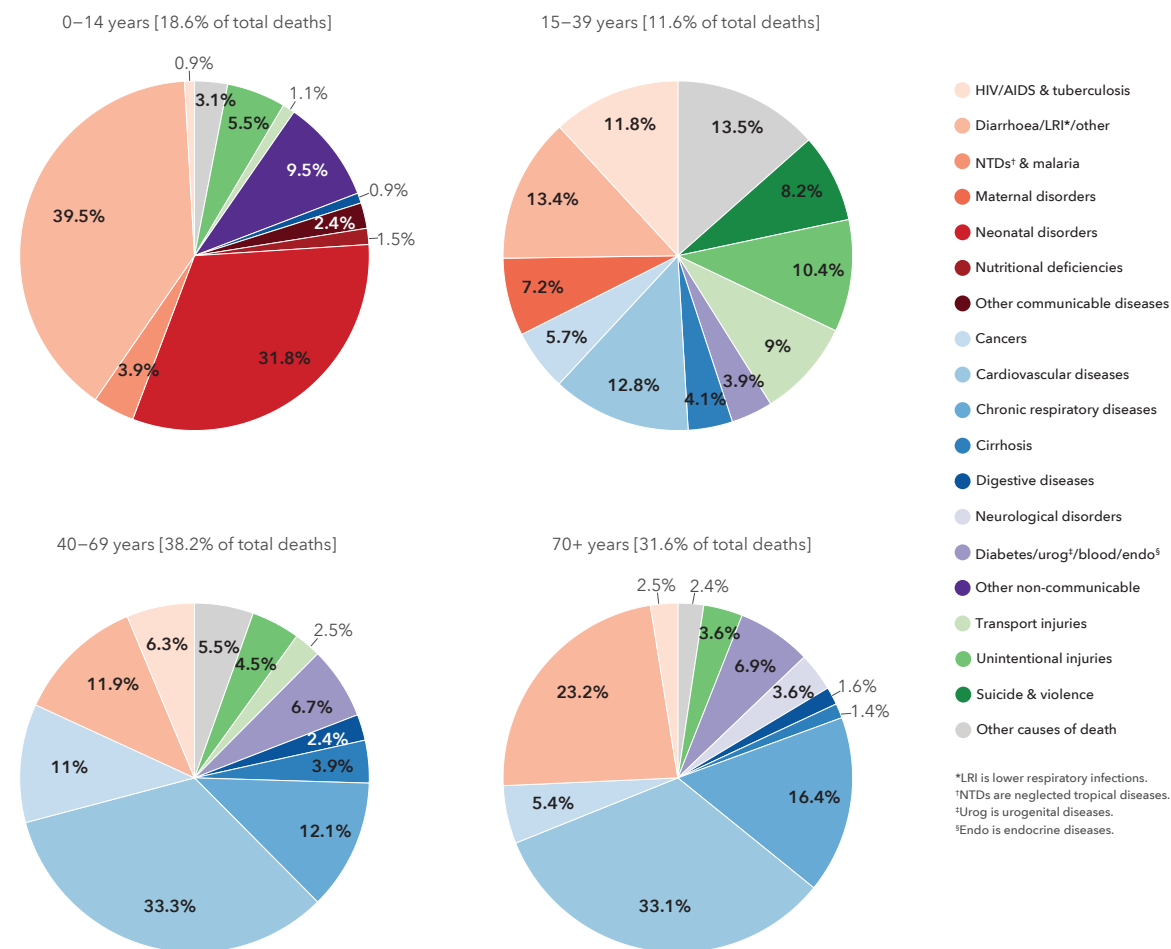
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



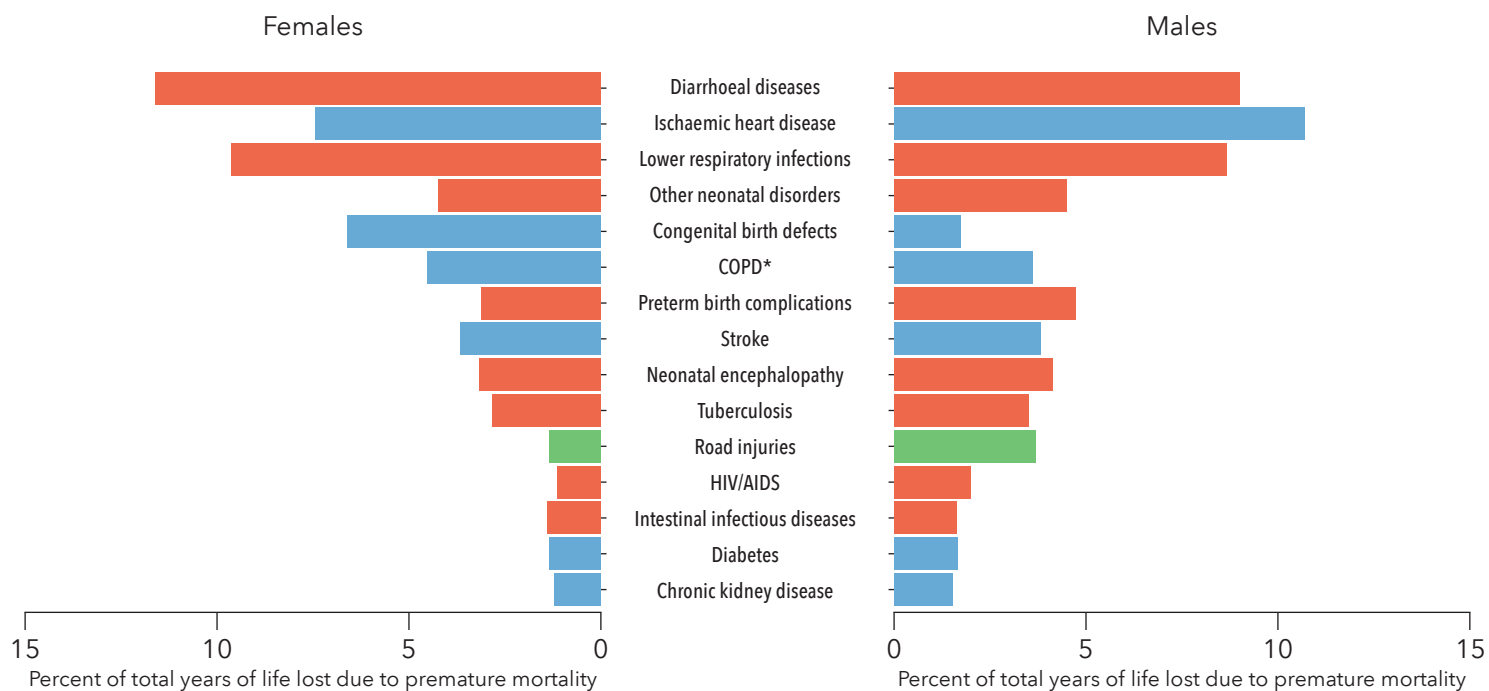
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

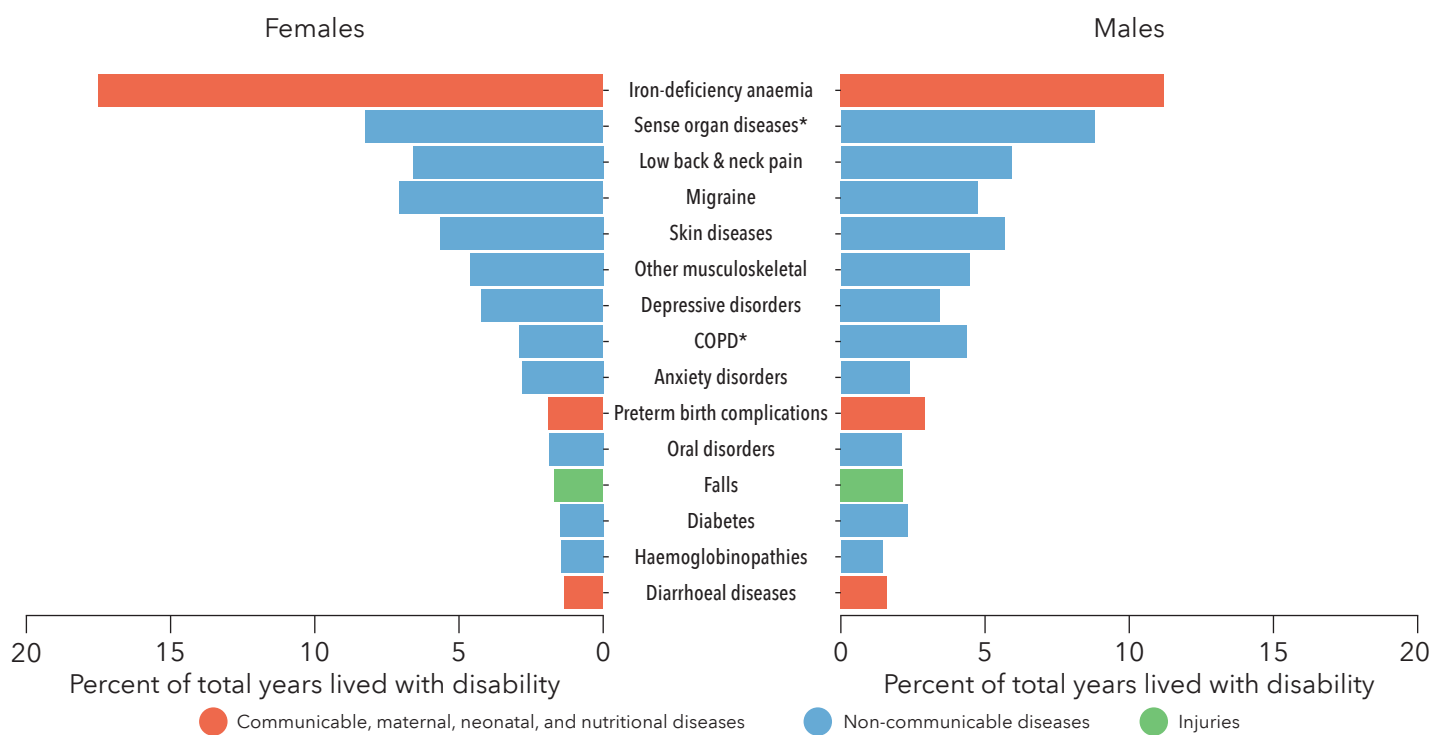


**Proportion of total disease burden from:**  
 Premature death: 69.9% | Disability or morbidity: 30.1%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

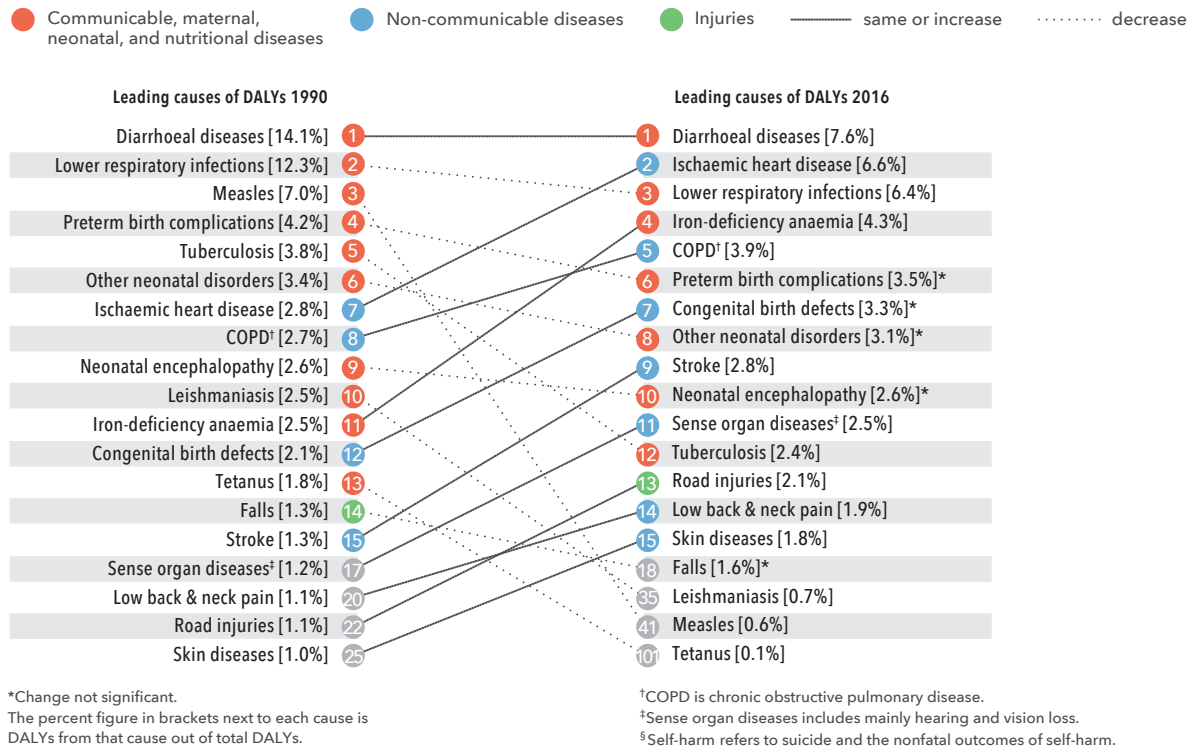


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

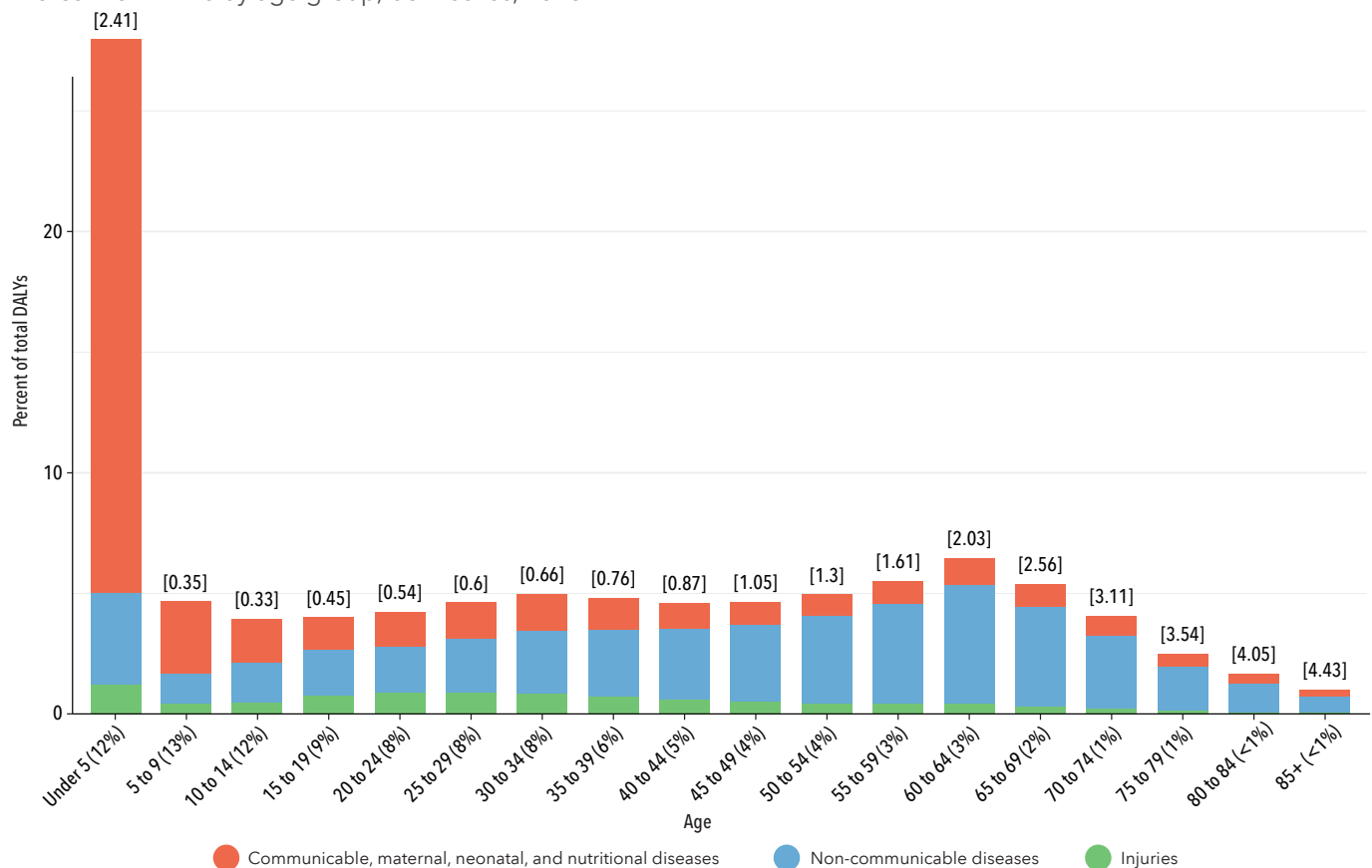


## Proportion of total disease burden from: CMNNDs: 42.6% | NCDs: 47.6% | Injuries: 9.8%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016



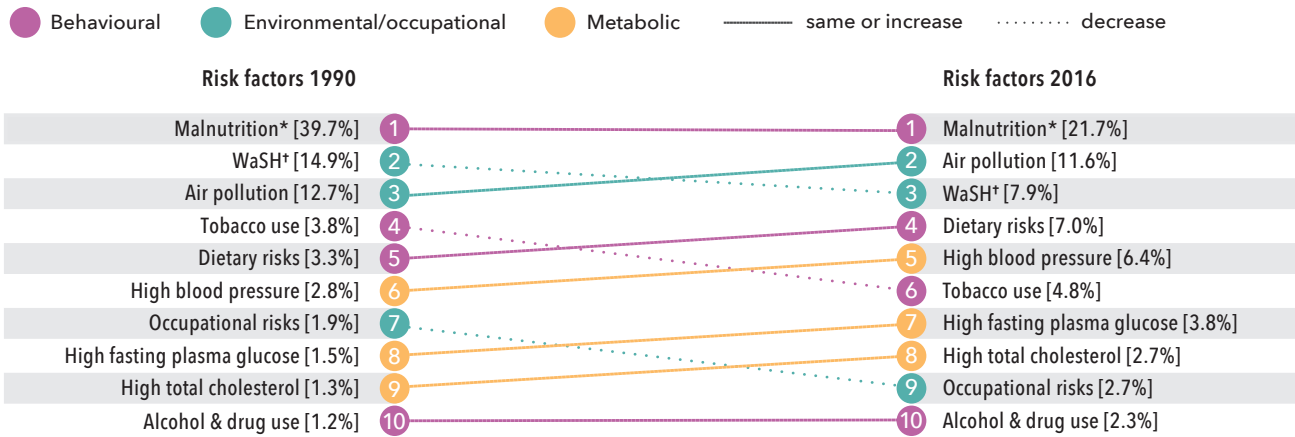
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

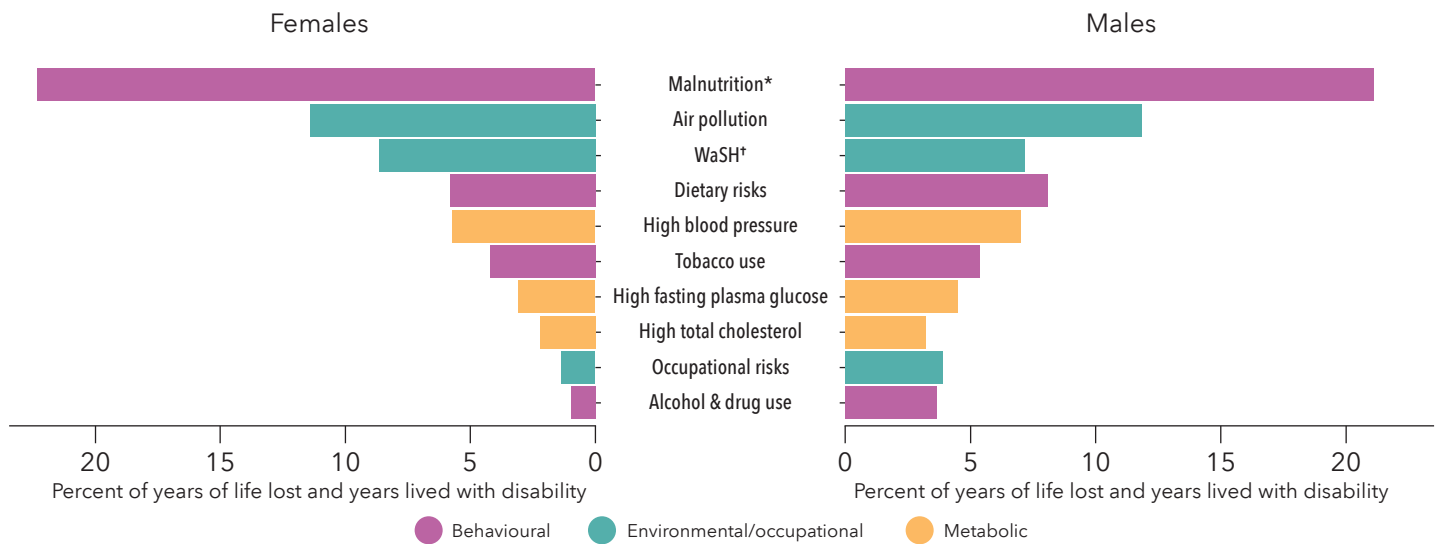


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
\*WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
\*WaSH is unsafe water, sanitation, and handwashing.

# Chhattisgarh

## 1990 life expectancy

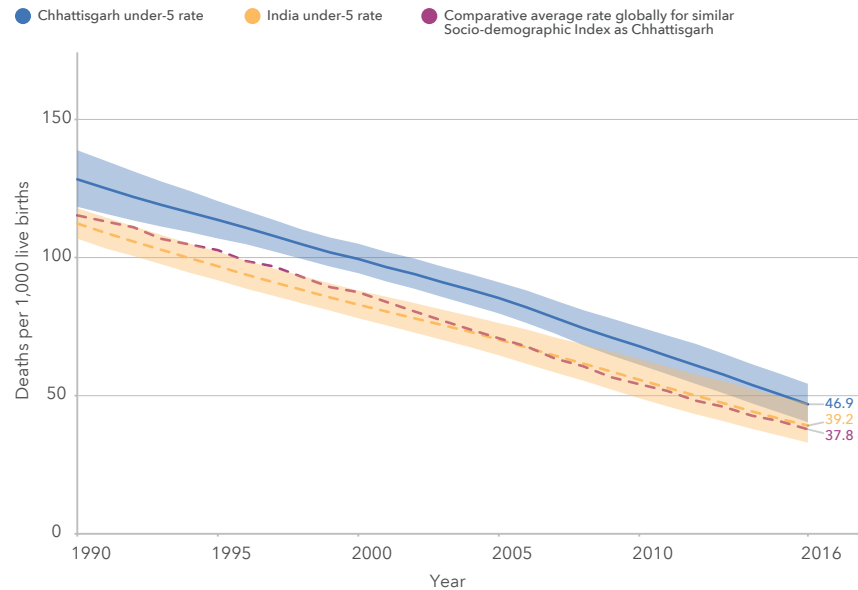
Females: 58.9 years Males: 55.7 years

## 2016 life expectancy

Females: 68.3 years Males: 64.6 years

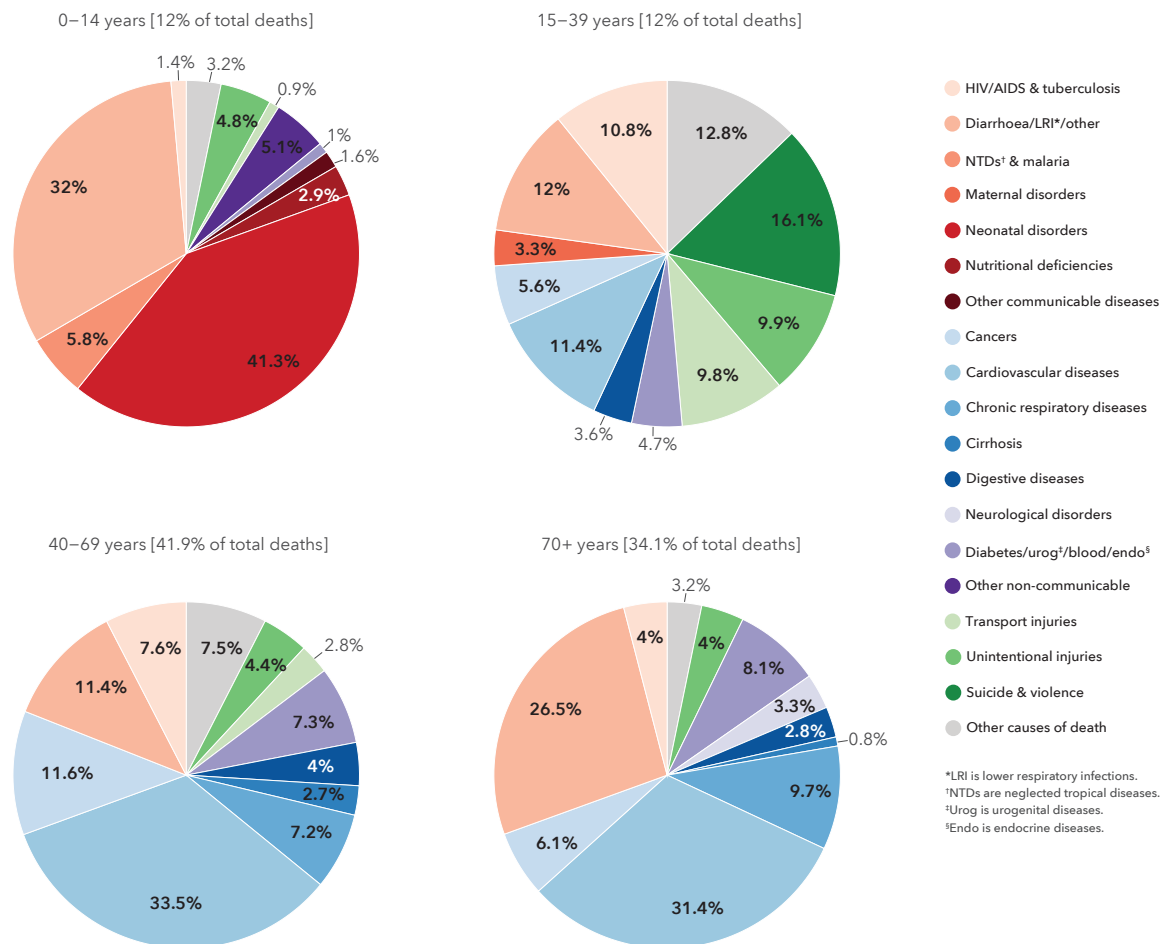
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

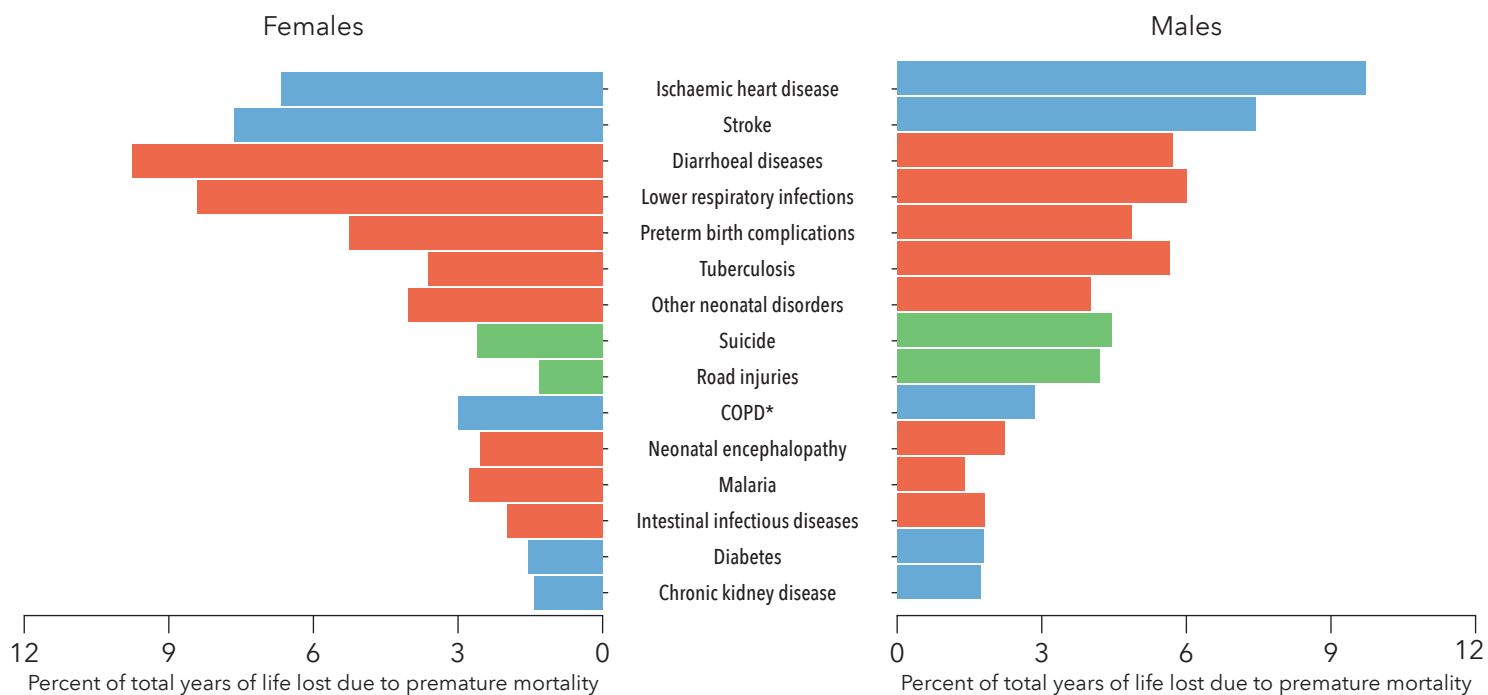
Percent contribution of top 10 causes of death by age group, both sexes, 2016



**Proportion of total disease burden from:**  
 Premature death: 70.1% | Disability or morbidity: 29.9%

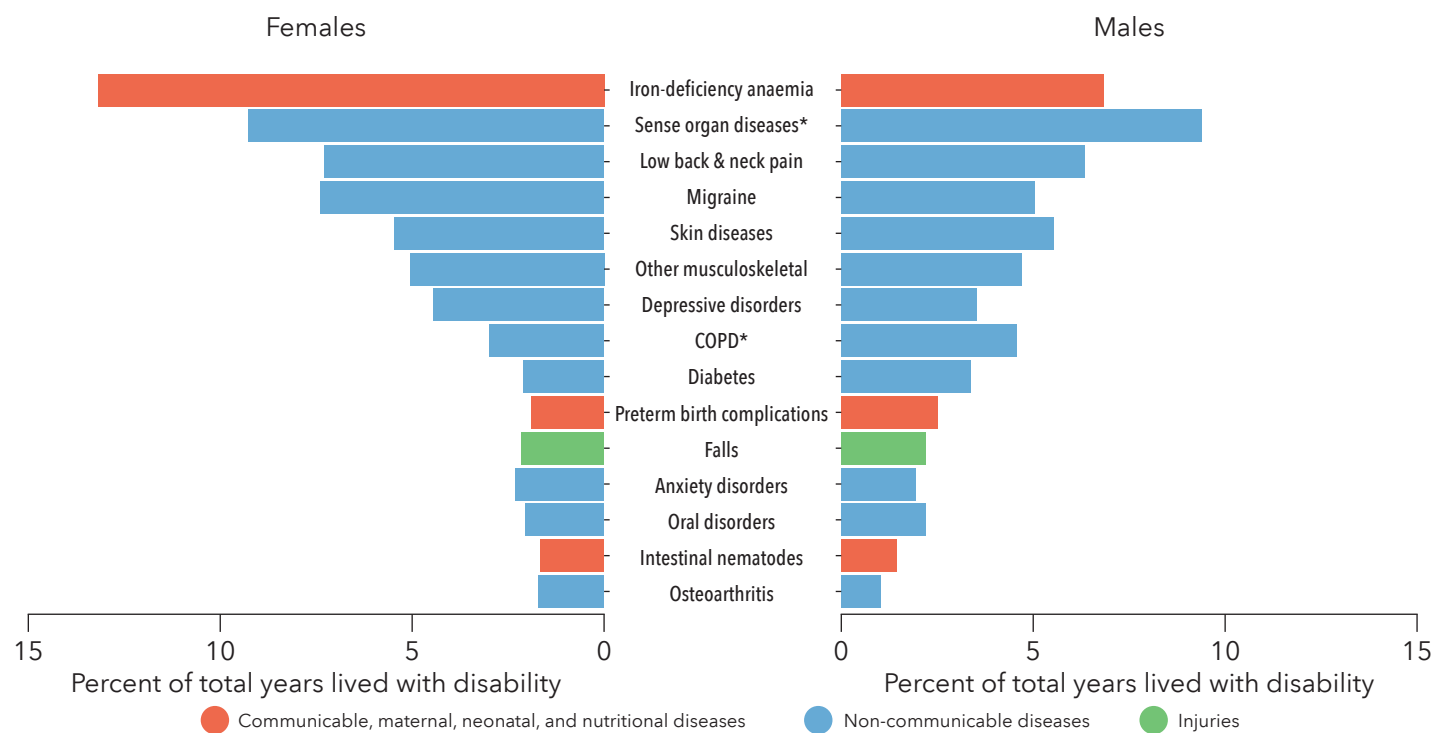
**What caused the most years of life lost, by sex, in 2016?**

Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**

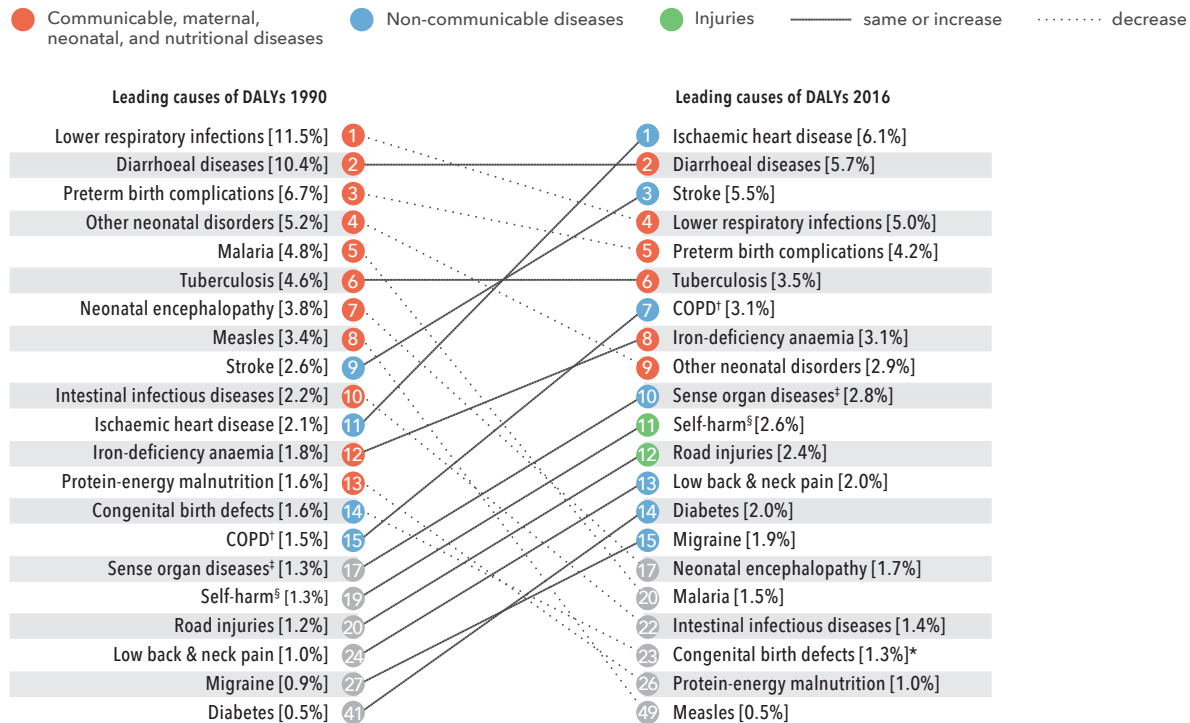
Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 37.7% | NCDs: 50.4% | Injuries: 11.9%

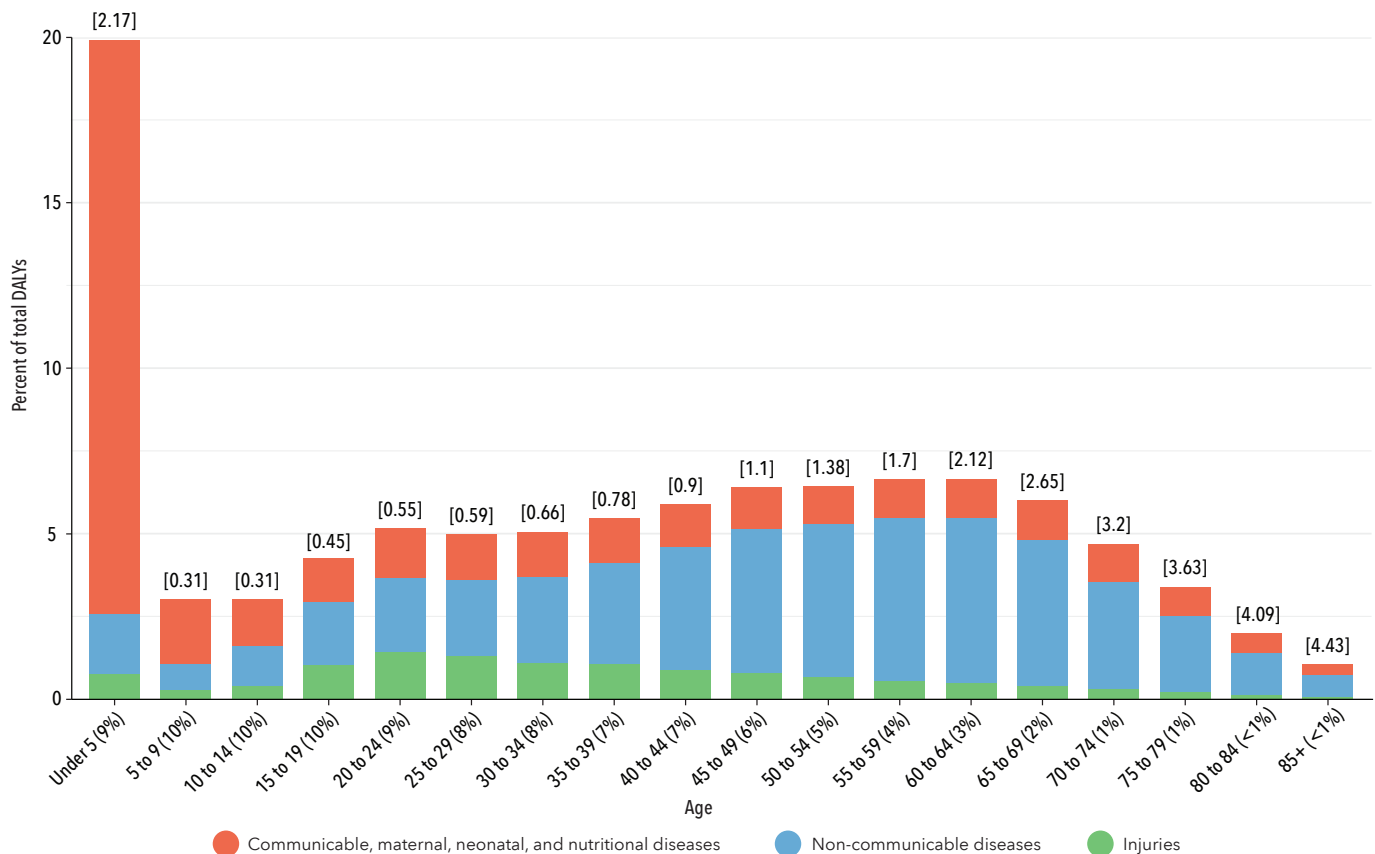
How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016



\*Change not significant.  
The percent figure in brackets next to each cause is DALYs from that cause out of total DALYs.

†COPD is chronic obstructive pulmonary disease.  
‡Sense organ diseases includes mainly hearing and vision loss.  
§Self-harm refers to suicide and the nonfatal outcomes of self-harm.

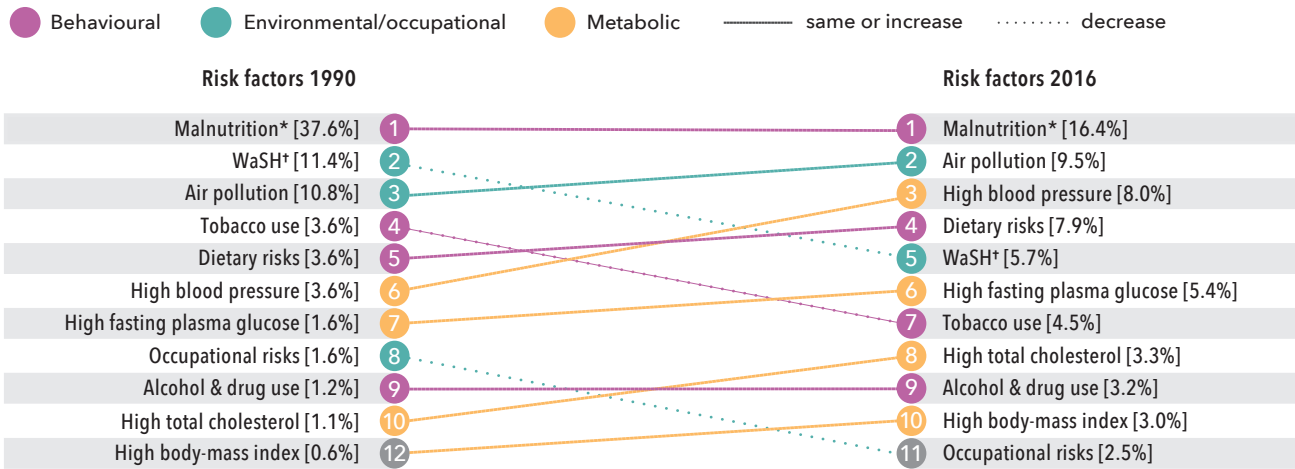
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

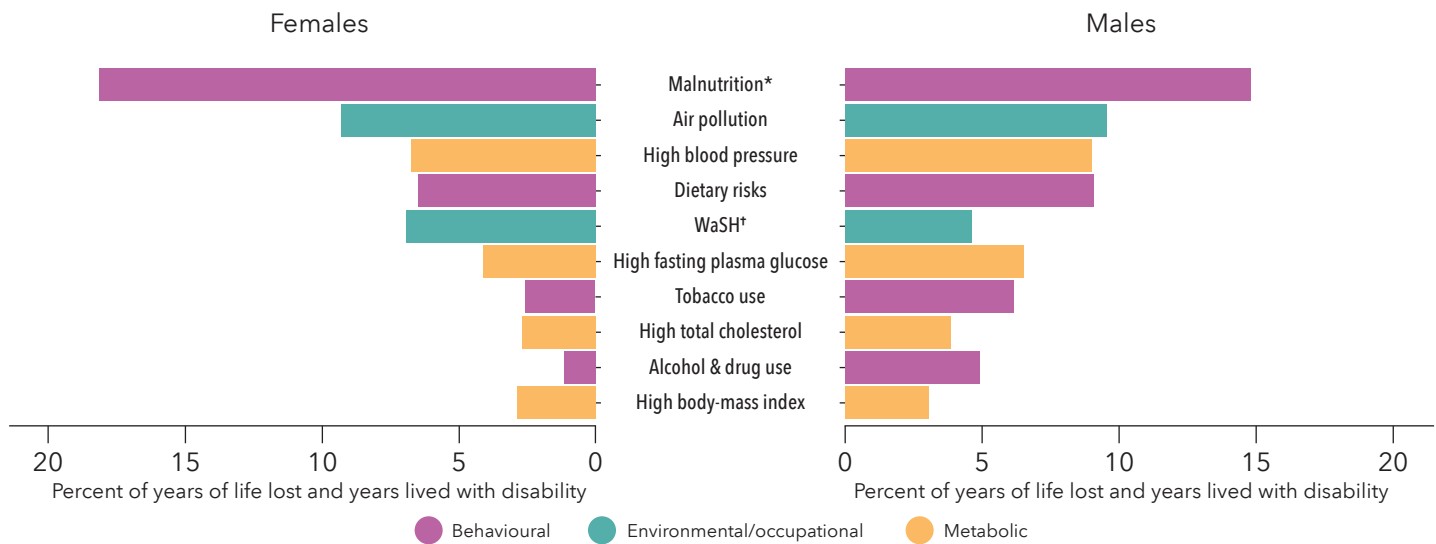


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Delhi

## 1990 life expectancy

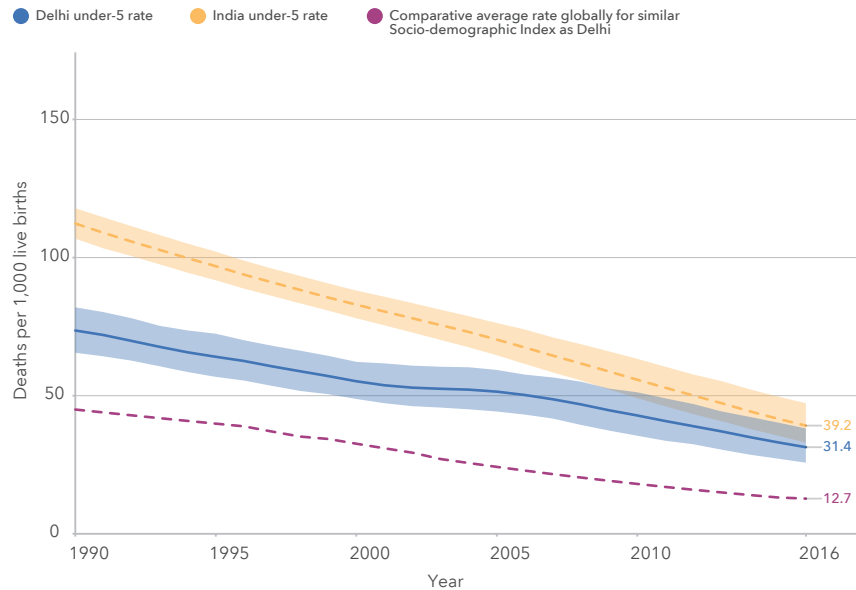
Females: 65.6 years Males: 63.5 years

## 2016 life expectancy

Females: 74.7 years Males: 70.8 years

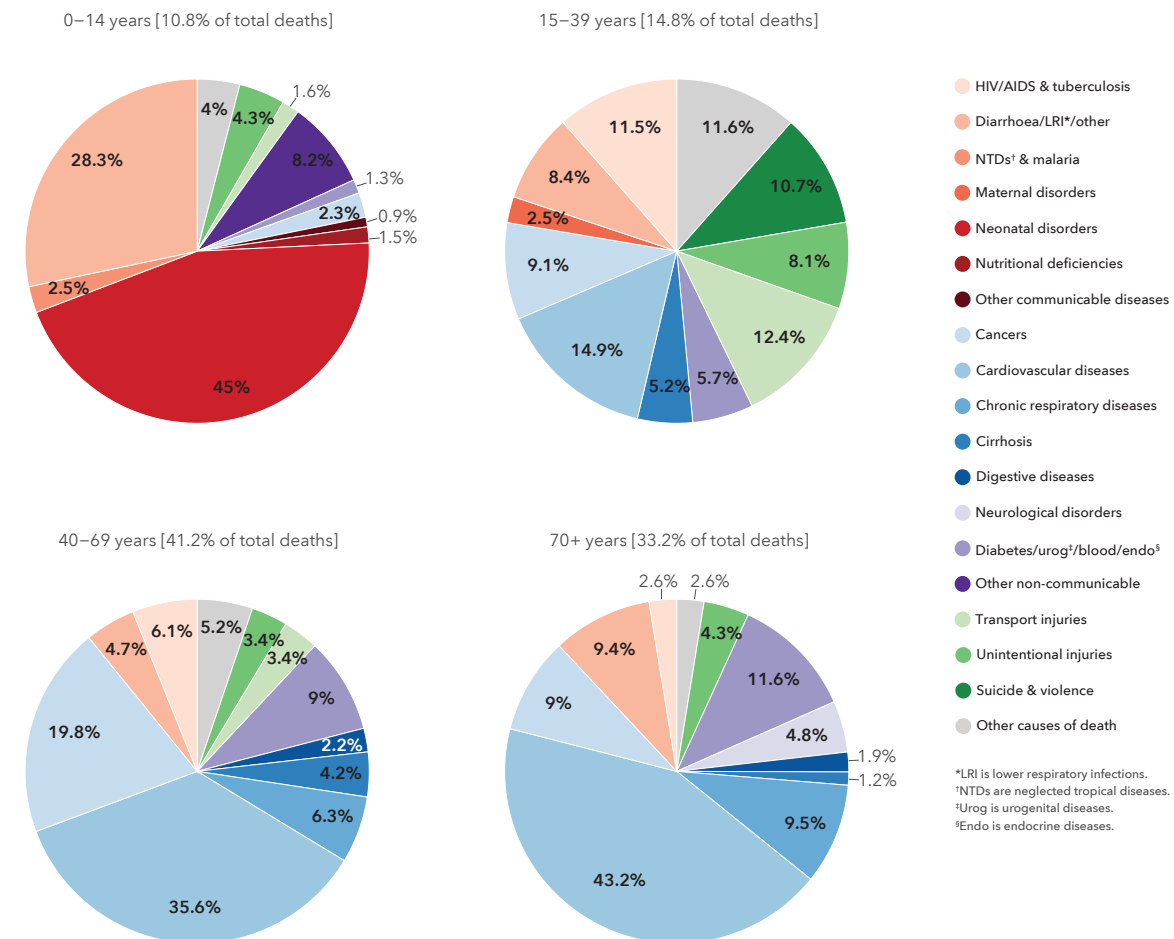
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

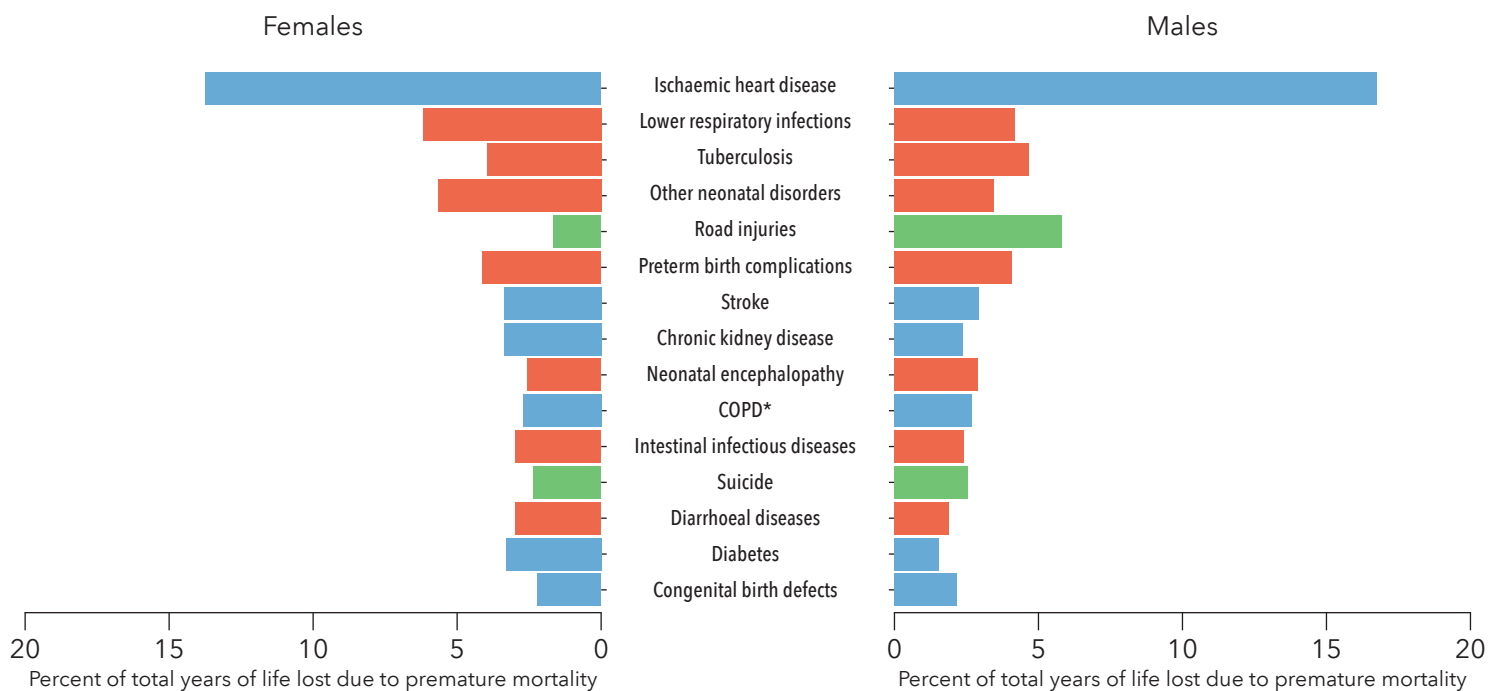
Percent contribution of top 10 causes of death by age group, both sexes, 2016



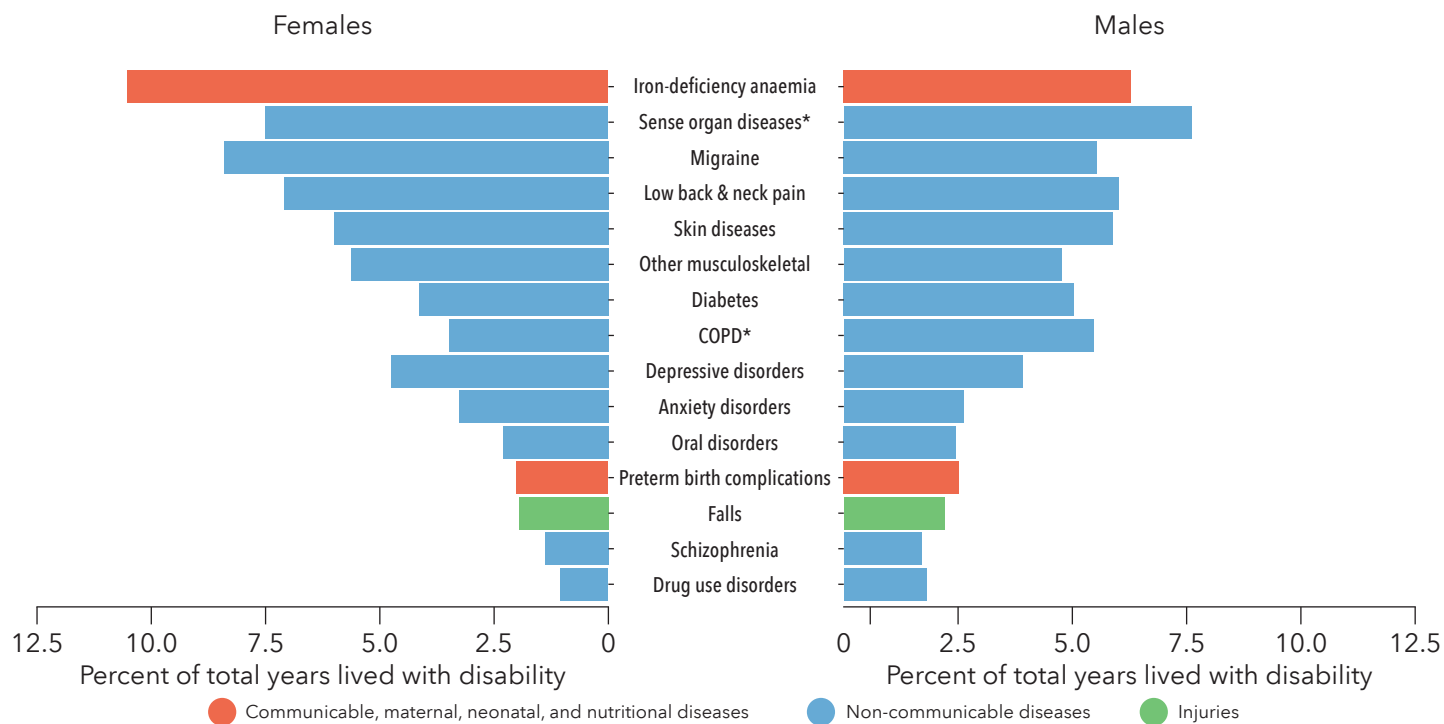
\*LRI is lower respiratory infections.  
<sup>†</sup>NTDs are neglected tropical diseases.  
<sup>‡</sup>Urog is urogenital diseases.  
<sup>§</sup>Endo is endocrine diseases.

**Proportion of total disease burden from:**  
 Premature death: 59.2% | Disability or morbidity: 40.8%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

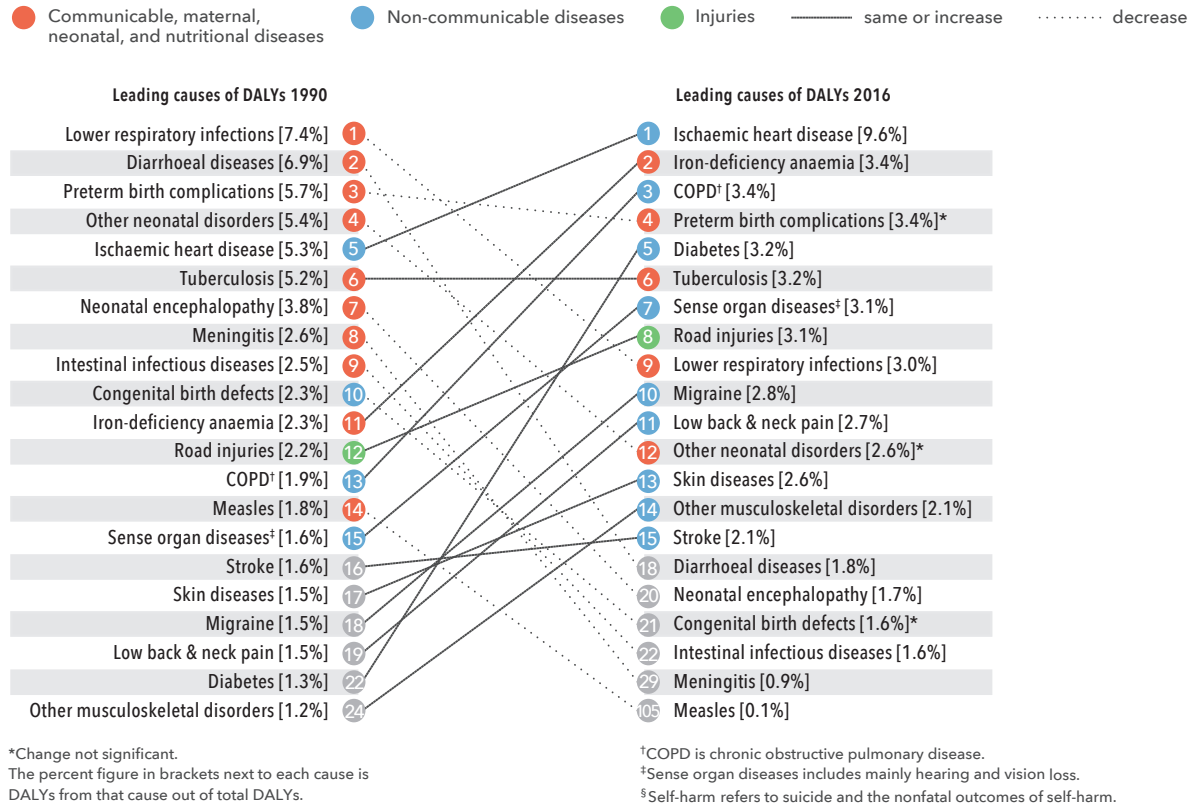


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

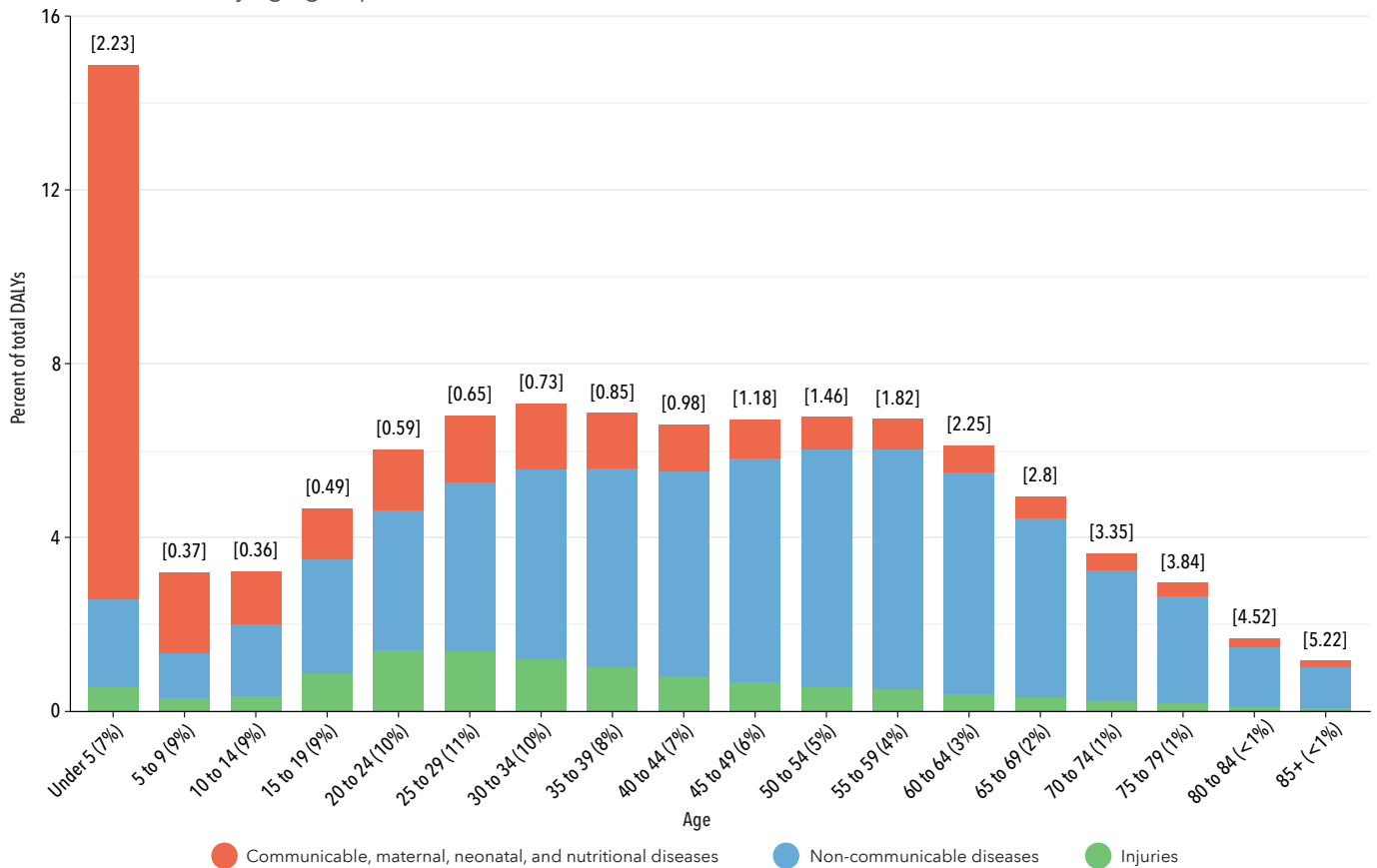


## Proportion of total disease burden from: CMNNDs: 27.8% | NCDs: 61.2% | Injuries: 11.0%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990–2016



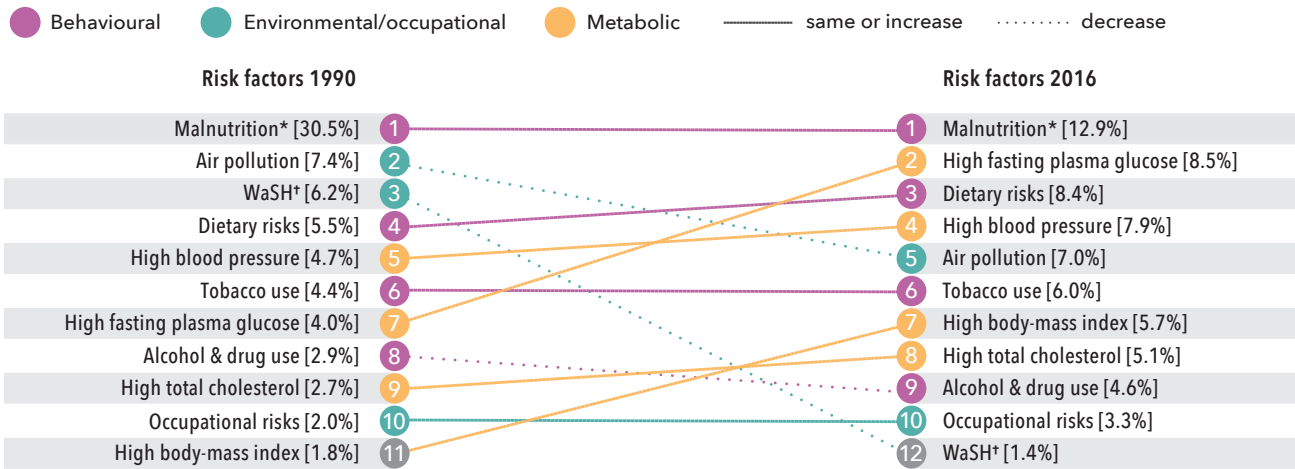
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

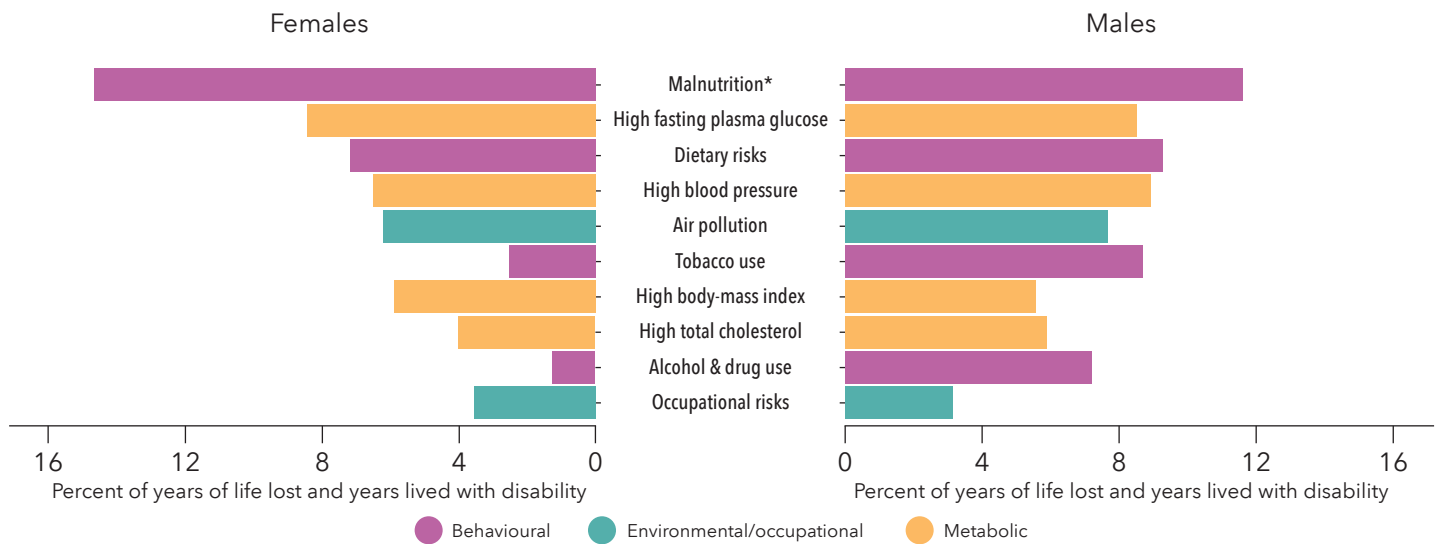


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
\*WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Goa

## 1990 life expectancy

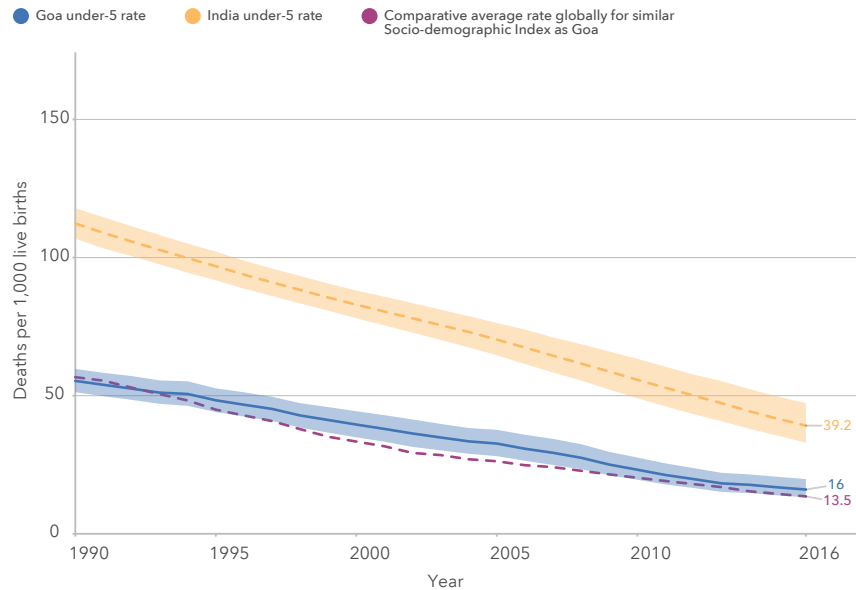
Females: 69.2 years Males: 66.1 years

## 2016 life expectancy

Females: 78.4 years Males: 73.0 years

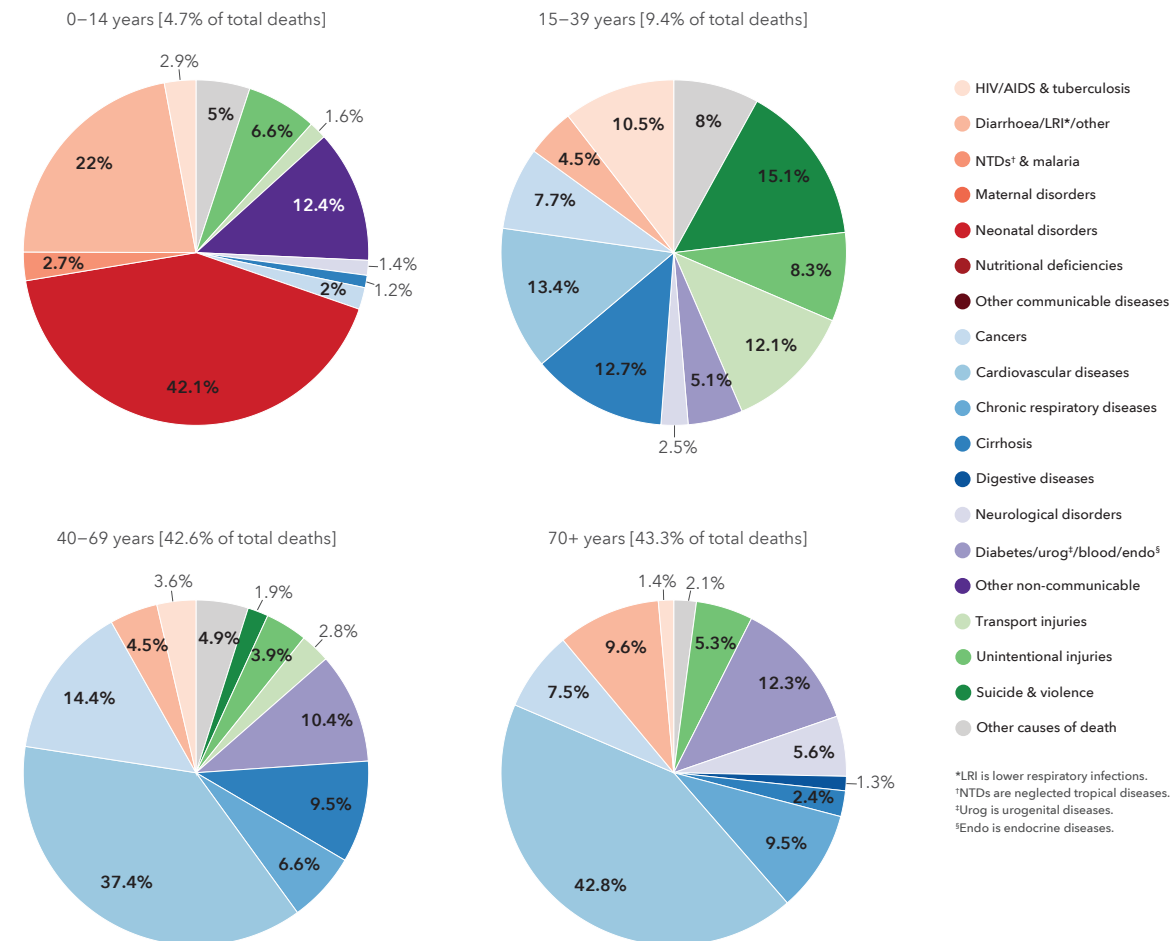
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



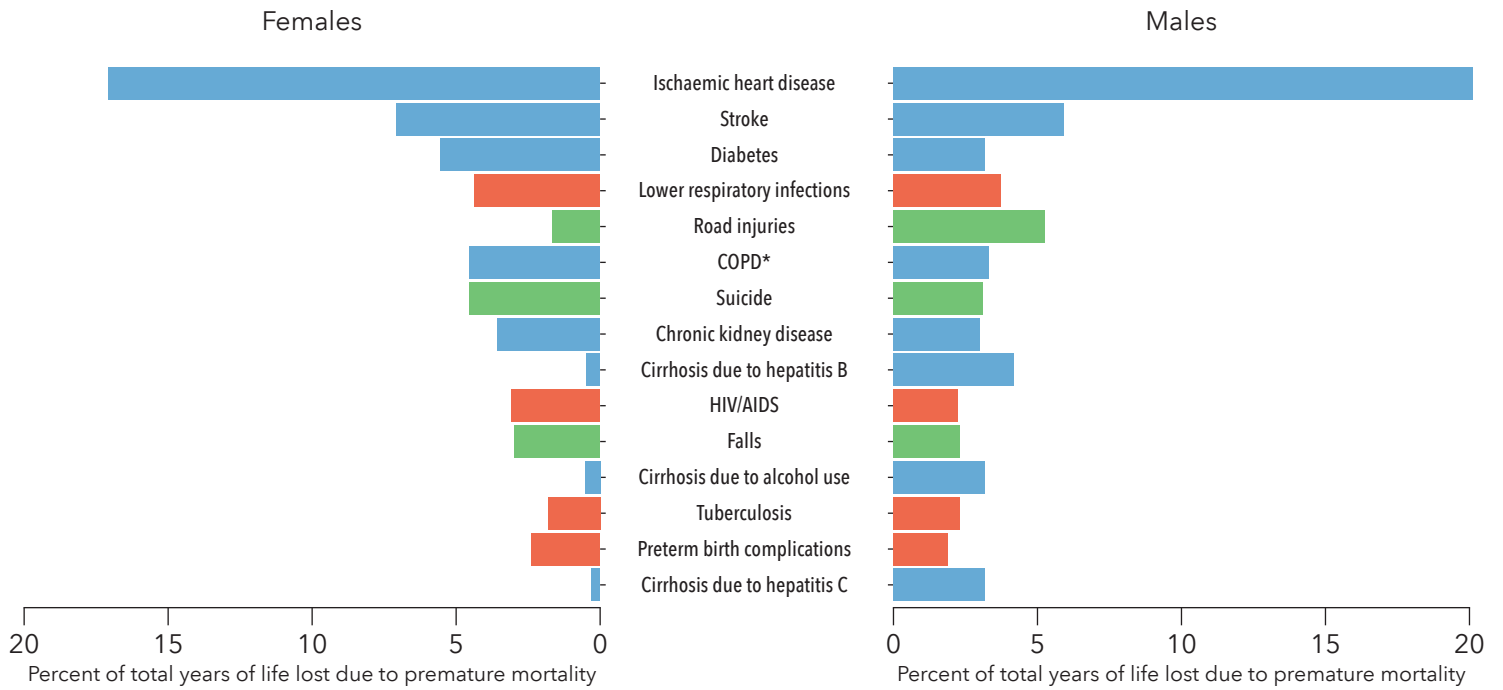
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

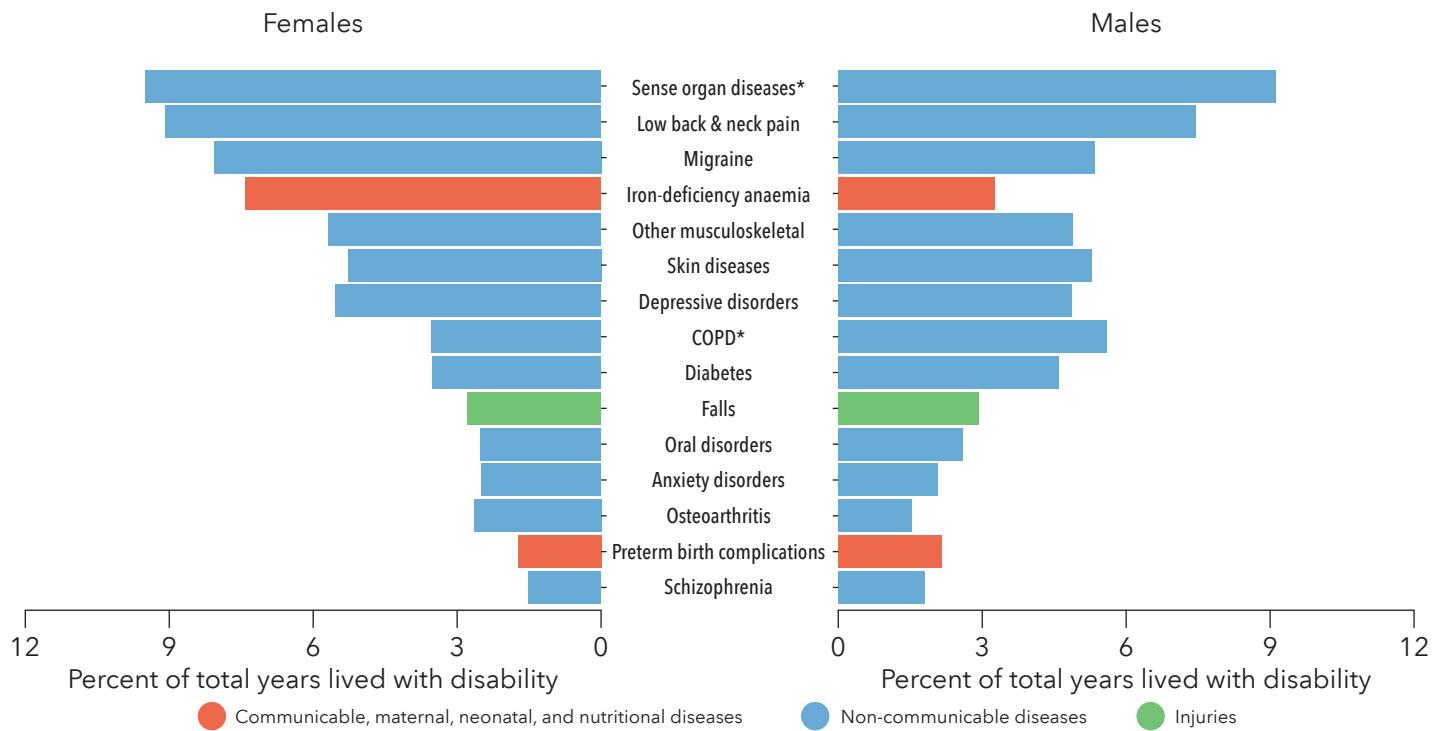


**Proportion of total disease burden from:**  
 Premature death: 56.1% | Disability or morbidity: 43.9%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

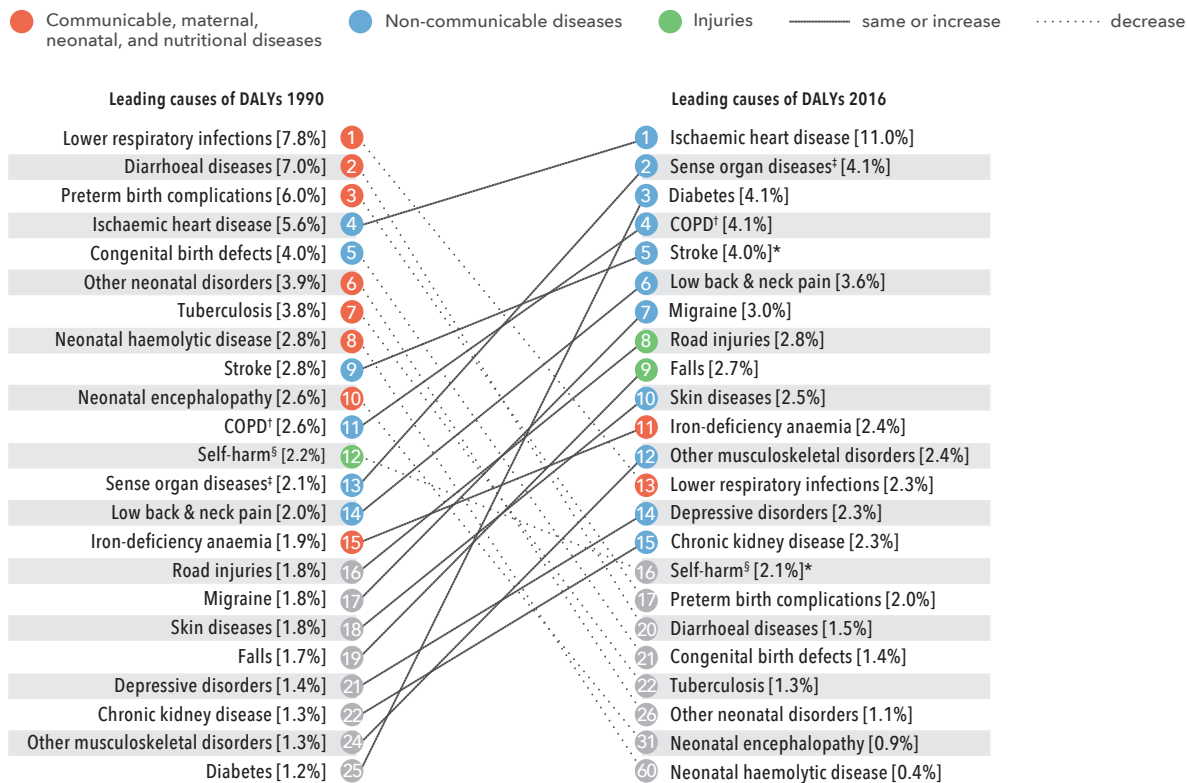


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 17.6% | NCDs: 70.9% | Injuries: 11.5%

### How have the leading causes of death and disability combined changed from 1990 to 2016?

Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016

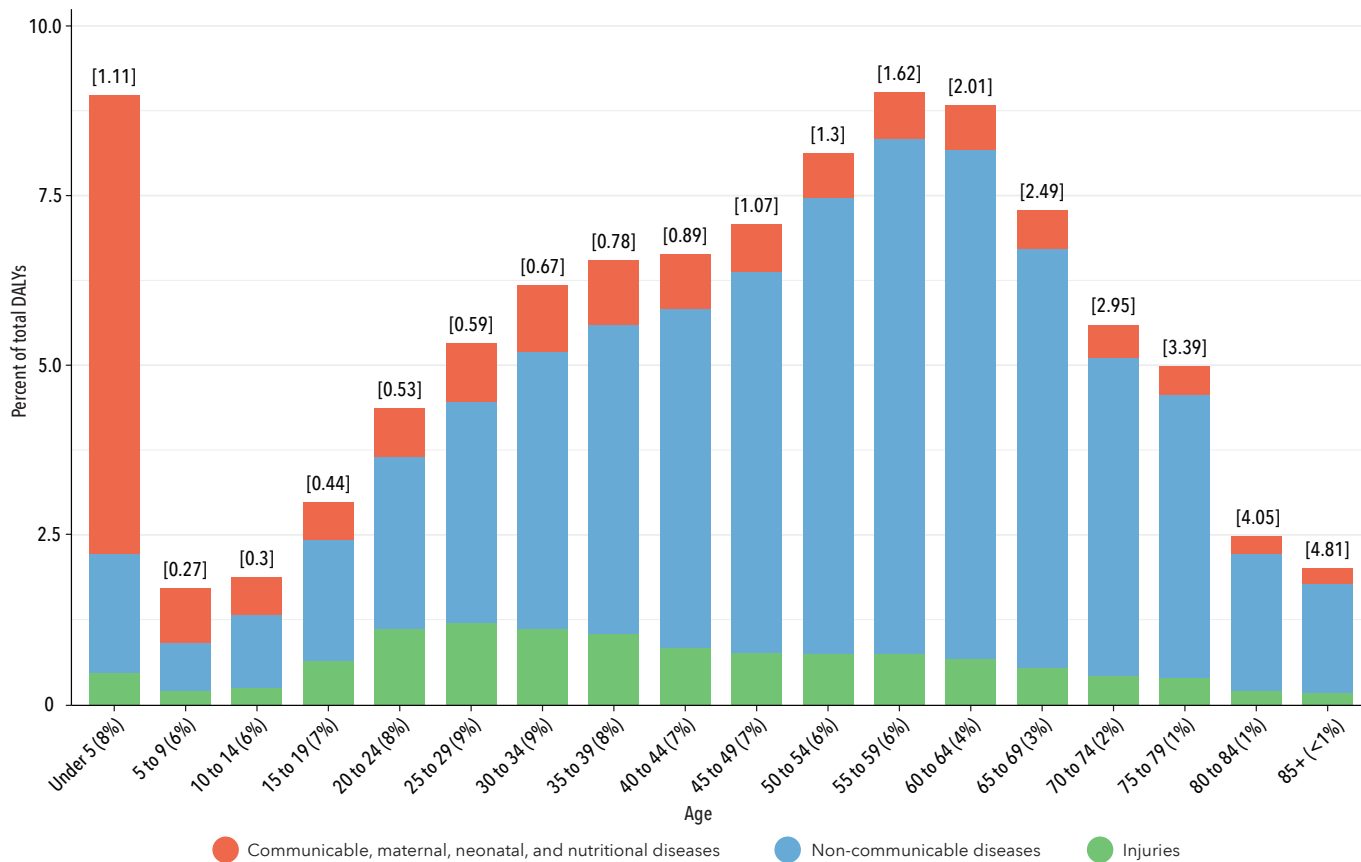


\*Change not significant.  
†The percent figure in brackets next to each cause is DALYs from that cause out of total DALYs.

†COPD is chronic obstructive pulmonary disease.  
‡Sense organ diseases includes mainly hearing and vision loss.  
§Self-harm refers to suicide and the nonfatal outcomes of self-harm.

### What caused the most death and disability combined across age groups in 2016?

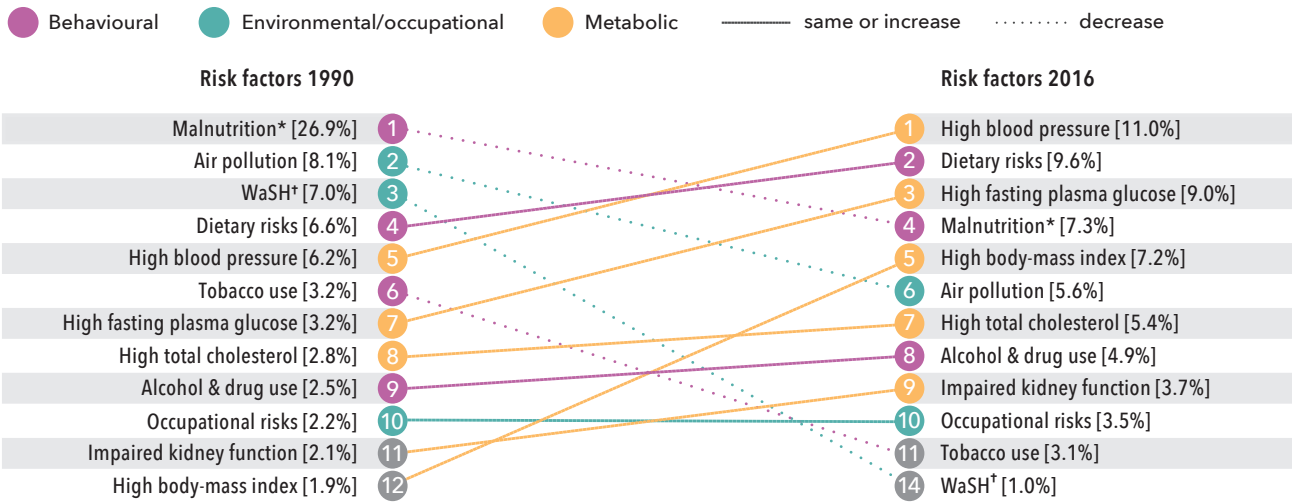
Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

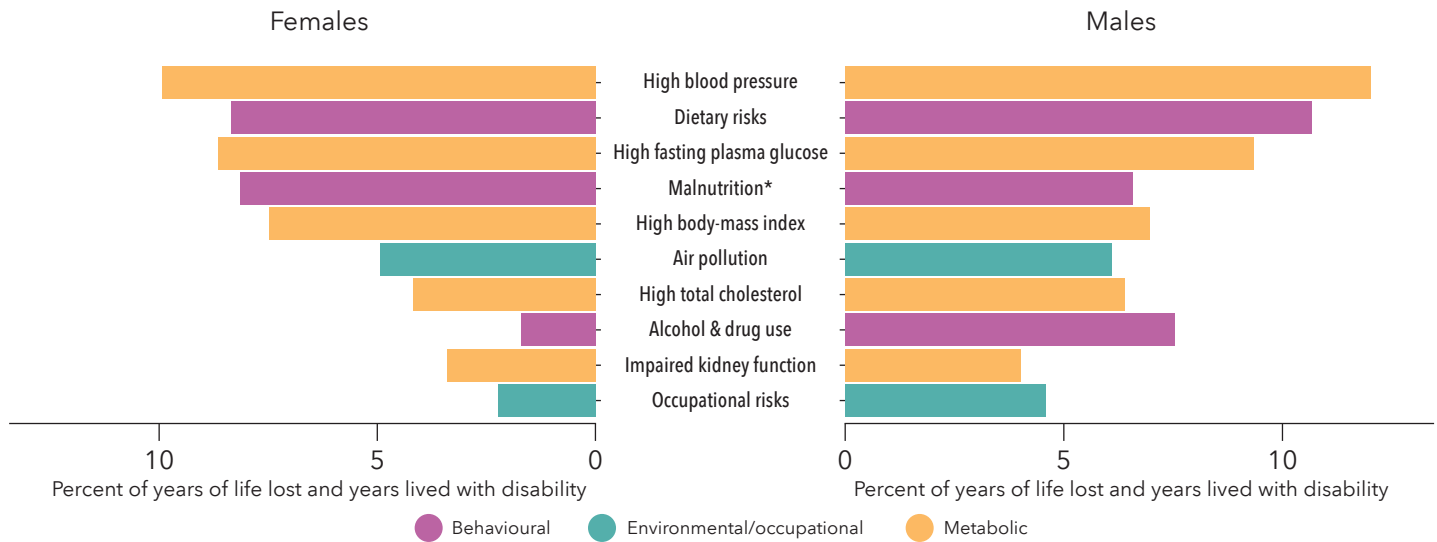


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Gujarat

1990 life expectancy

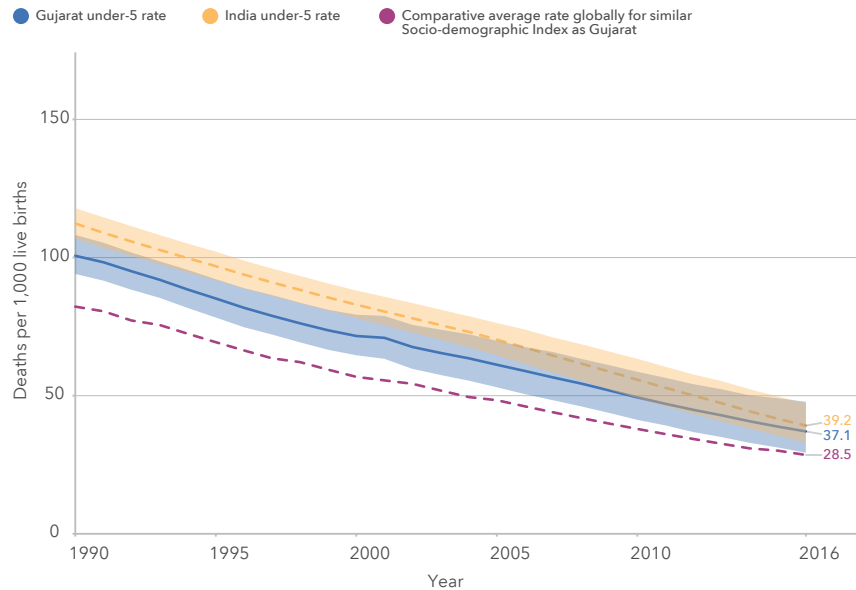
Females: 62.2 years Males: 59.8 years

2016 life expectancy

Females: 71.5 years Males: 67.3 years

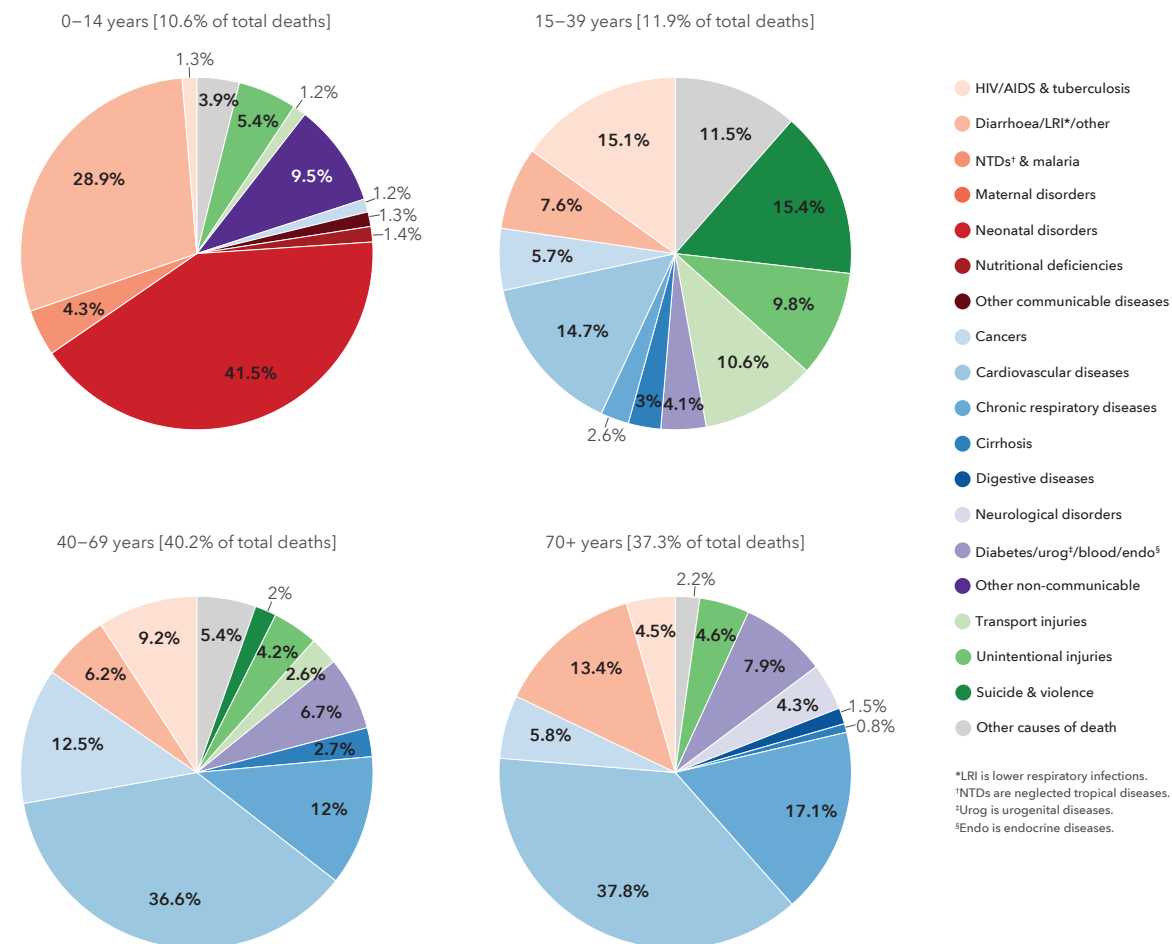
## How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



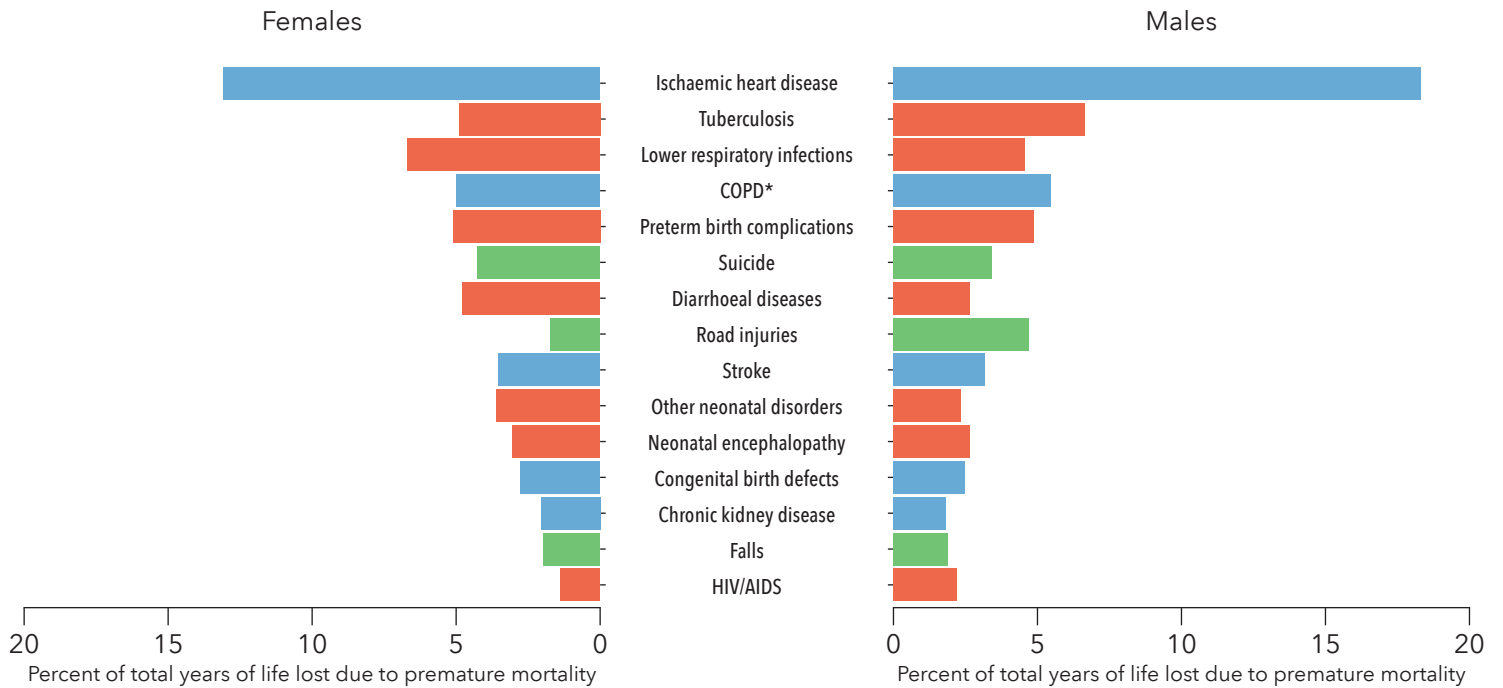
## What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

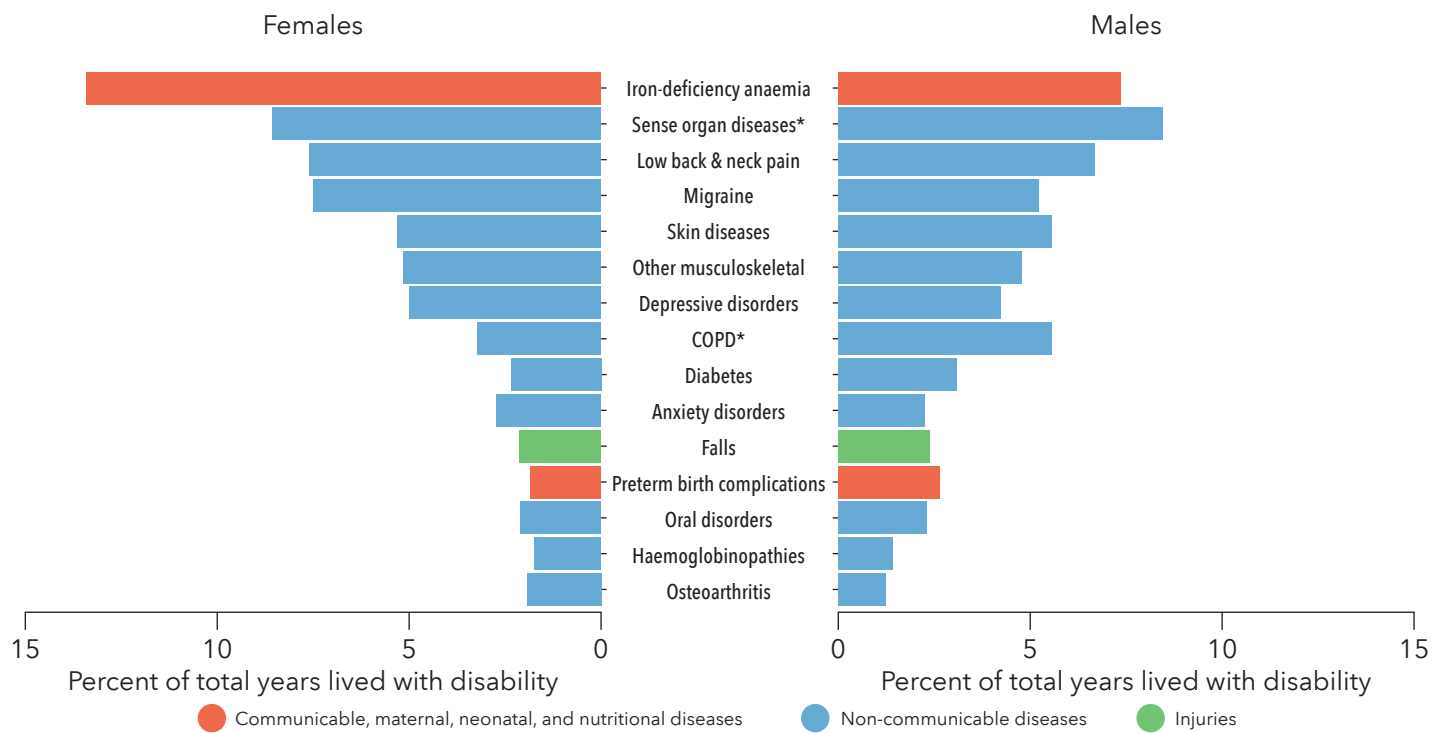


**Proportion of total disease burden from:**  
 Premature death: 66.2% | Disability or morbidity: 33.8%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

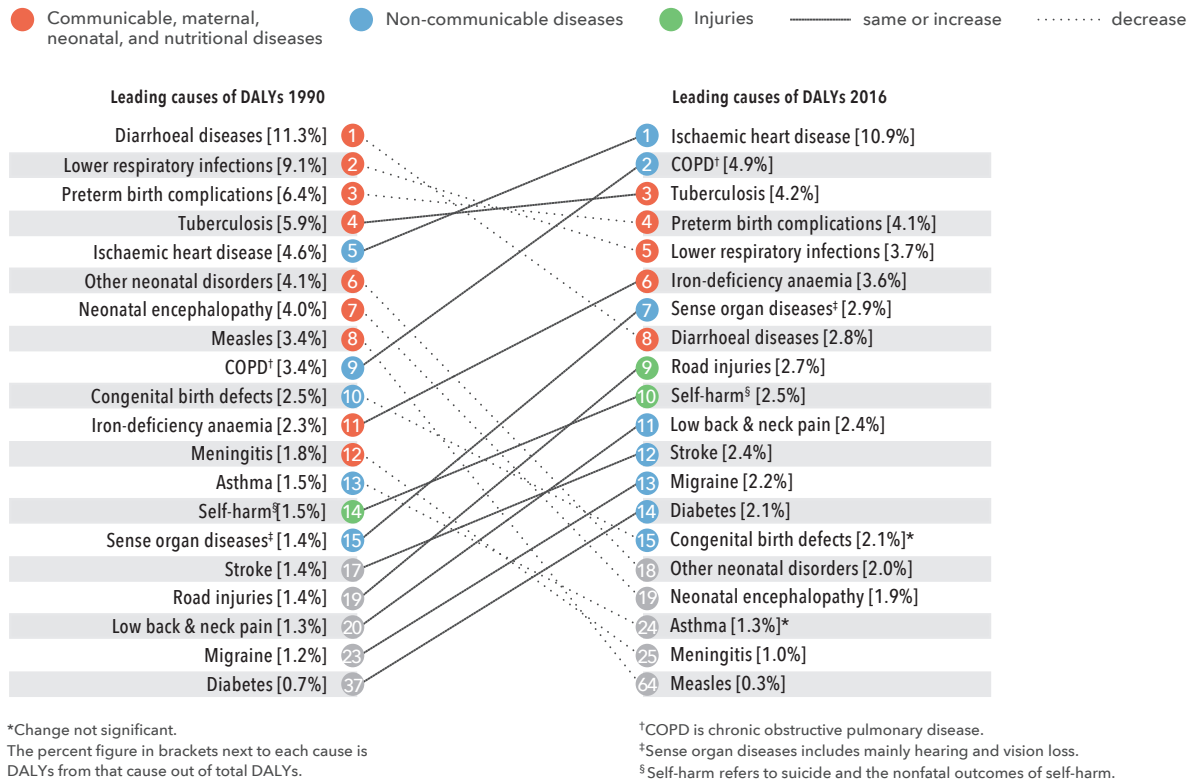


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

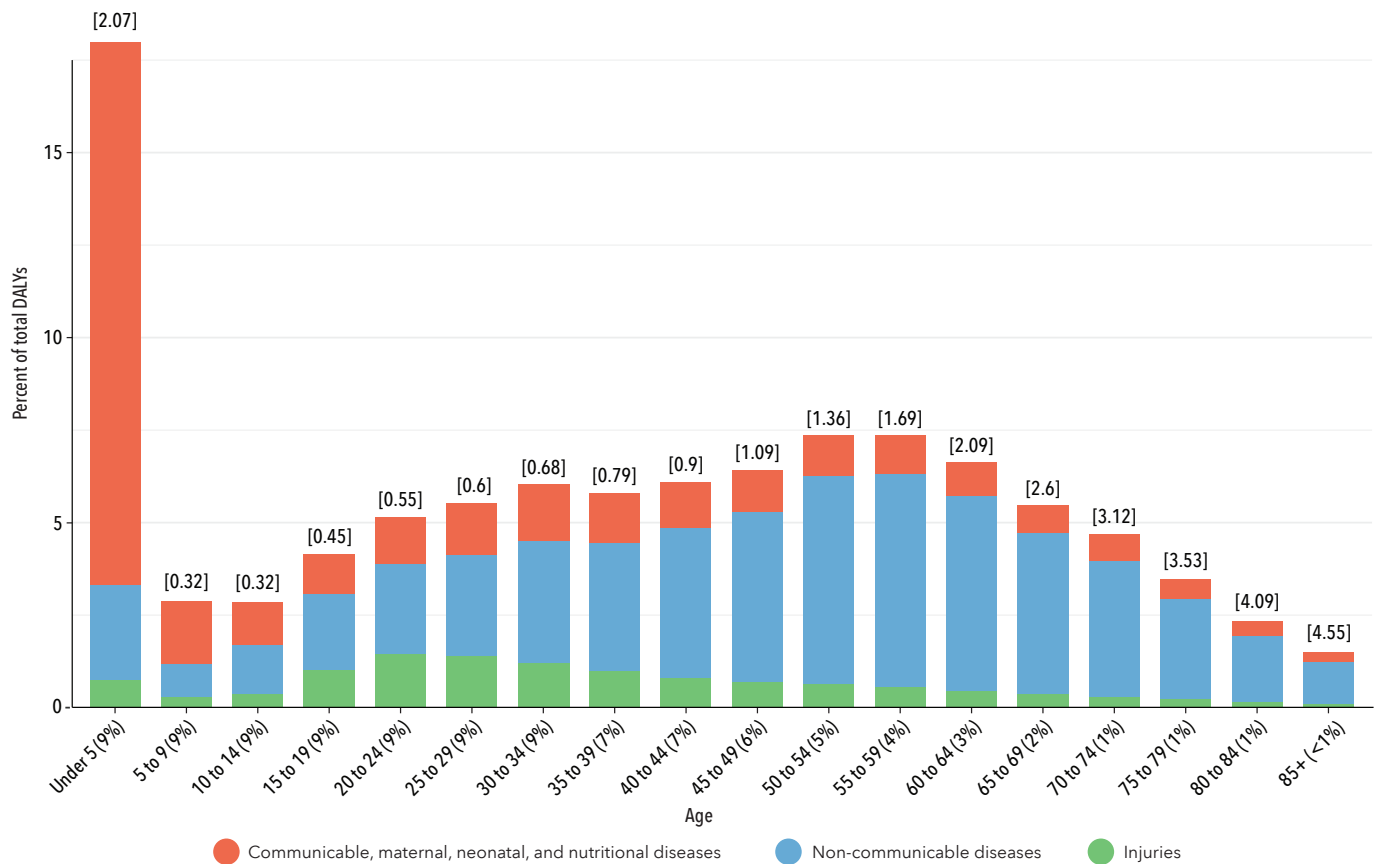


## Proportion of total disease burden from: CMNNDs: 31.6% | NCDs: 56.7% | Injuries: 11.7%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016



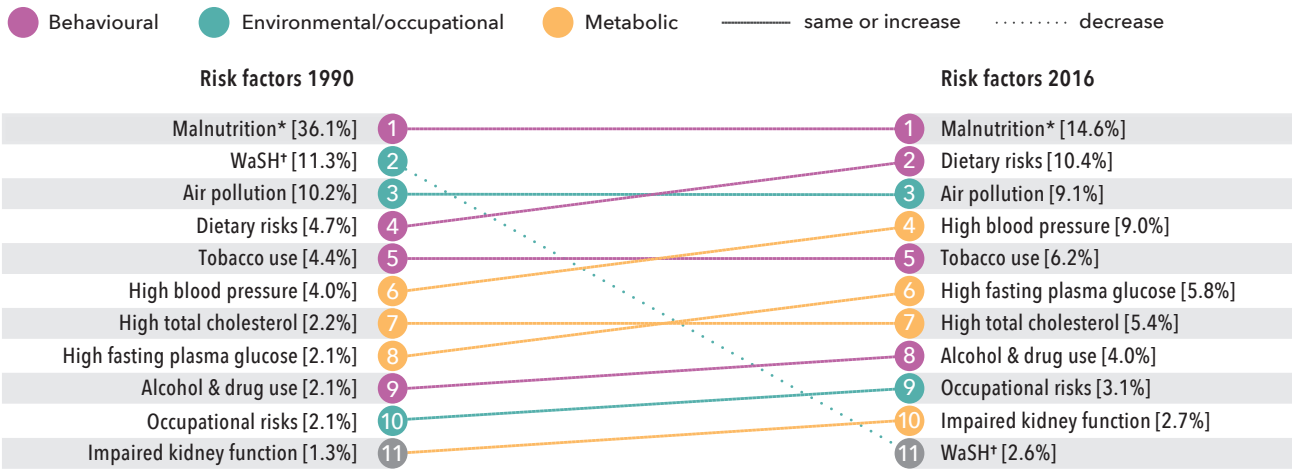
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group.  
The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

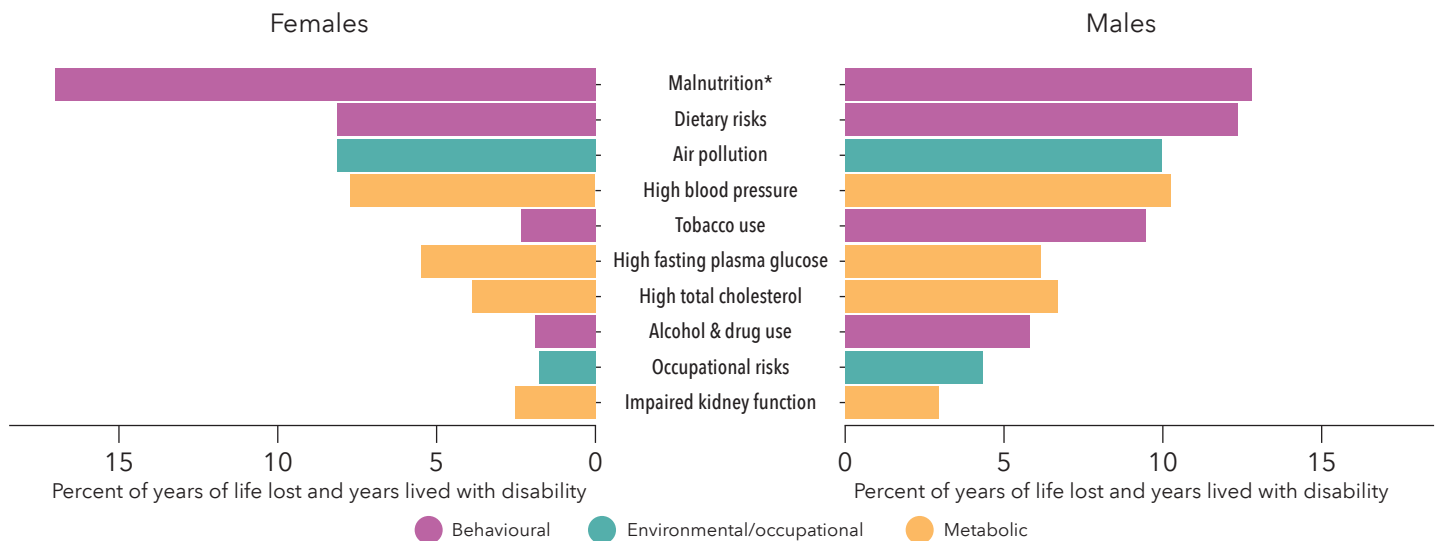


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Haryana

**1990 life expectancy**

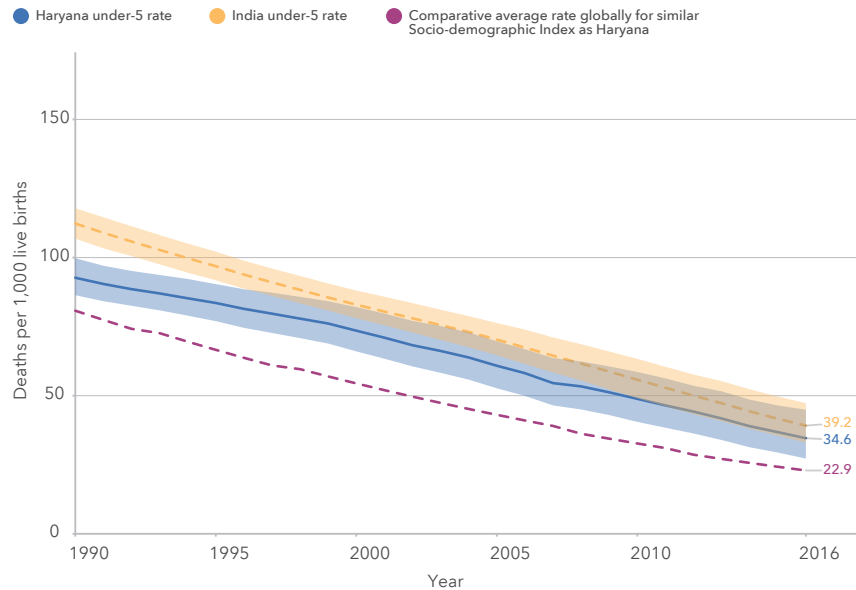
Females: 62.1 years Males: 60.1 years

**2016 life expectancy**

Females: 71.3 years Males: 65.0 years

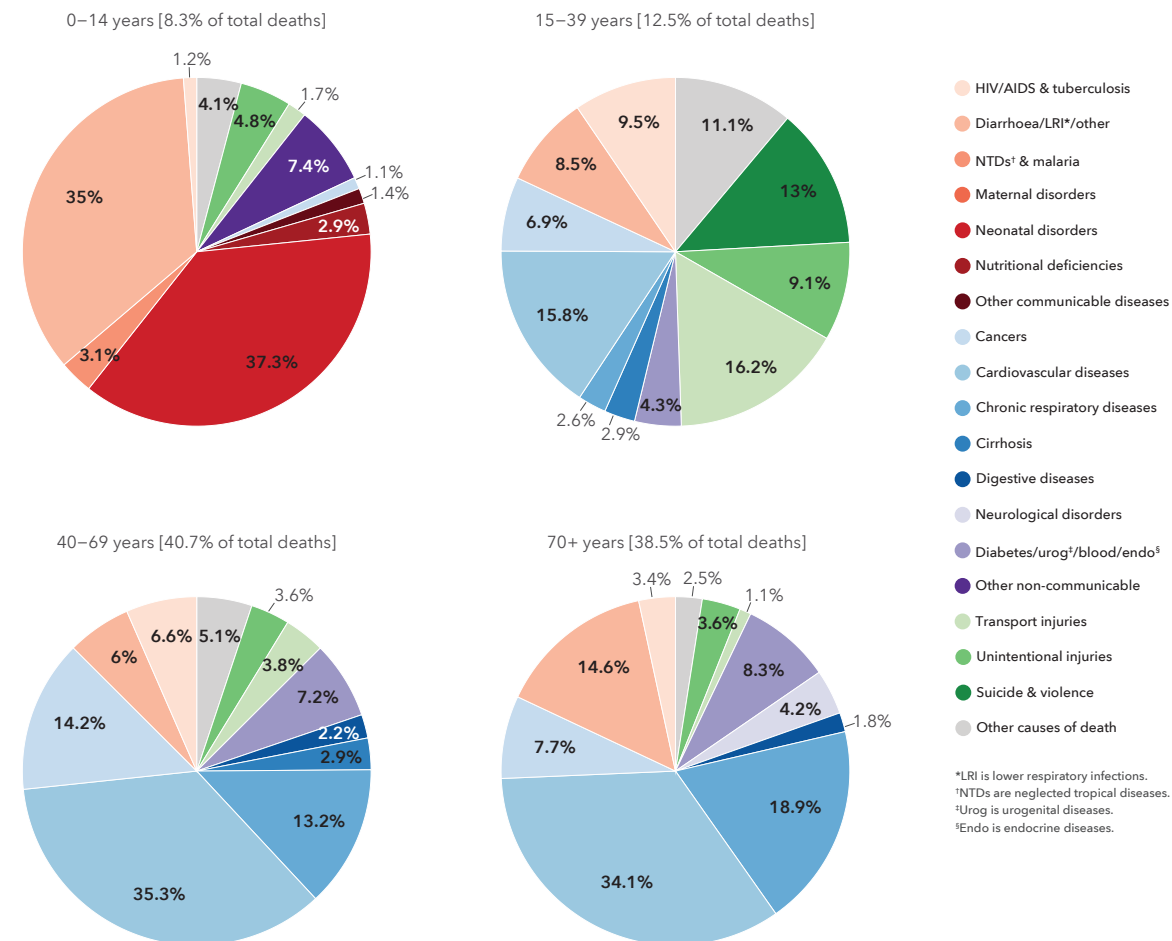
## How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



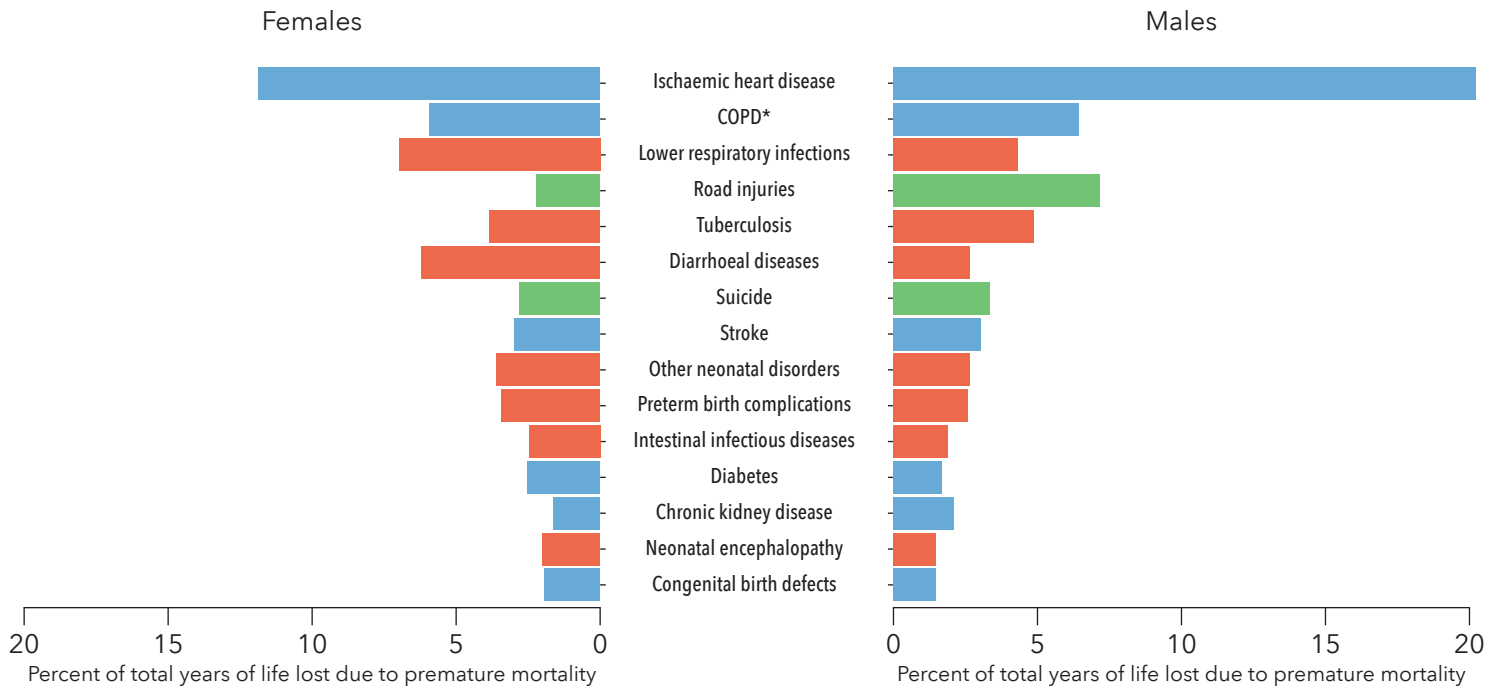
## What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

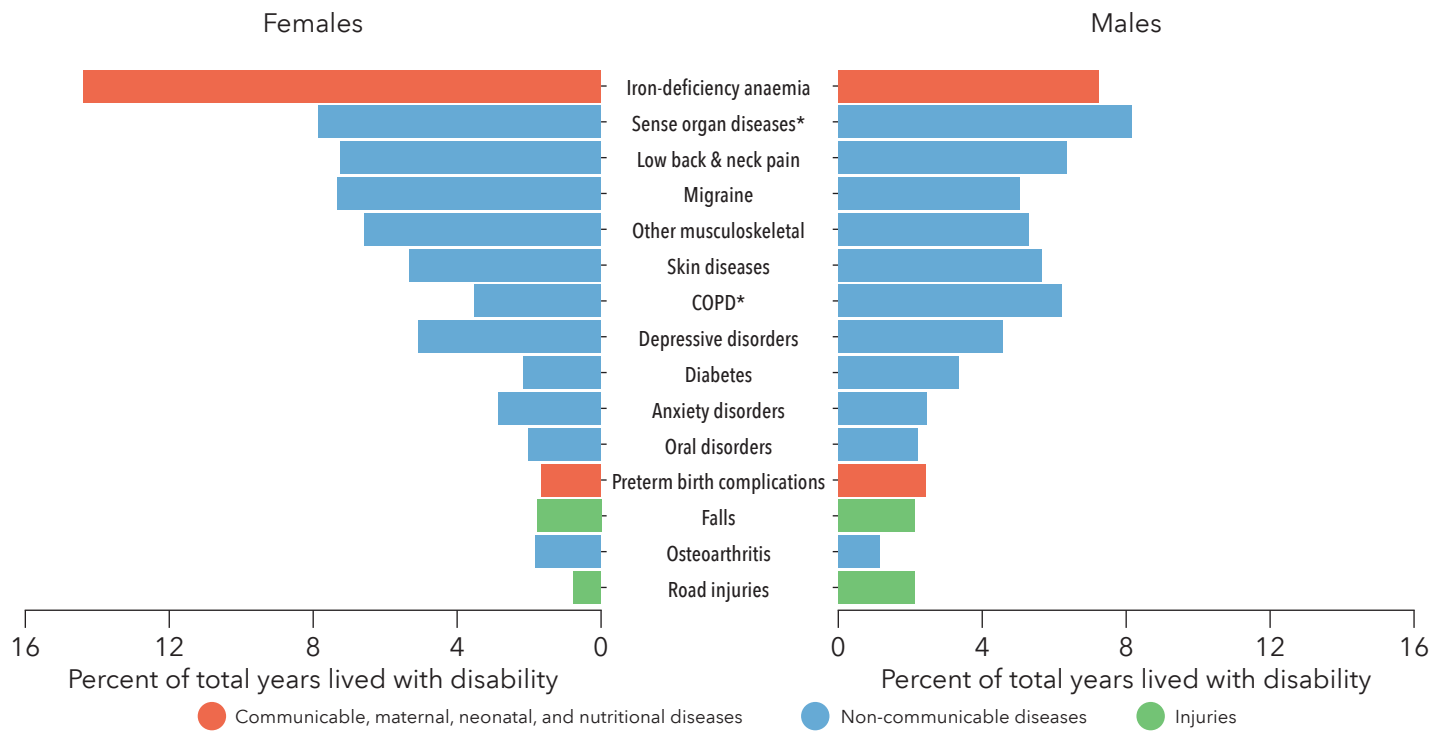


**Proportion of total disease burden from:**  
 Premature death: 67.3% | Disability or morbidity: 32.7%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



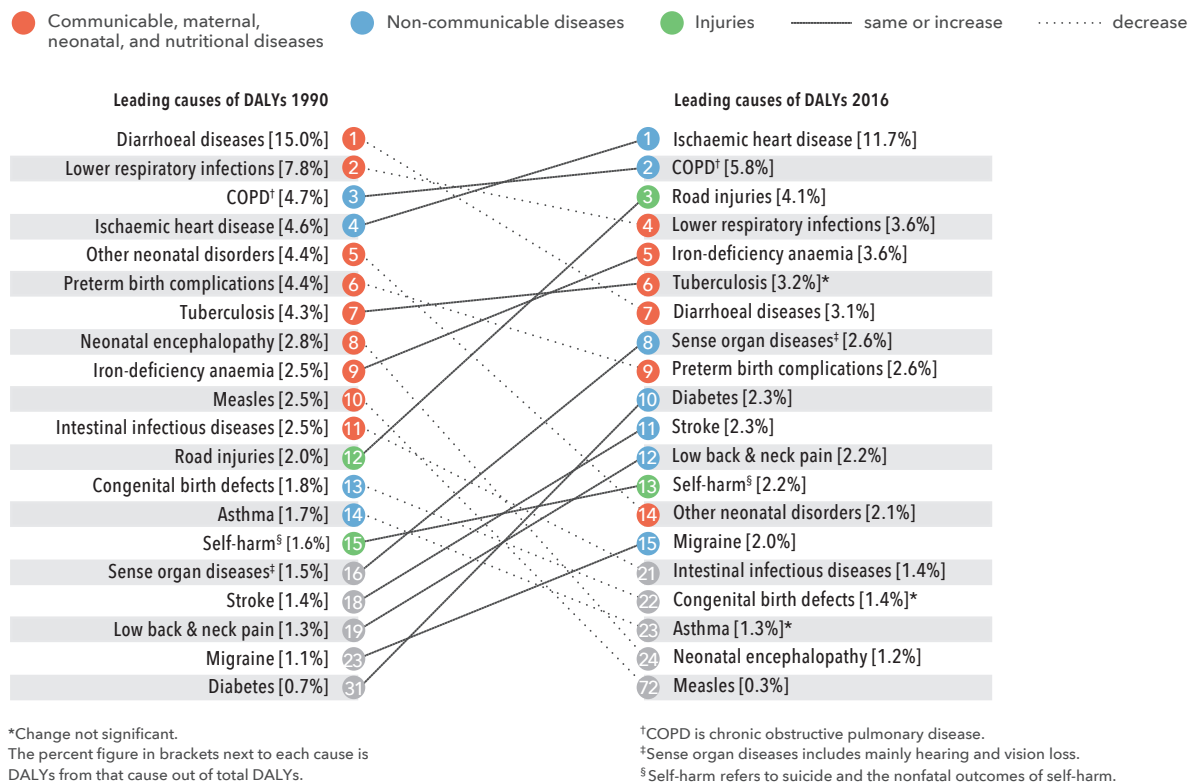
**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



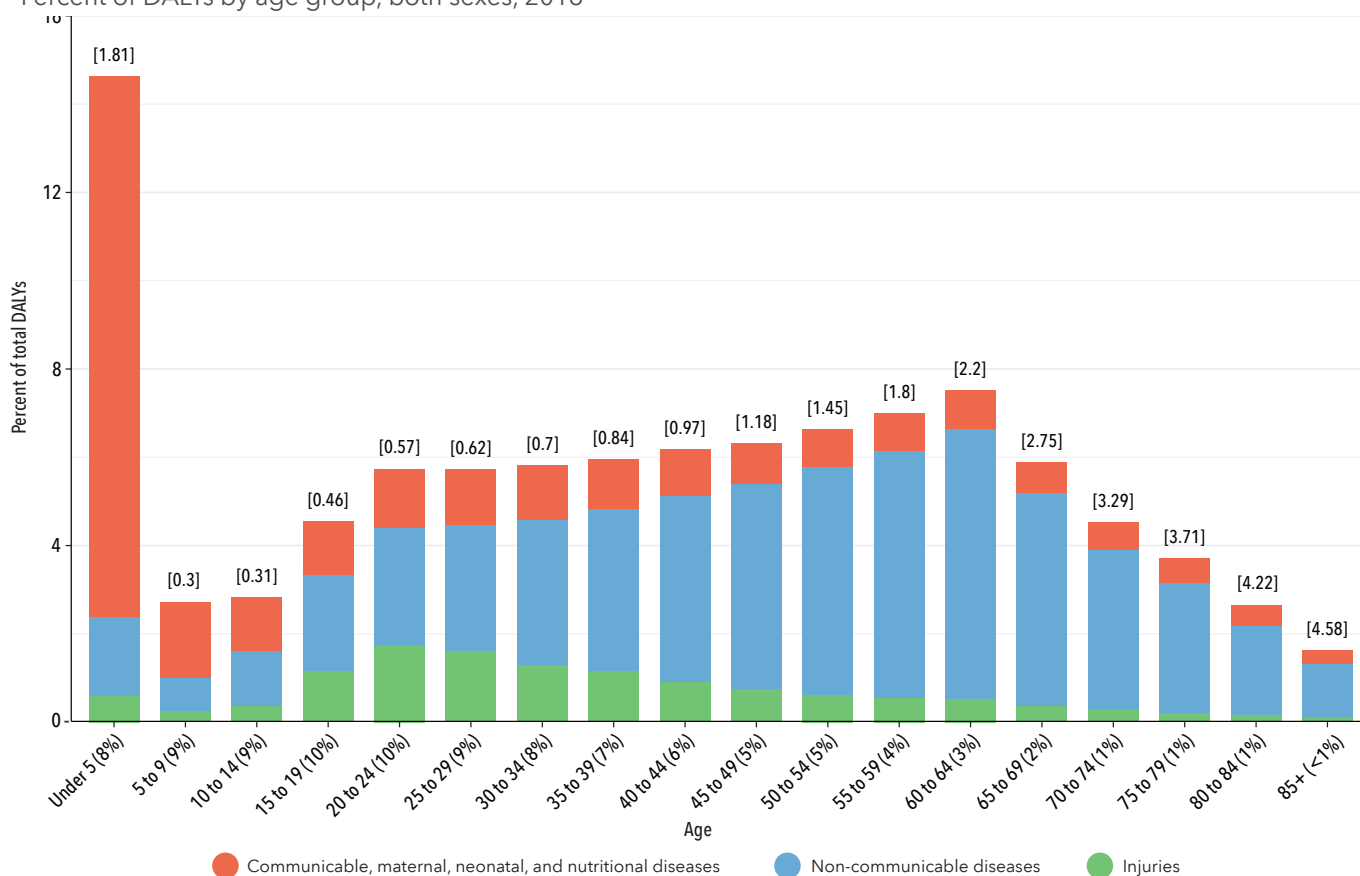
\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 28.5% | NCDs: 58.8% | Injuries: 12.7%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016



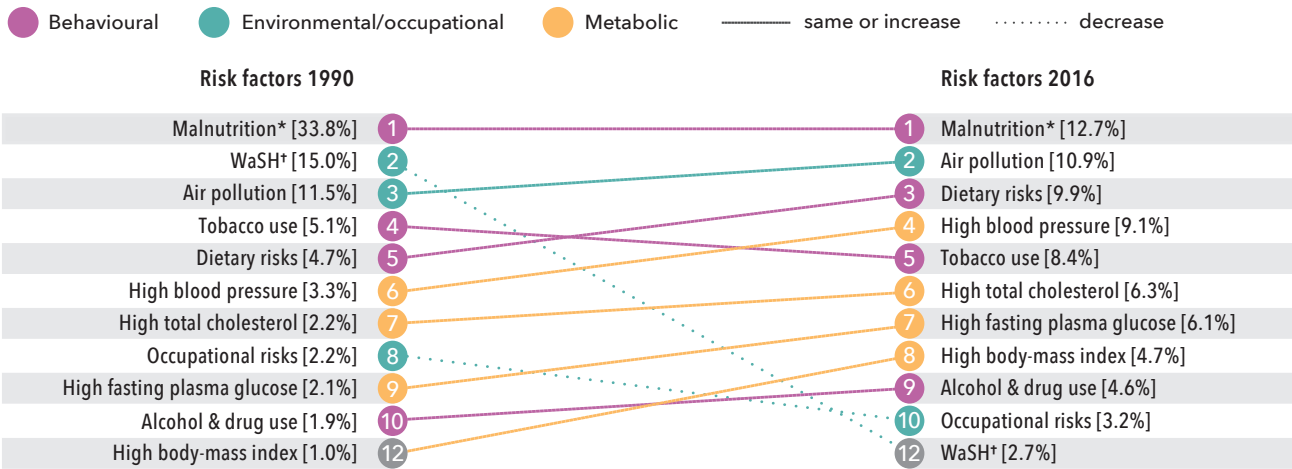
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

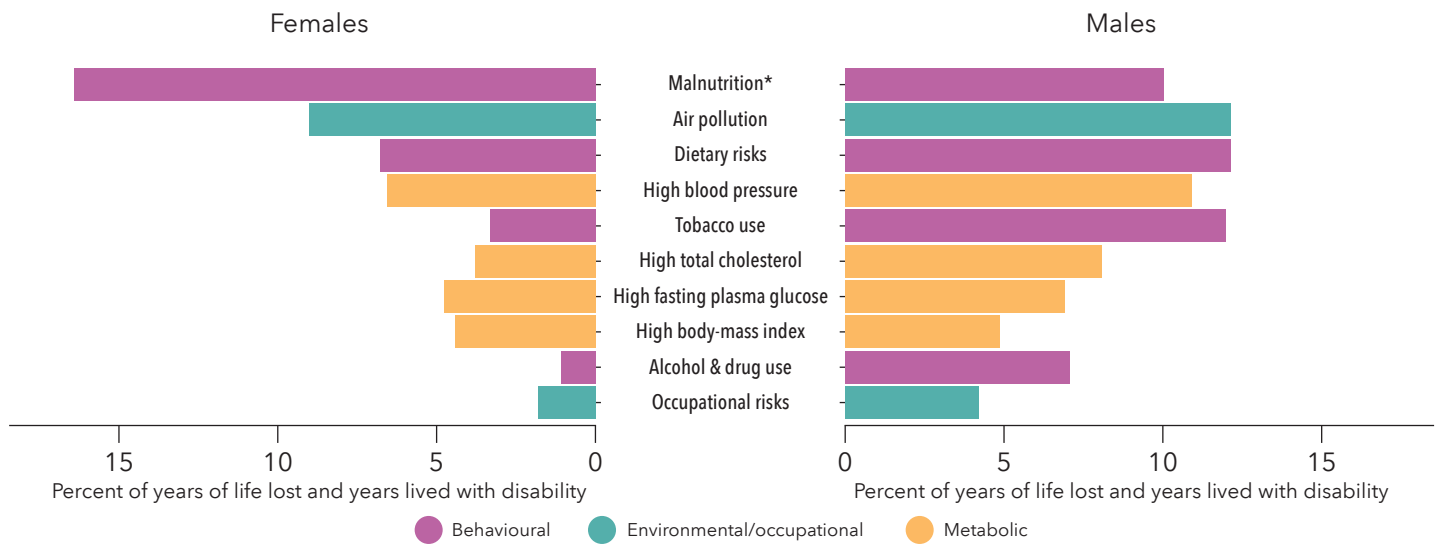


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Himachal Pradesh

## 1990 life expectancy

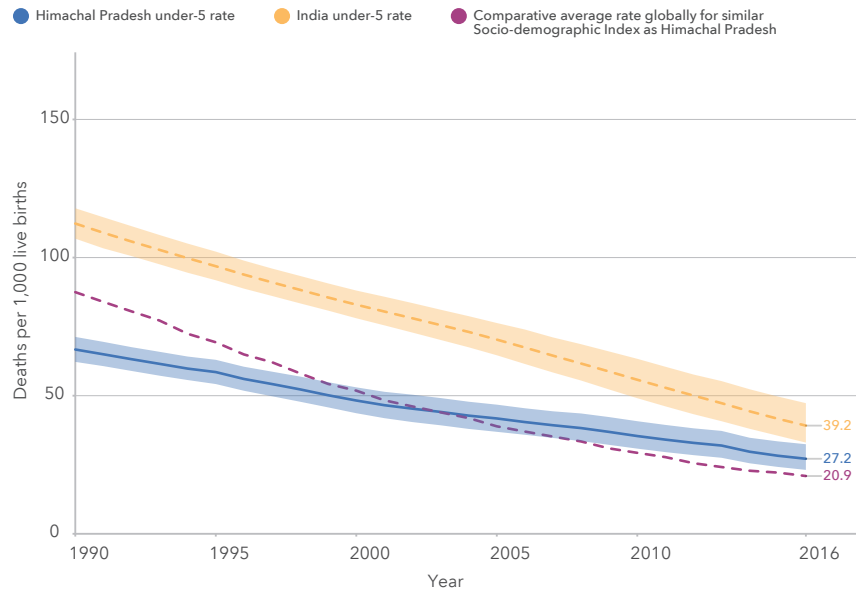
Females: 65.4 years Males: 64.2 years

## 2016 life expectancy

Females: 76.9 years Males: 71.0 years

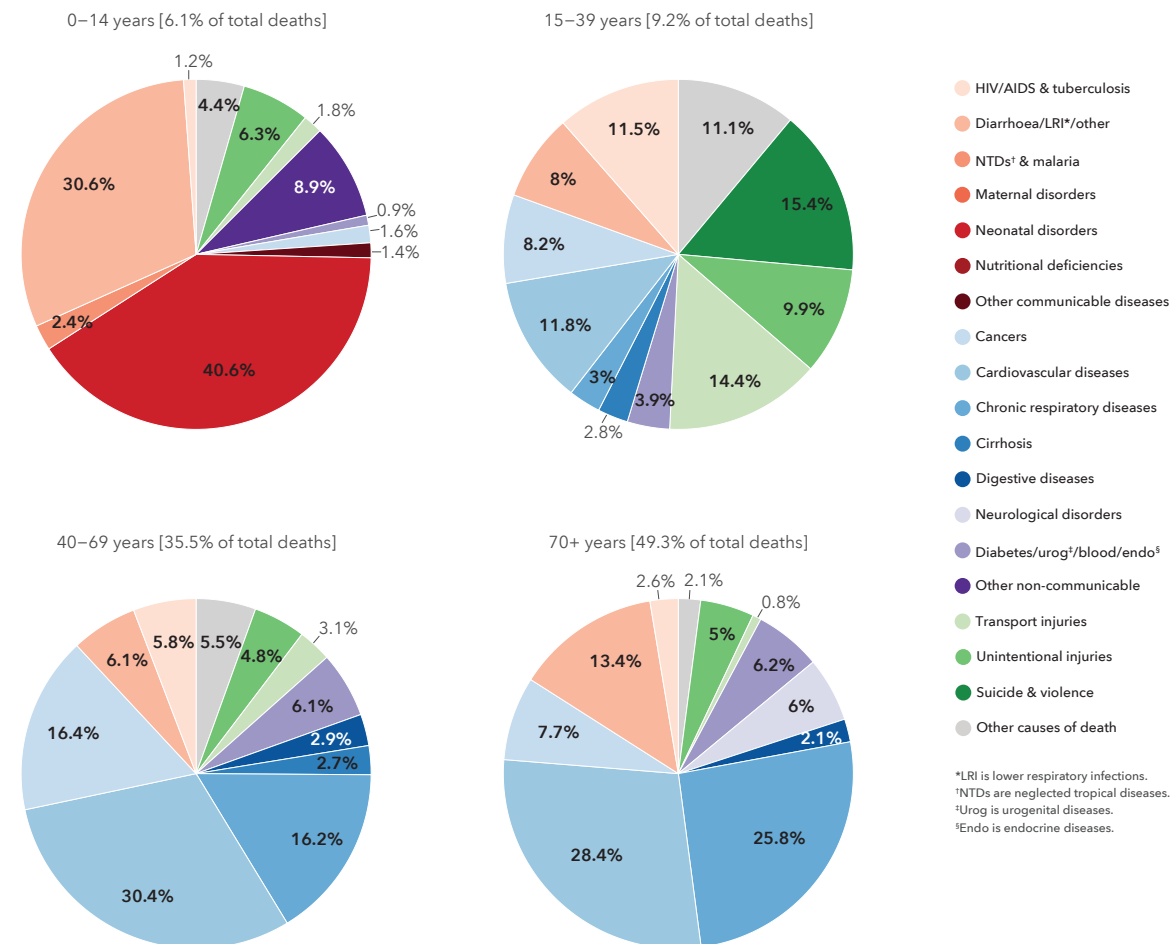
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

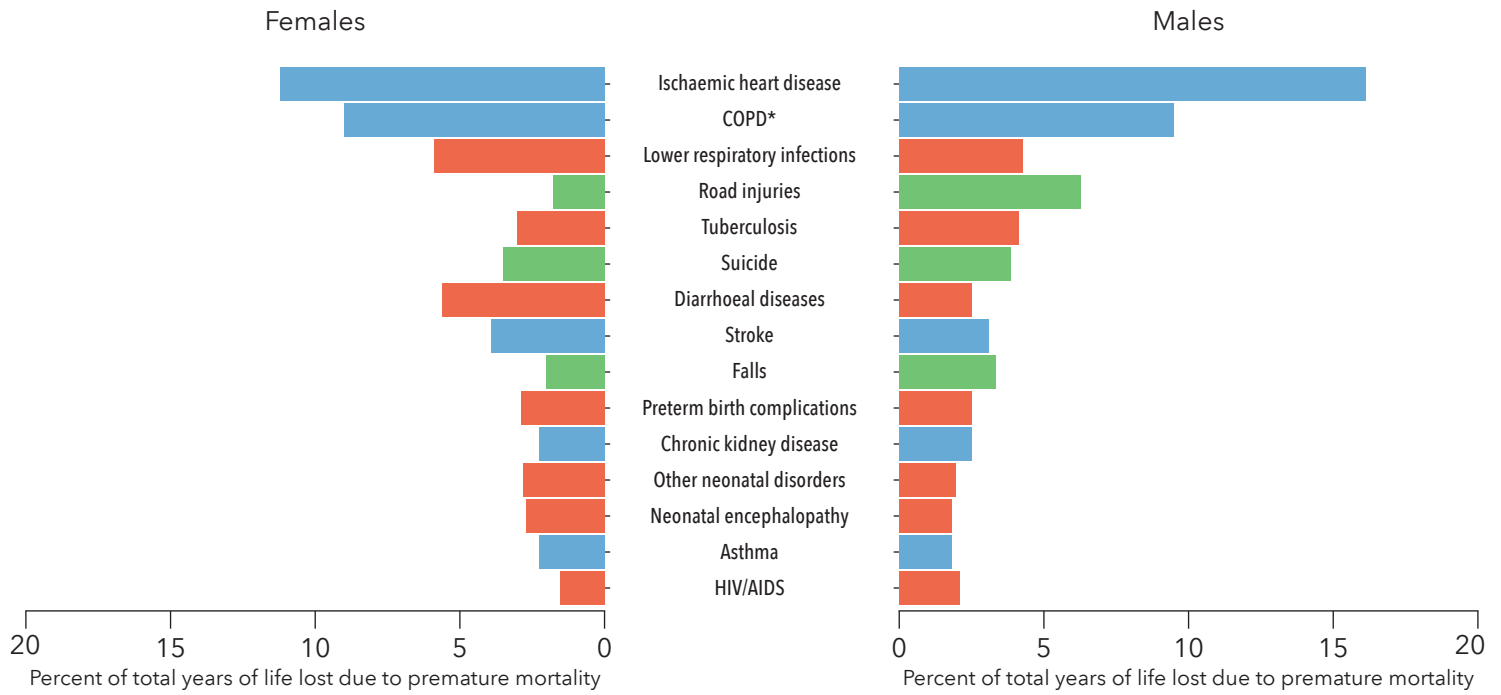
Percent contribution of top 10 causes of death by age group, both sexes, 2016



**Proportion of total disease burden from:**  
 Premature death: 59.0% | Disability or morbidity: 41.0%

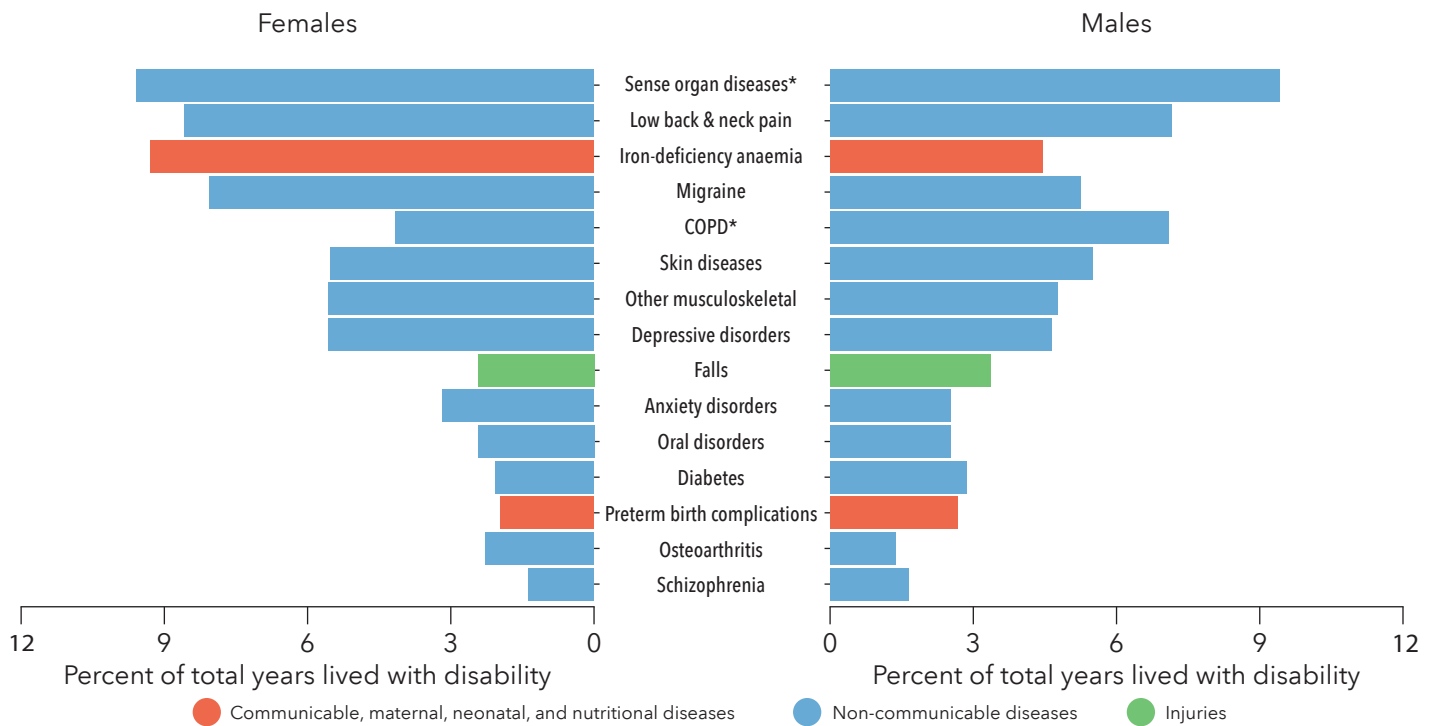
**What caused the most years of life lost, by sex, in 2016?**

Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**

Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

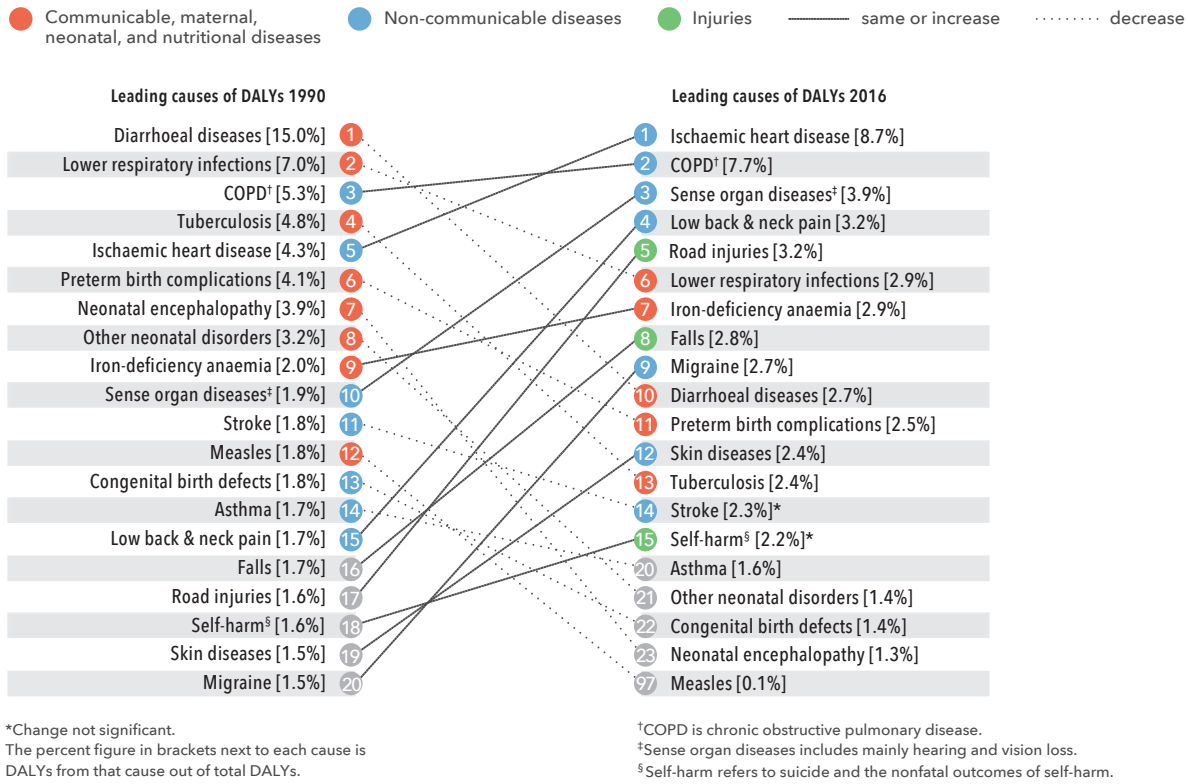


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

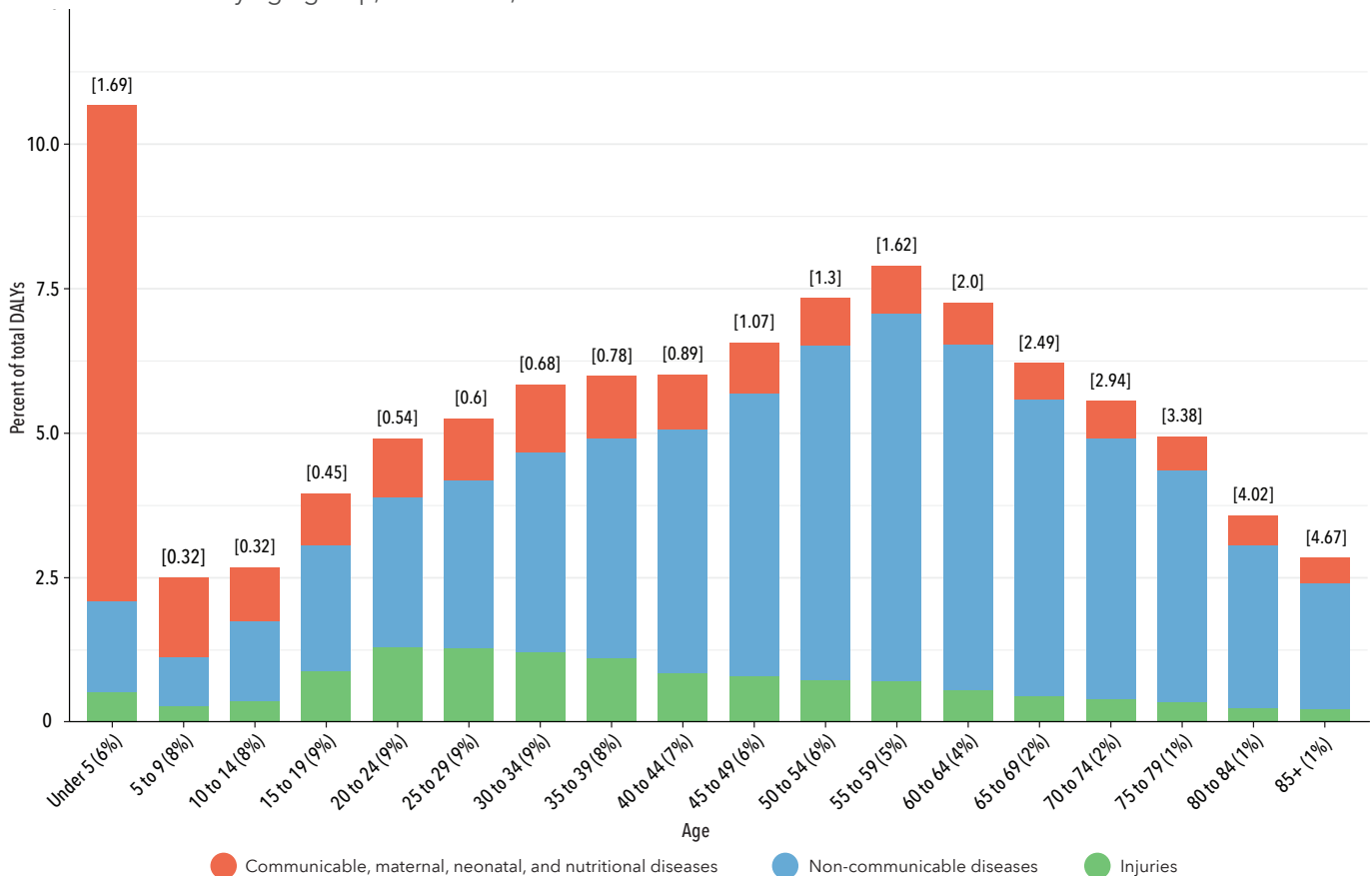


## Proportion of total disease burden from: CMNNDs: 23.1% | NCDs: 64.5% | Injuries: 12.4%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990–2016



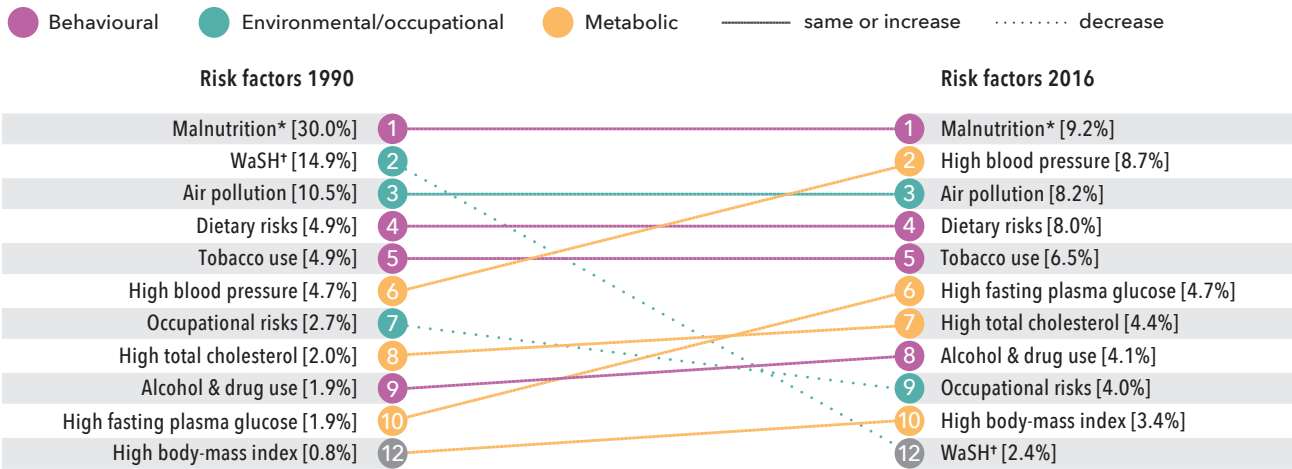
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

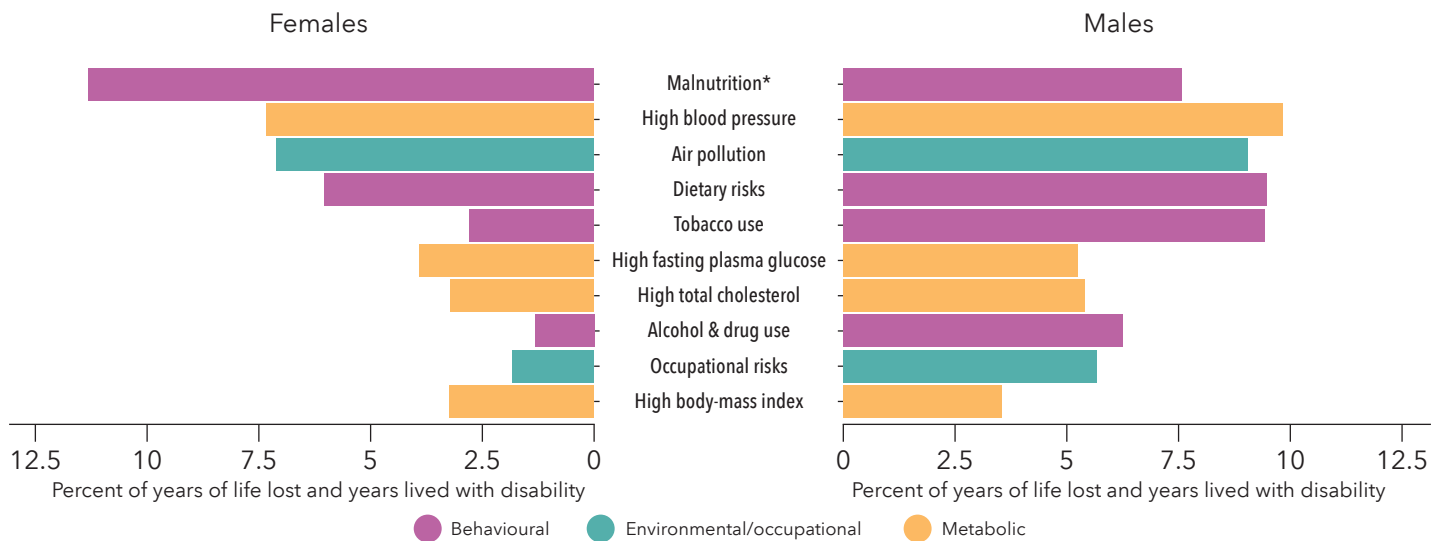


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Jammu and Kashmir

## 1990 life expectancy

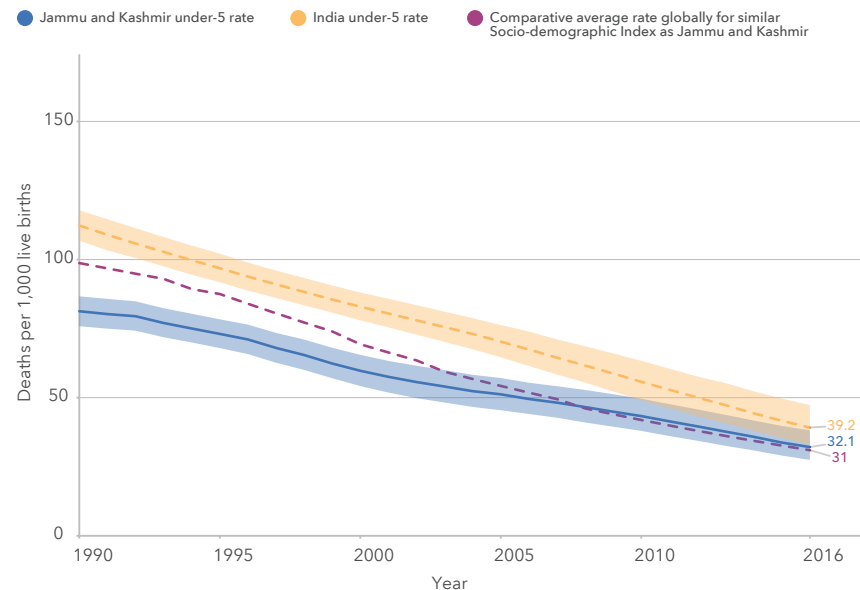
Females: 60.9 years Males: 60.2 years

## 2016 life expectancy

Females: 71.8 years Males: 68.3 years

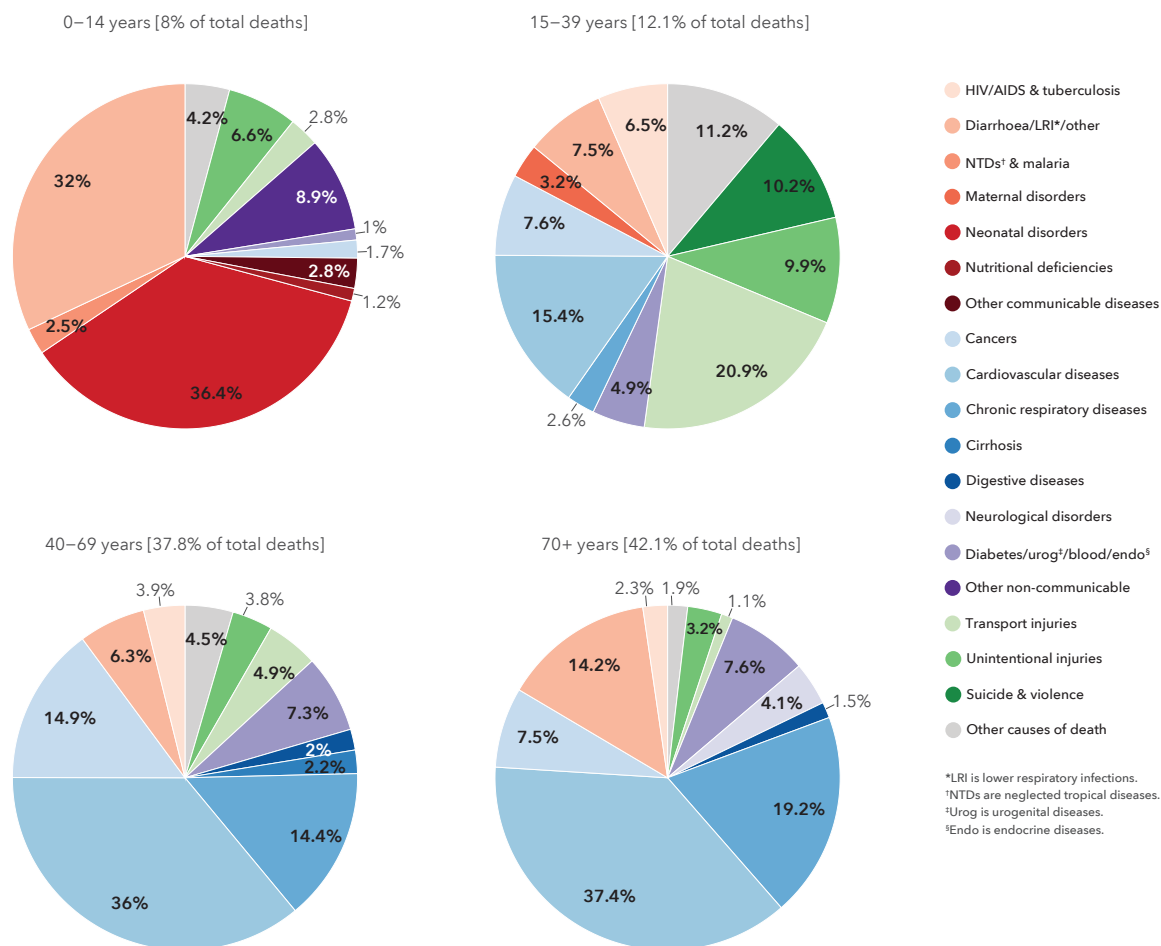
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



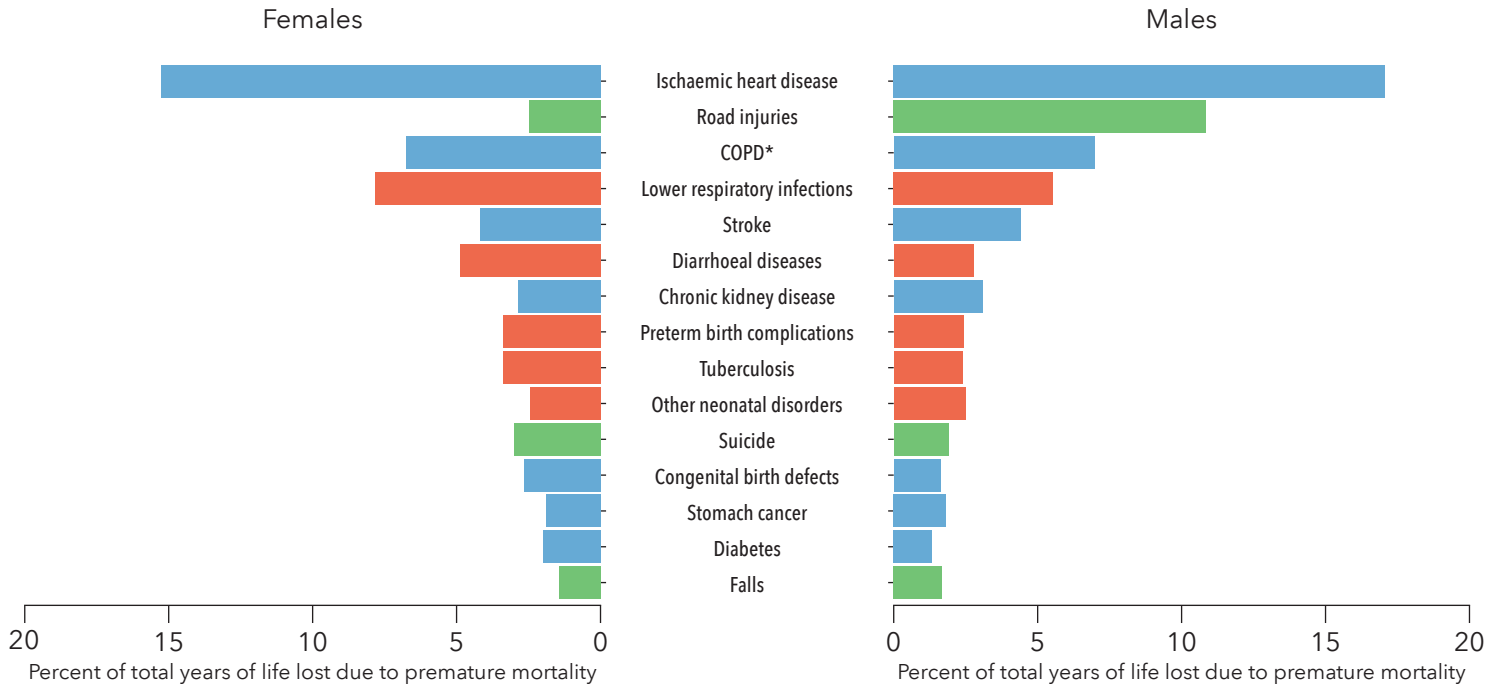
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

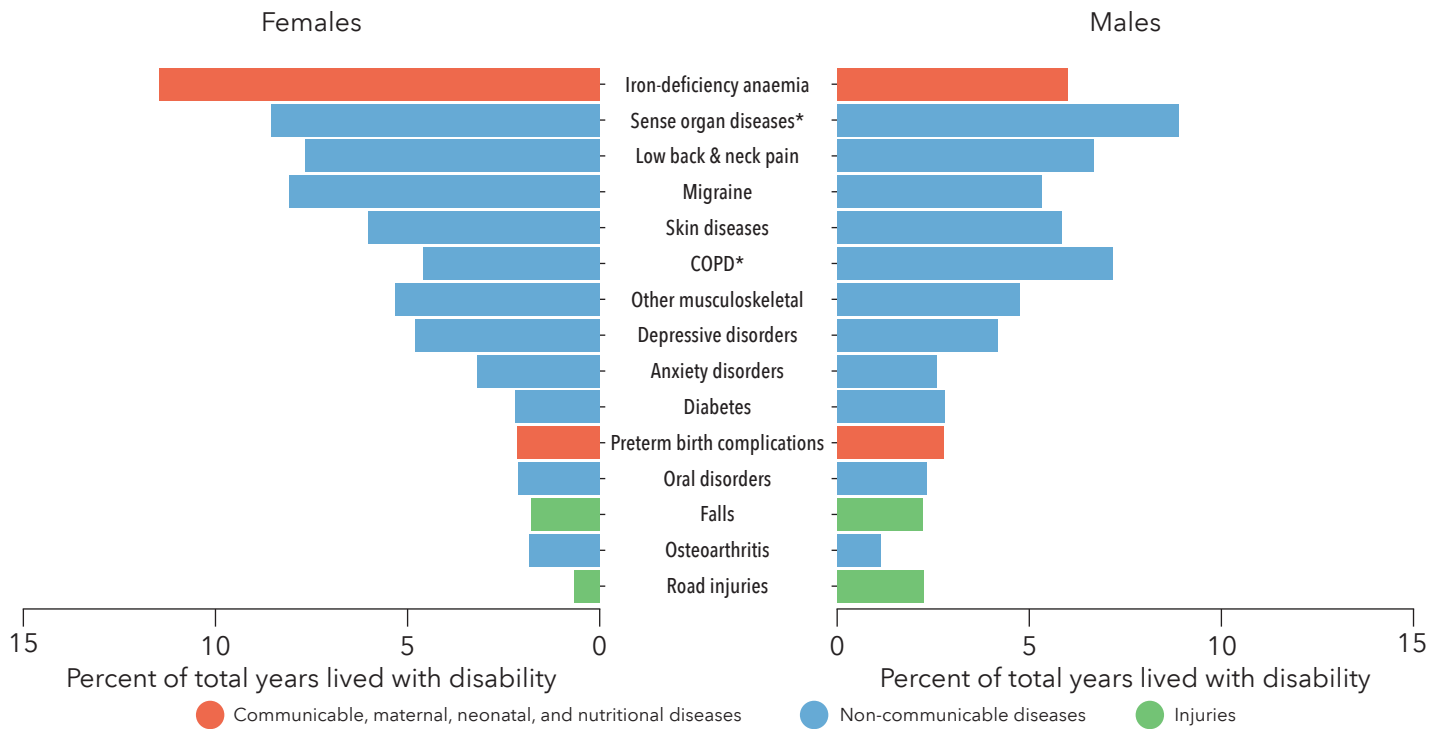


**Proportion of total disease burden from:**  
 Premature death: 64.2% | Disability or morbidity: 35.8%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



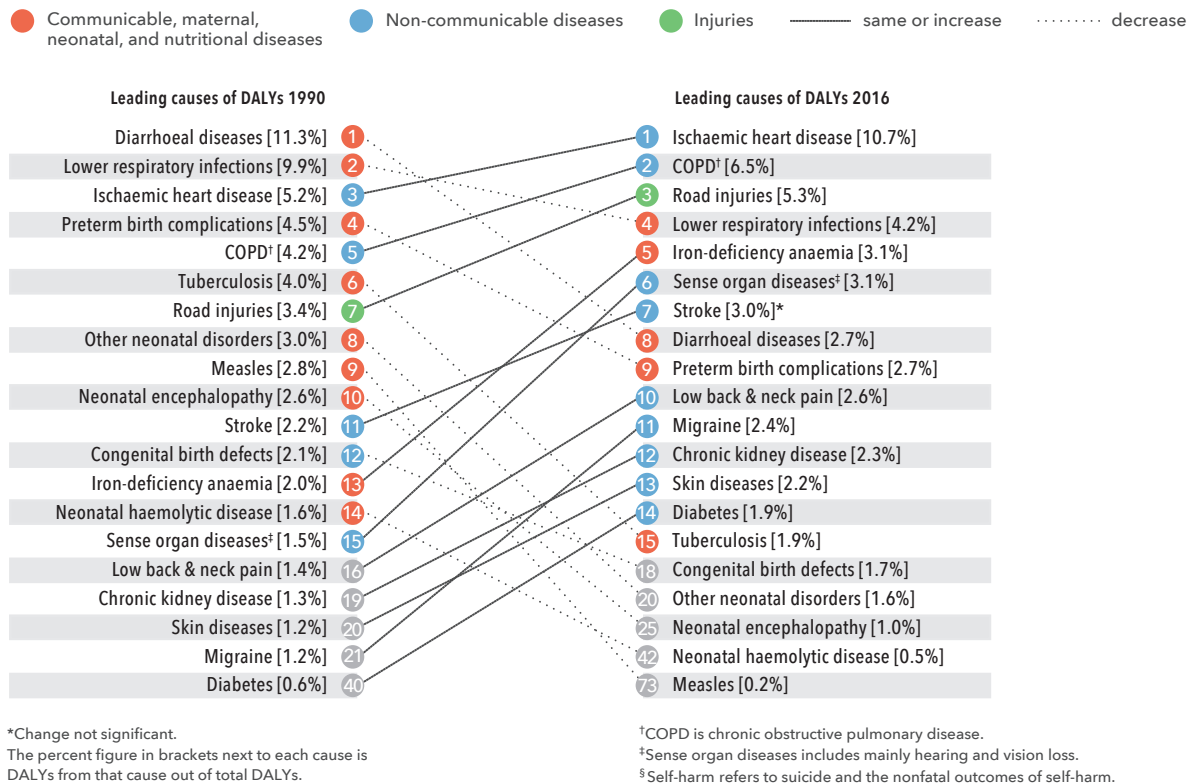
**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



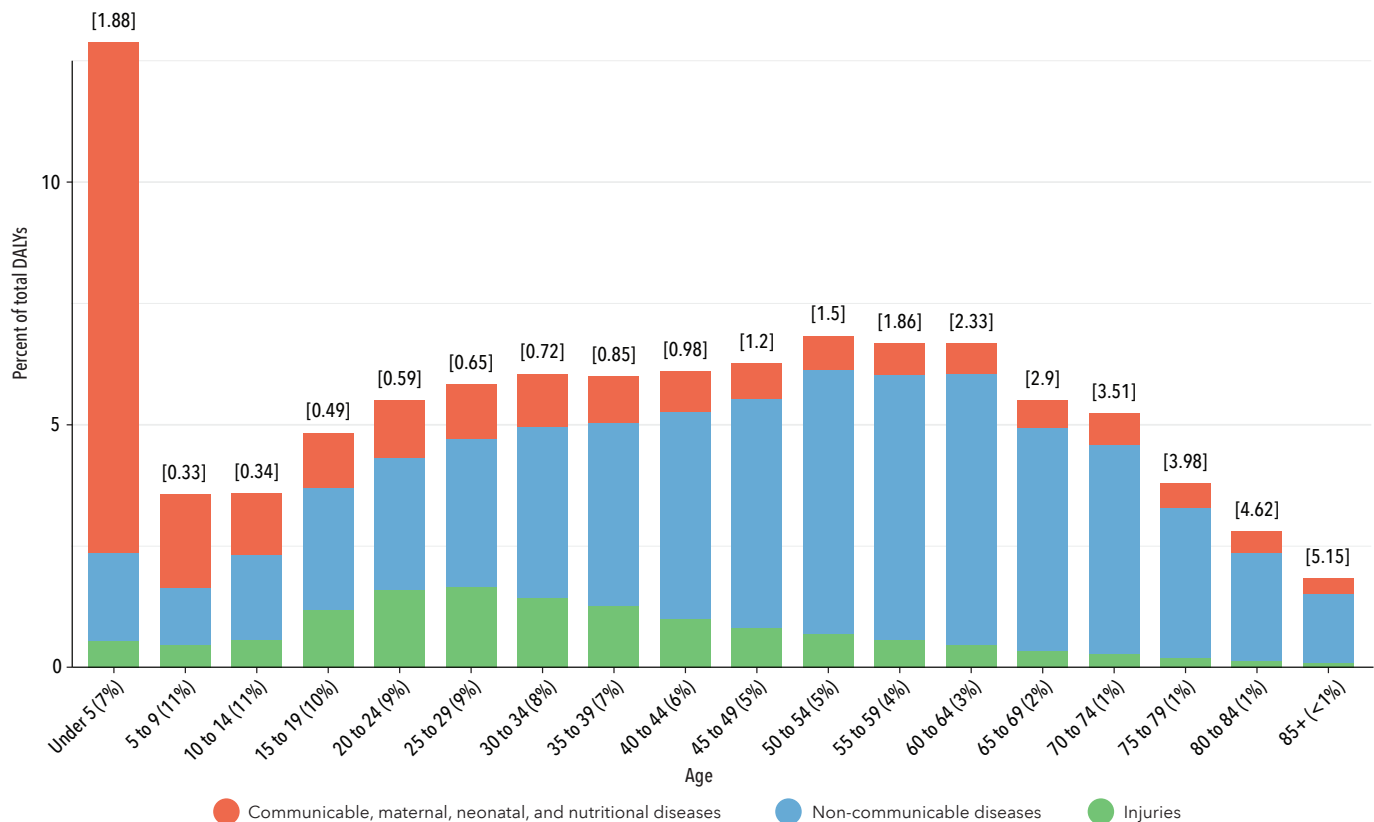
\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 25.3% | NCDs: 61.3% | Injuries: 13.4%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016

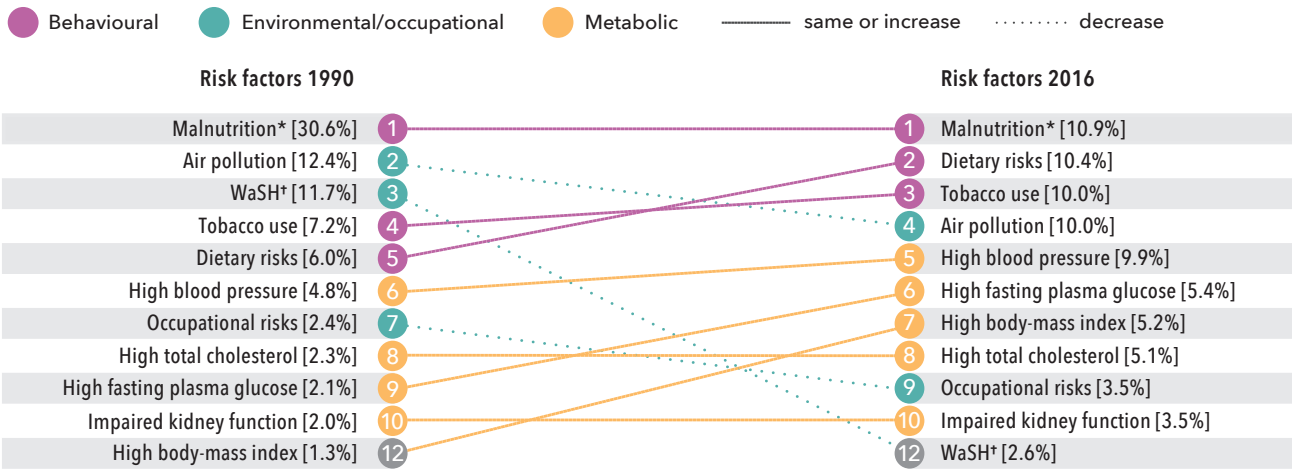


## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

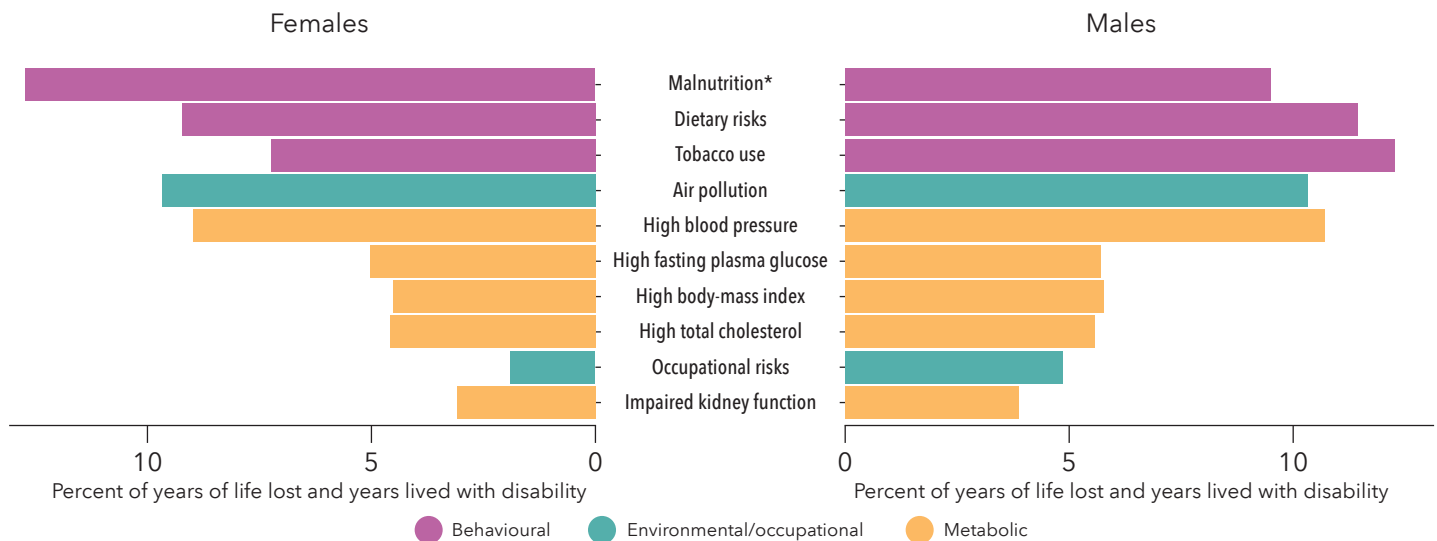


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Jharkhand

**1990 life expectancy**

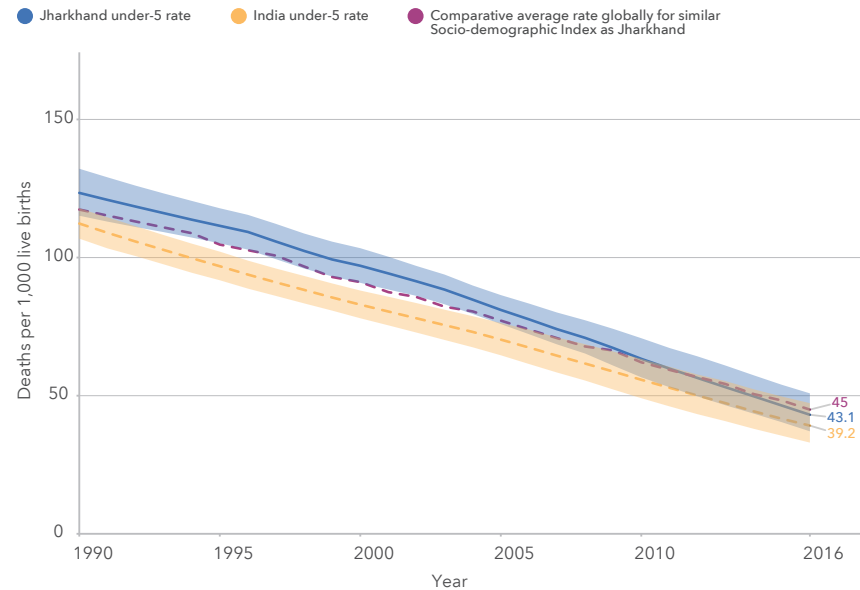
Females: 57.7 years Males: 57.2 years

**2016 life expectancy**

Females: 67.8 years Males: 67.0 years

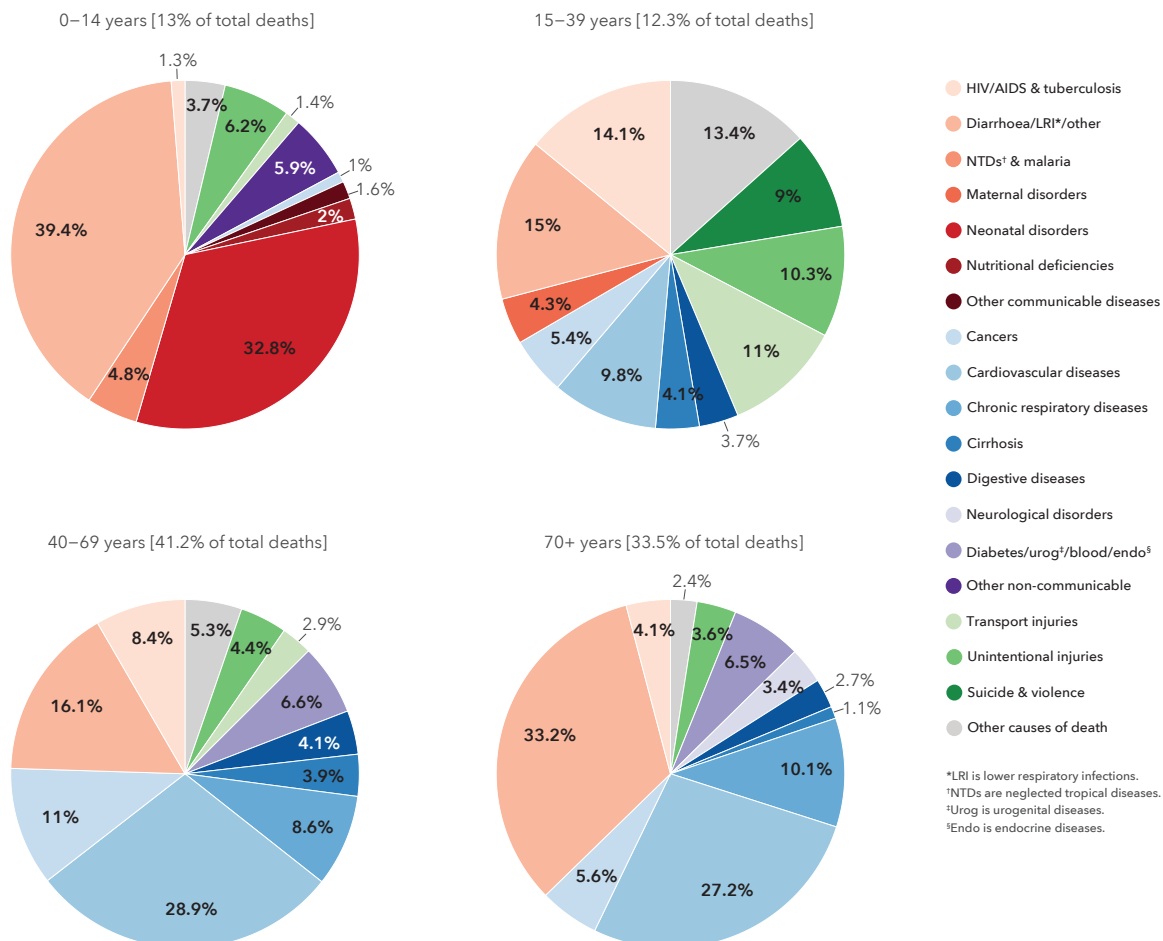
## How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



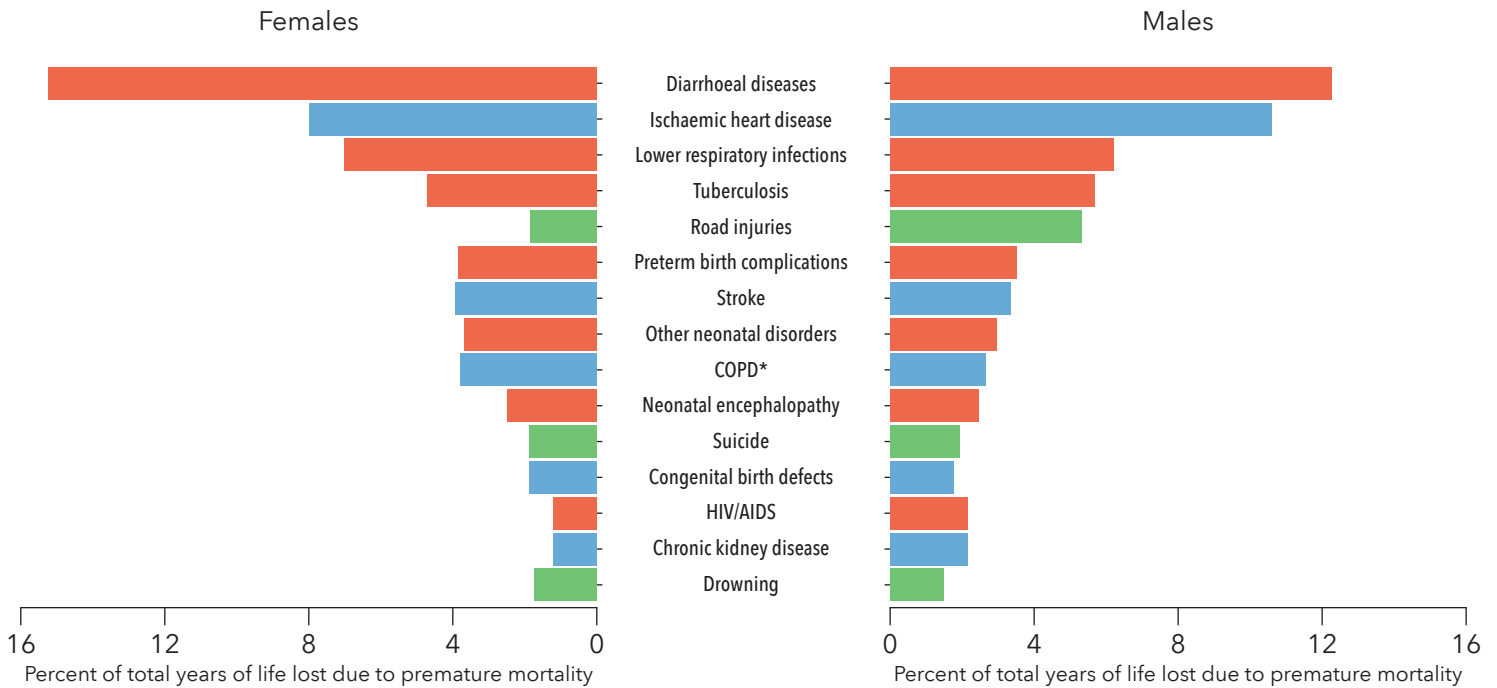
## What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

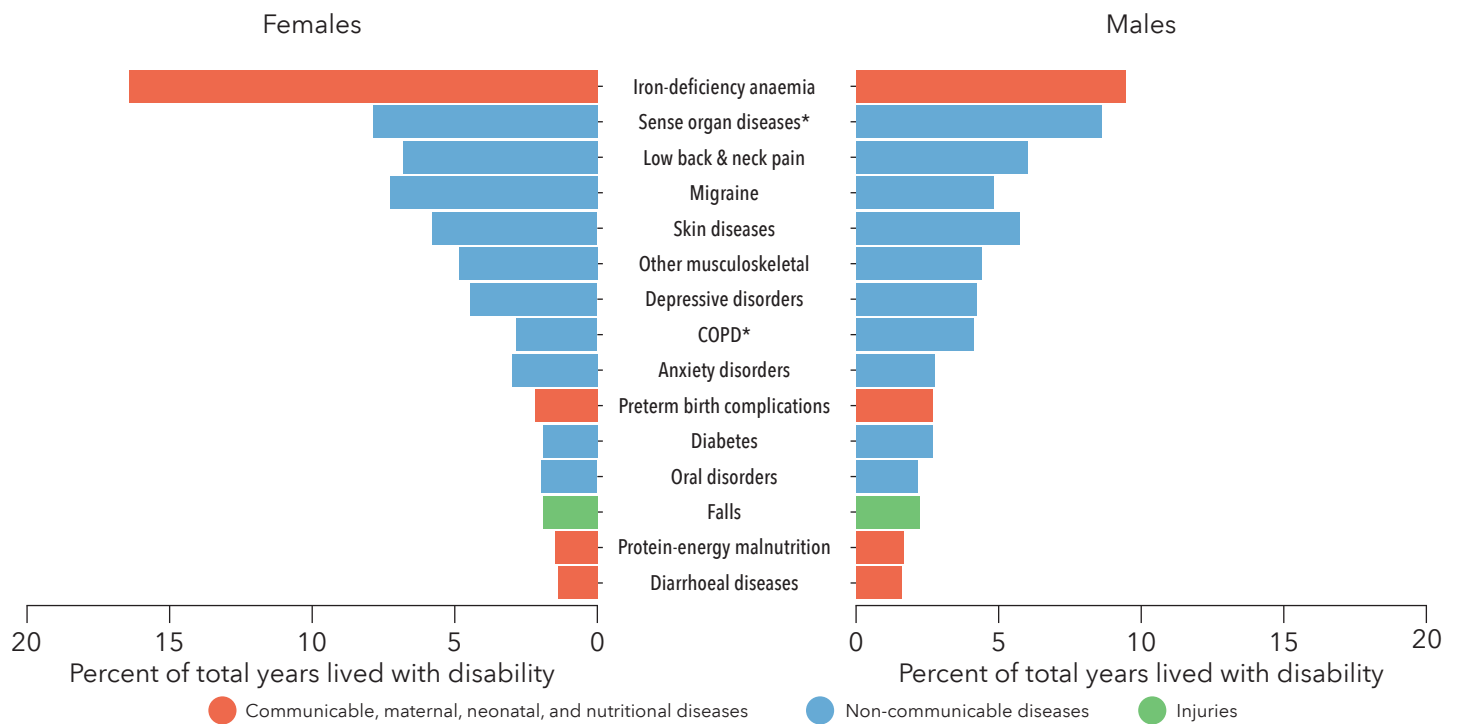


**Proportion of total disease burden from:**  
 Premature death: 67.9% | Disability or morbidity: 32.1%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

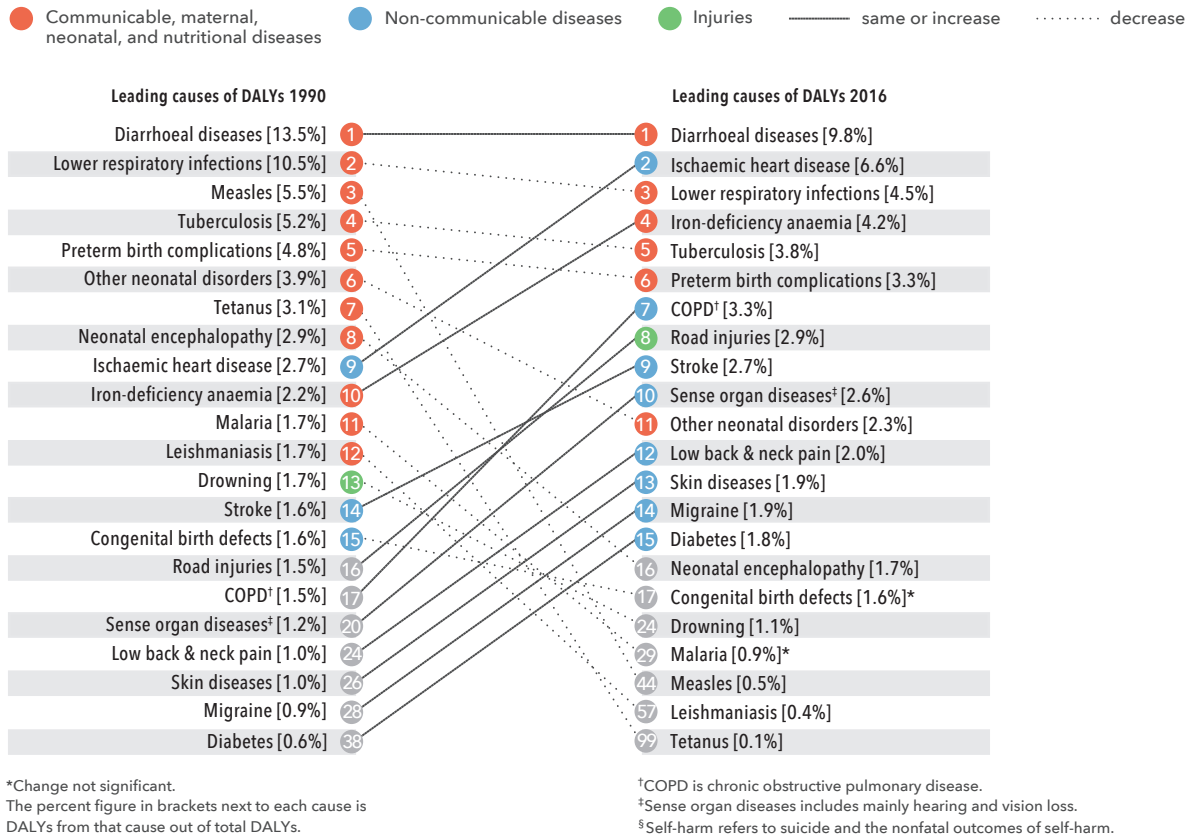


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.



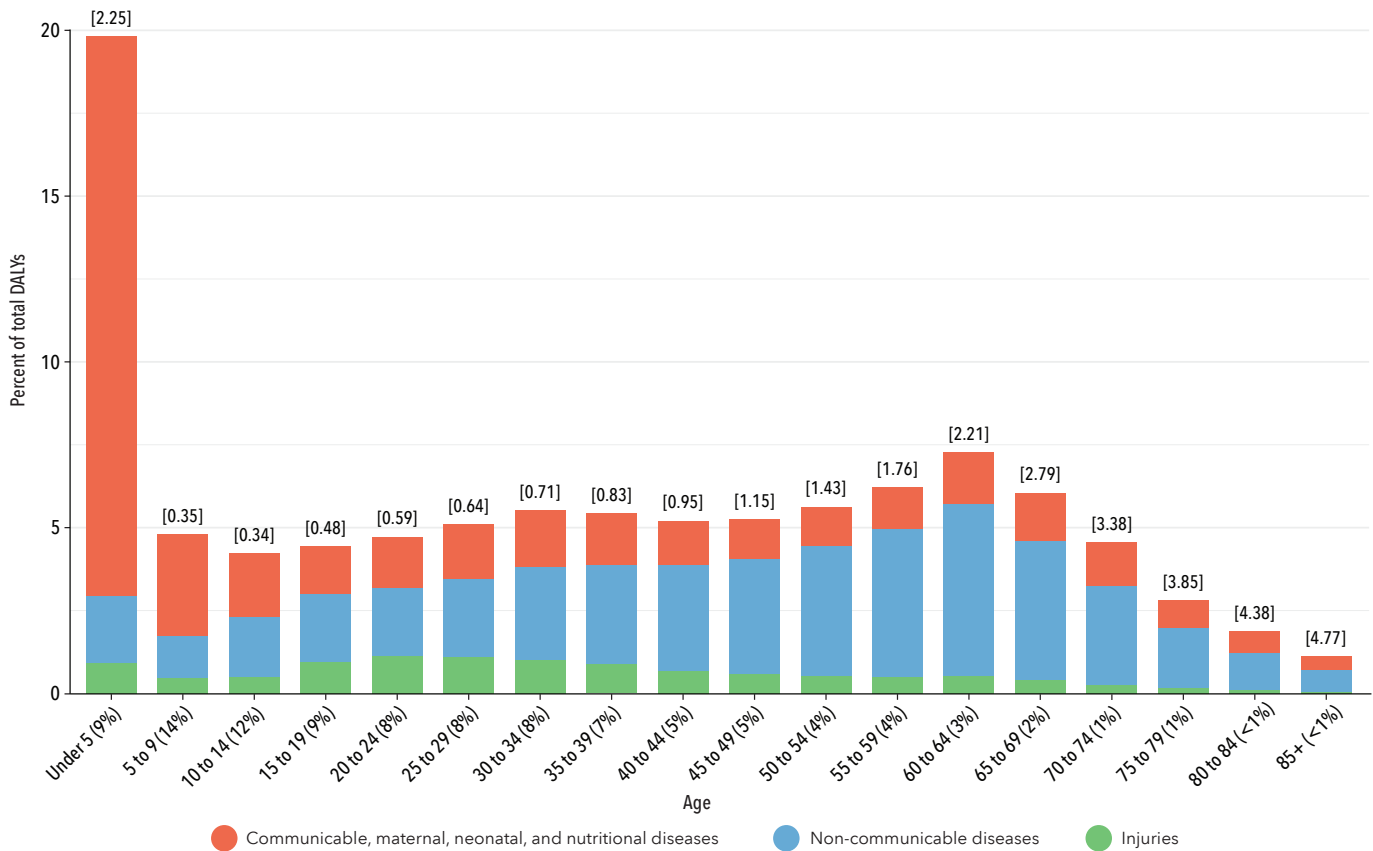
## Proportion of total disease burden from: CMNNDs: 40.8% | NCDs: 48.3% | Injuries: 10.9%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016



## What caused the most death and disability combined across age groups in 2016?

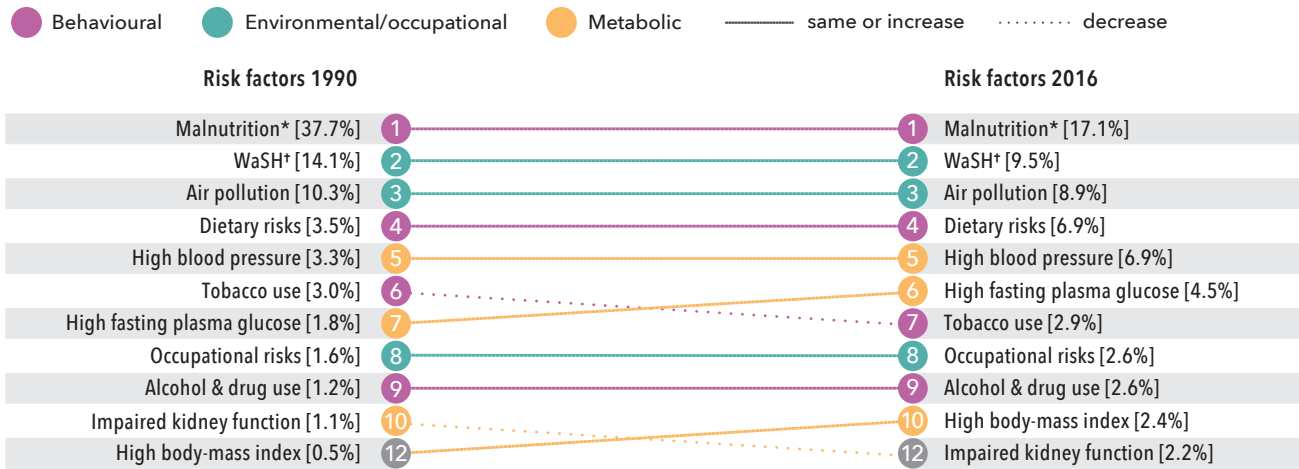
Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

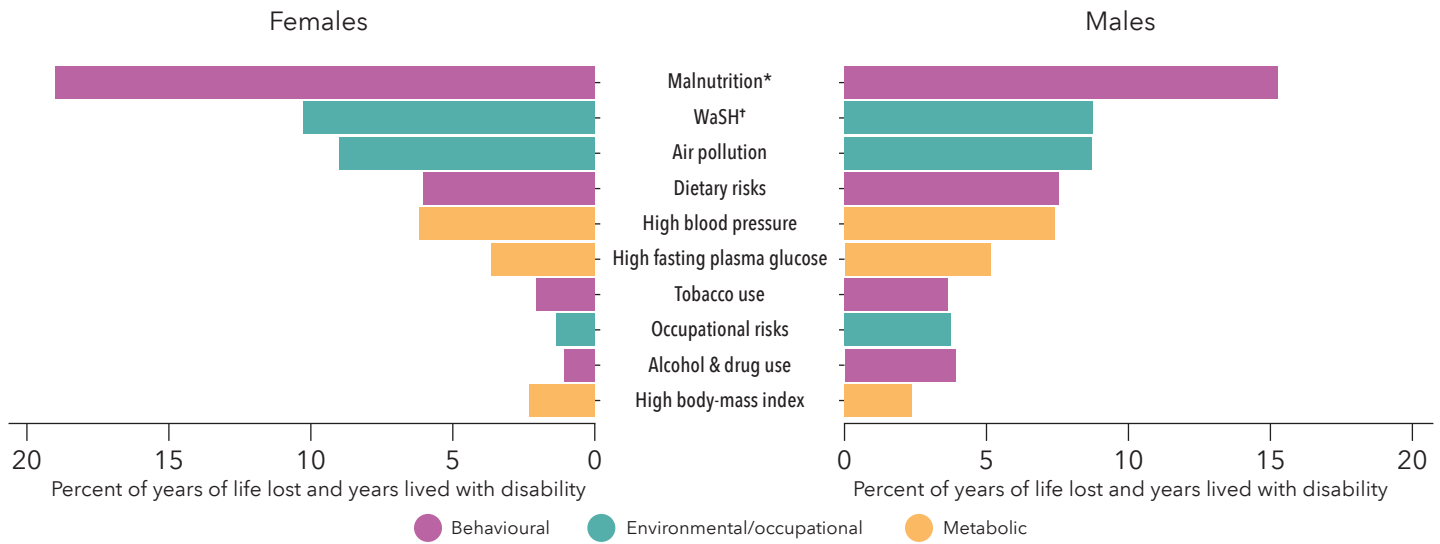


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
 †WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
 †WaSH is unsafe water, sanitation, and handwashing.

# Karnataka

## 1990 life expectancy

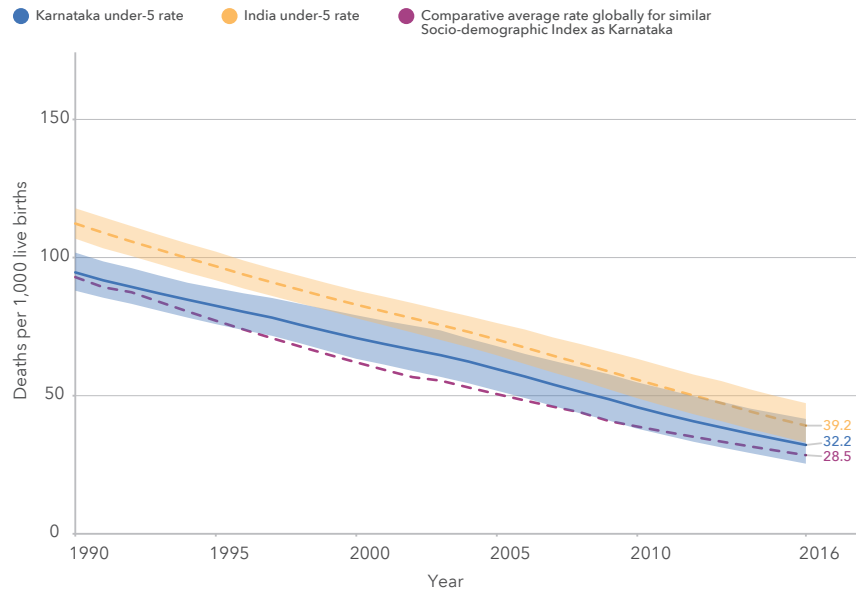
Females: 62.5 years Males: 59.0 years

## 2016 life expectancy

Females: 71.1 years Males: 67.1 years

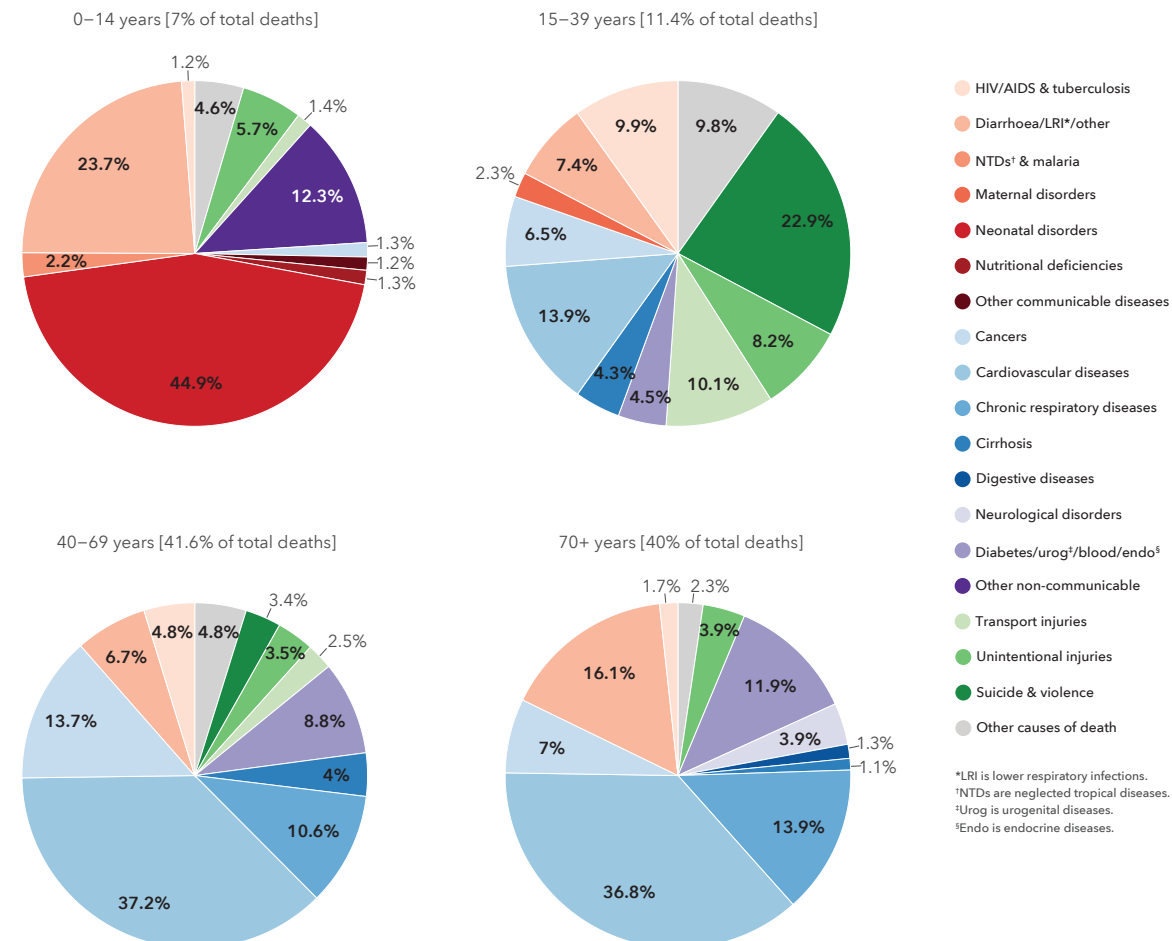
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



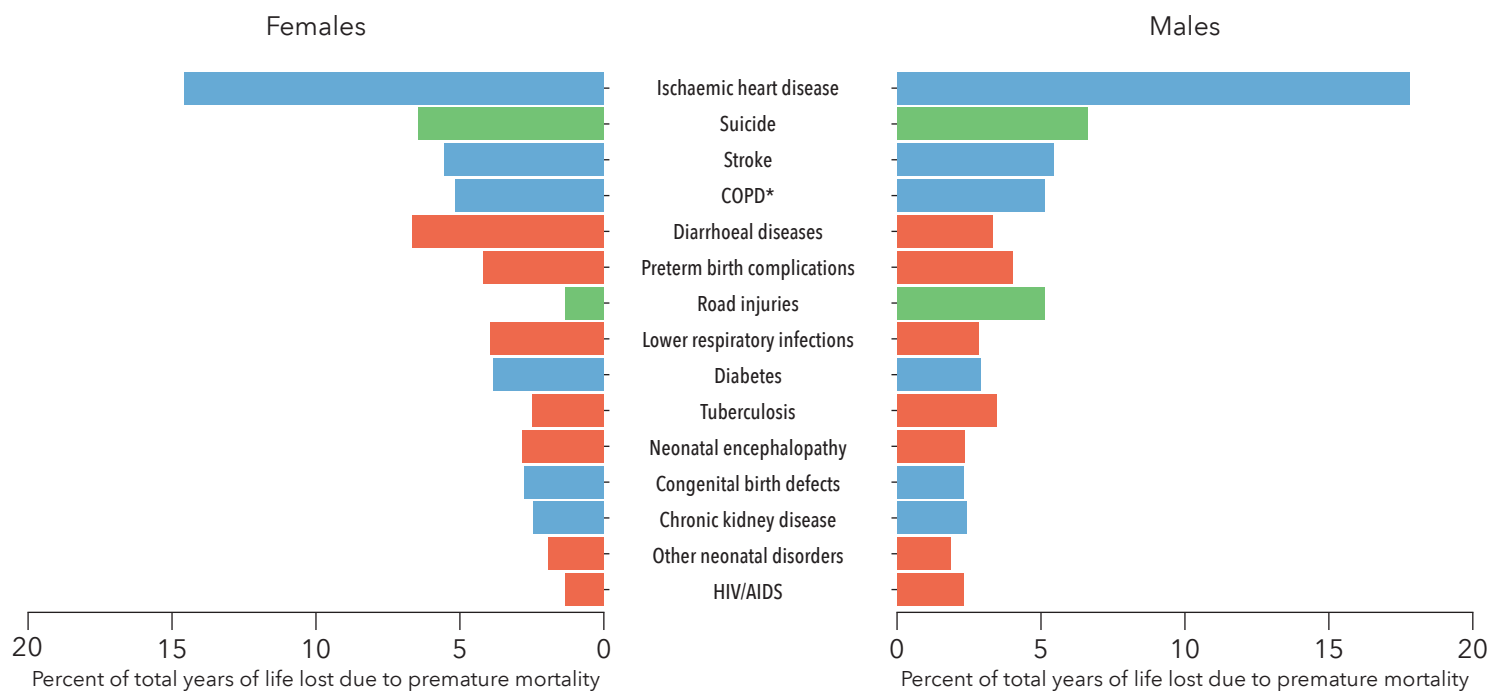
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

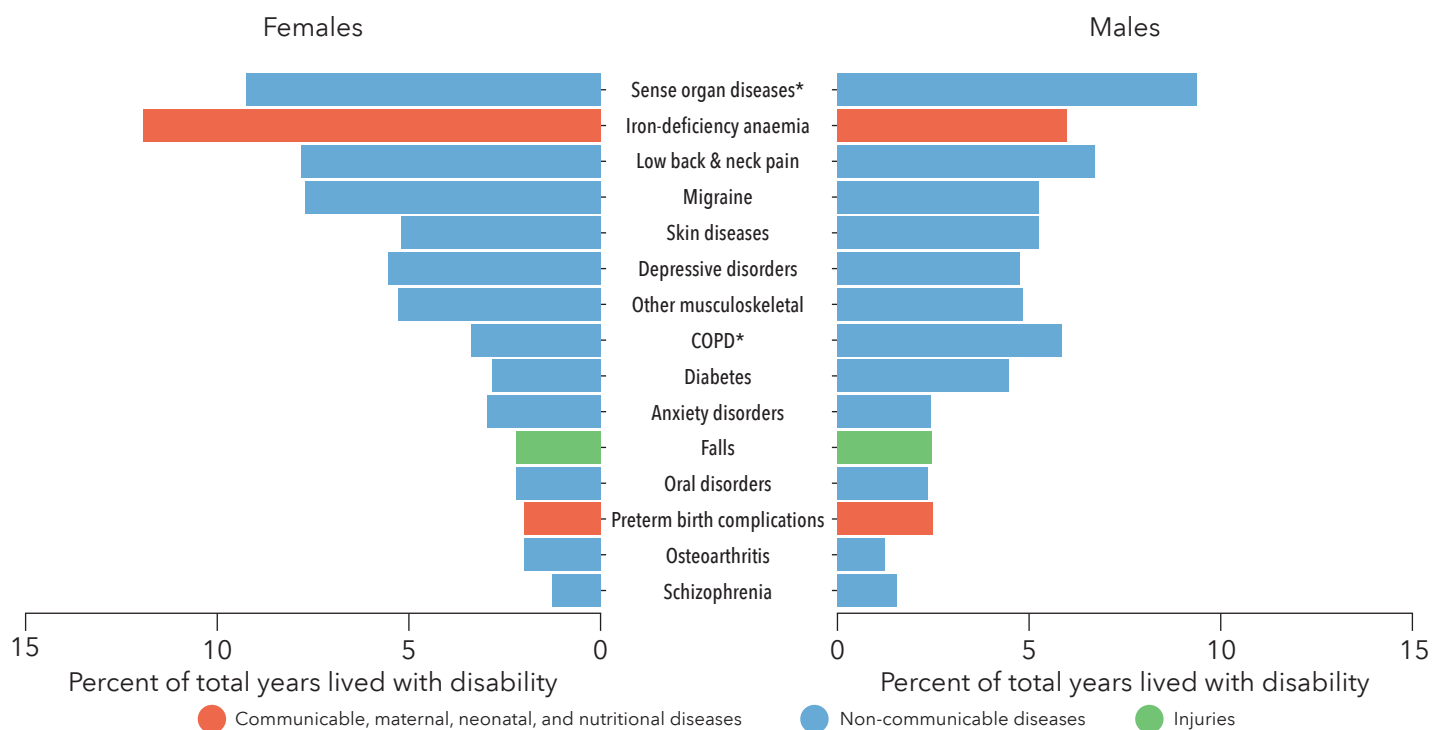


**Proportion of total disease burden from:**  
 Premature death: 65.9% | Disability or morbidity: 34.1%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



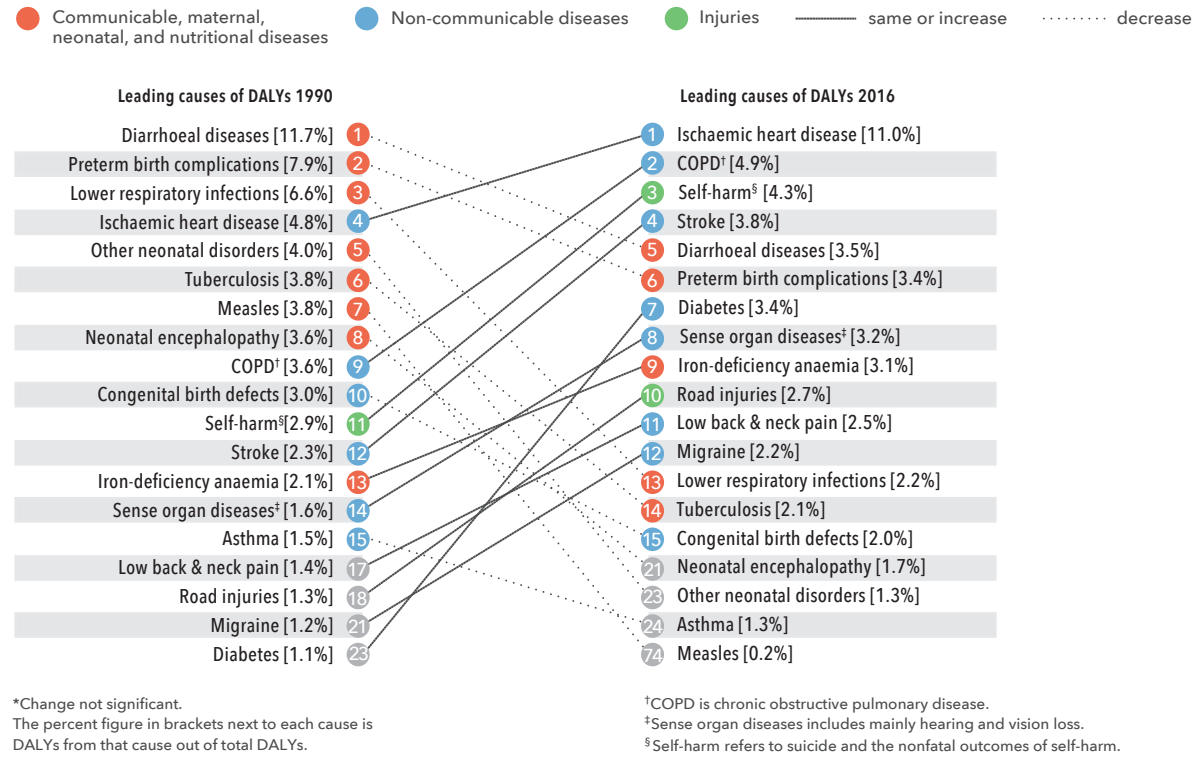
**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



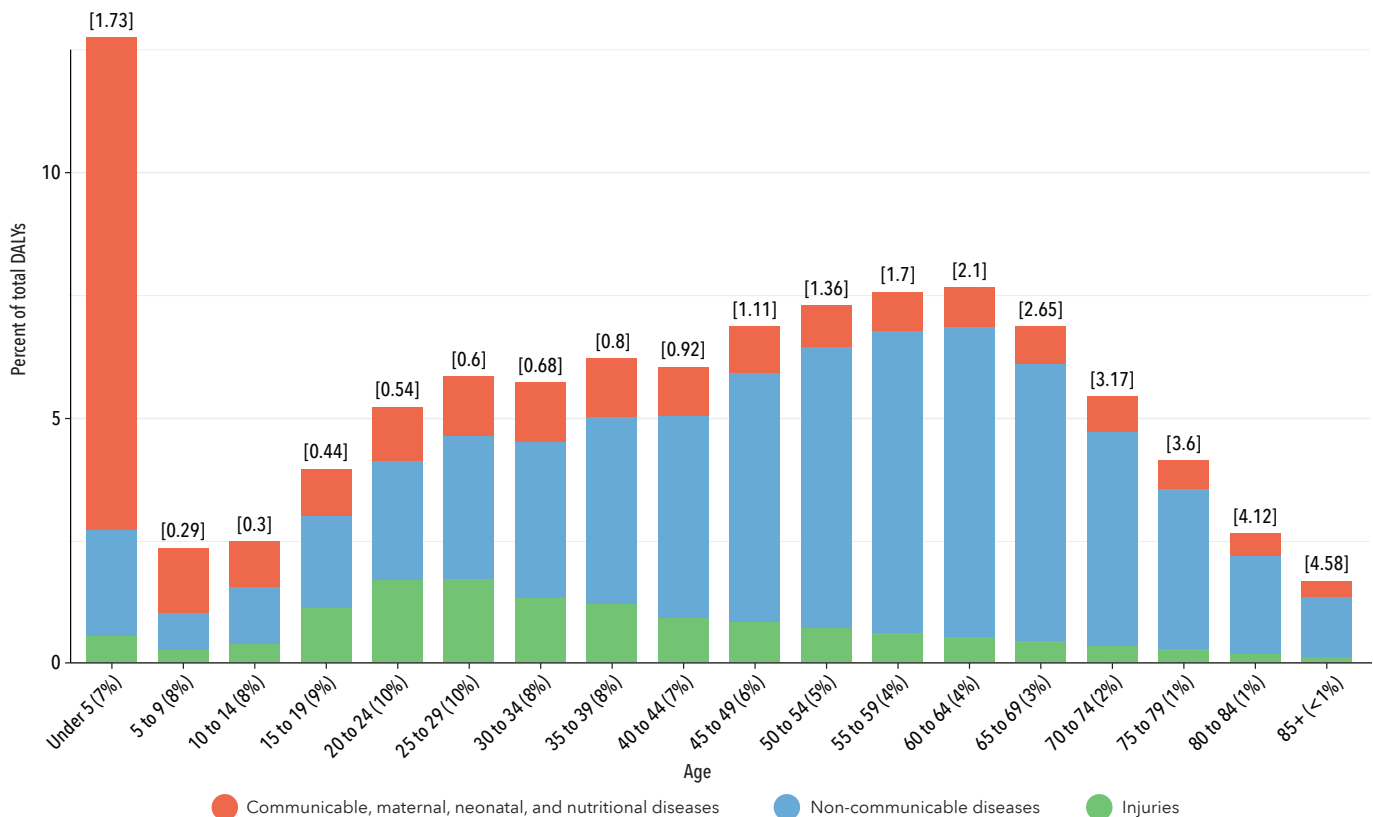
\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 25.1% | NCDs: 62.0% | Injuries: 12.9%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016

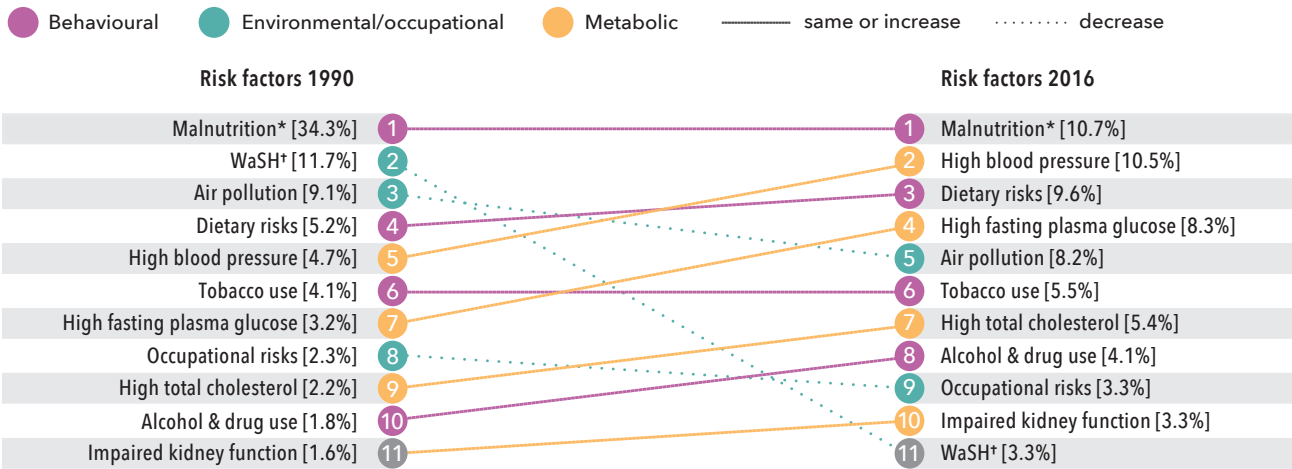


## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

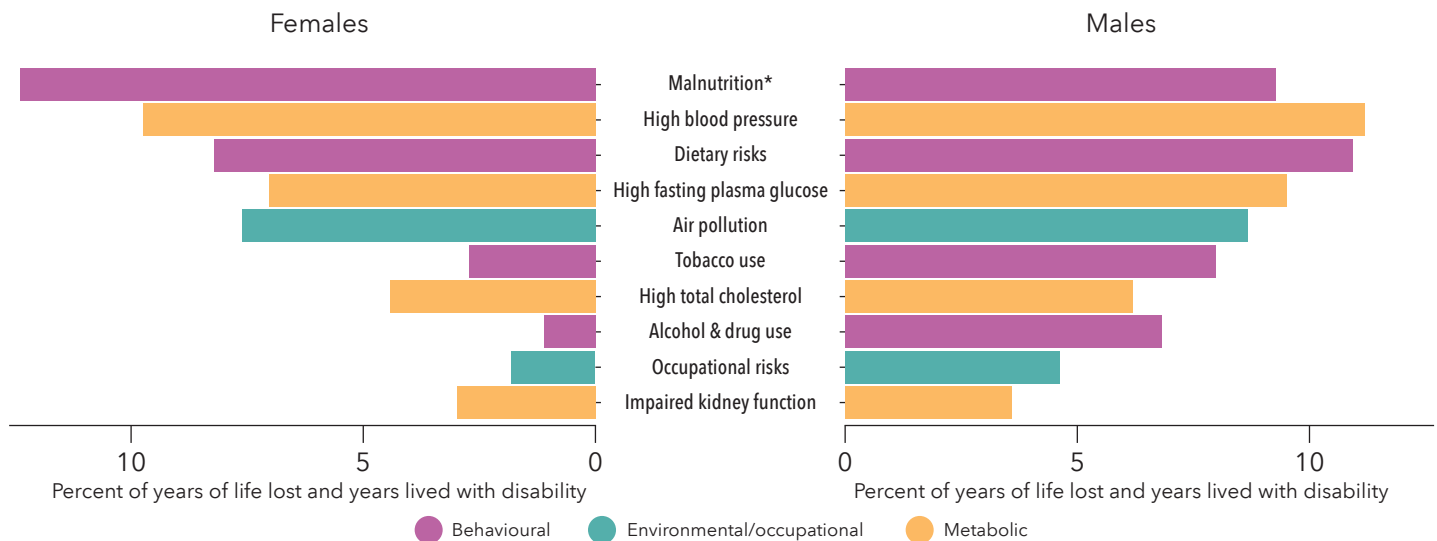


The percent figure in brackets next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Kerala

## 1990 life expectancy

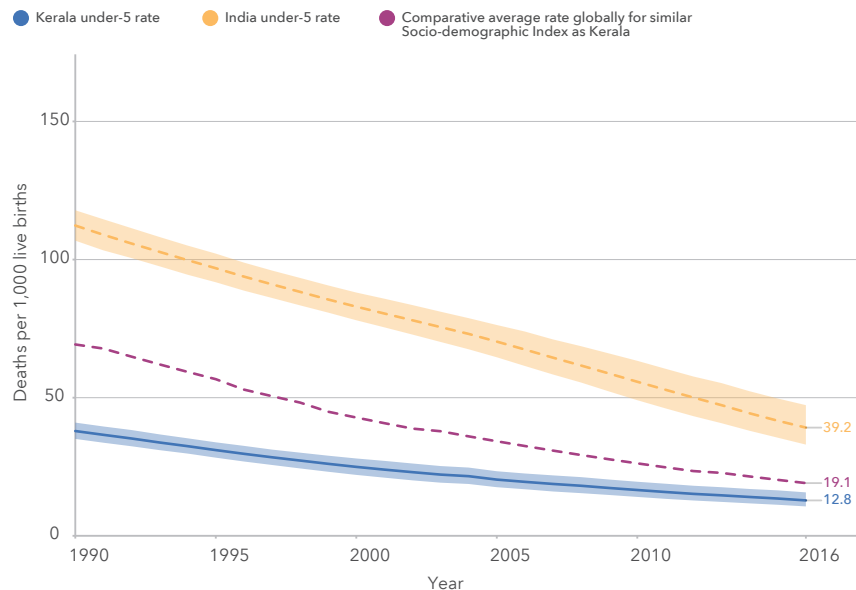
Females: 74.5 years Males: 67.6 years

## 2016 life expectancy

Females: 78.7 years Males: 73.8 years

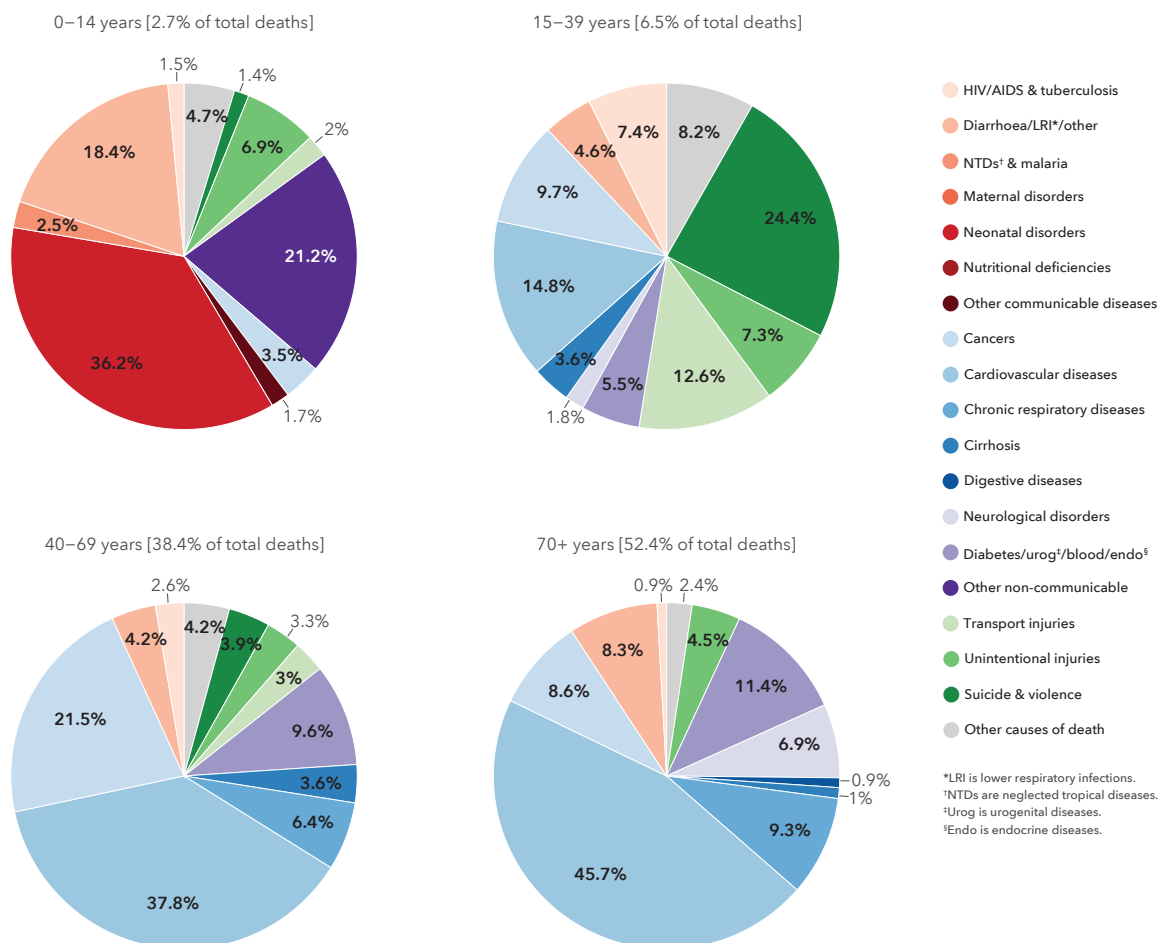
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016



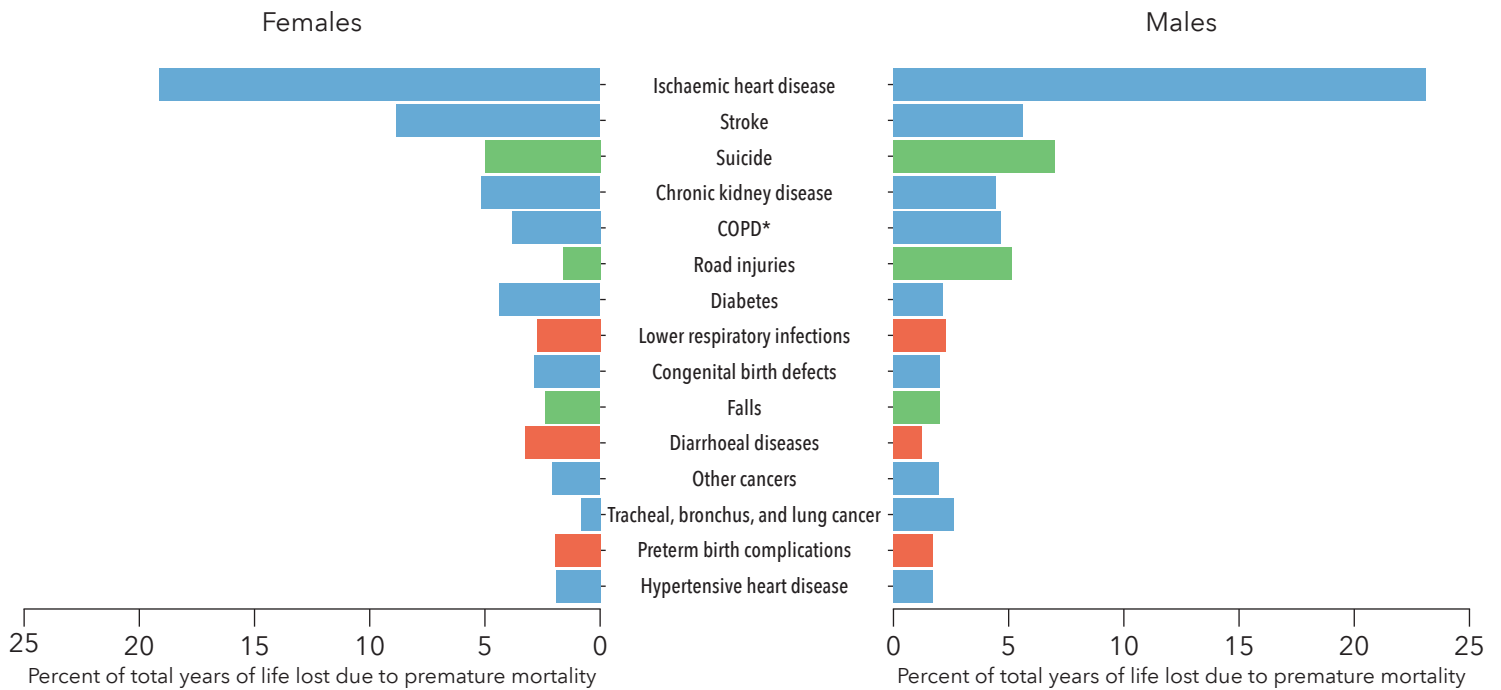
\*LRI is lower respiratory infections.  
<sup>†</sup>NTDs are neglected tropical diseases.  
<sup>‡</sup>Urog is urogenital diseases.  
<sup>§</sup>Endo is endocrine diseases.

## Proportion of total disease burden from:

Premature death: 54.8% | Disability or morbidity: 45.2%

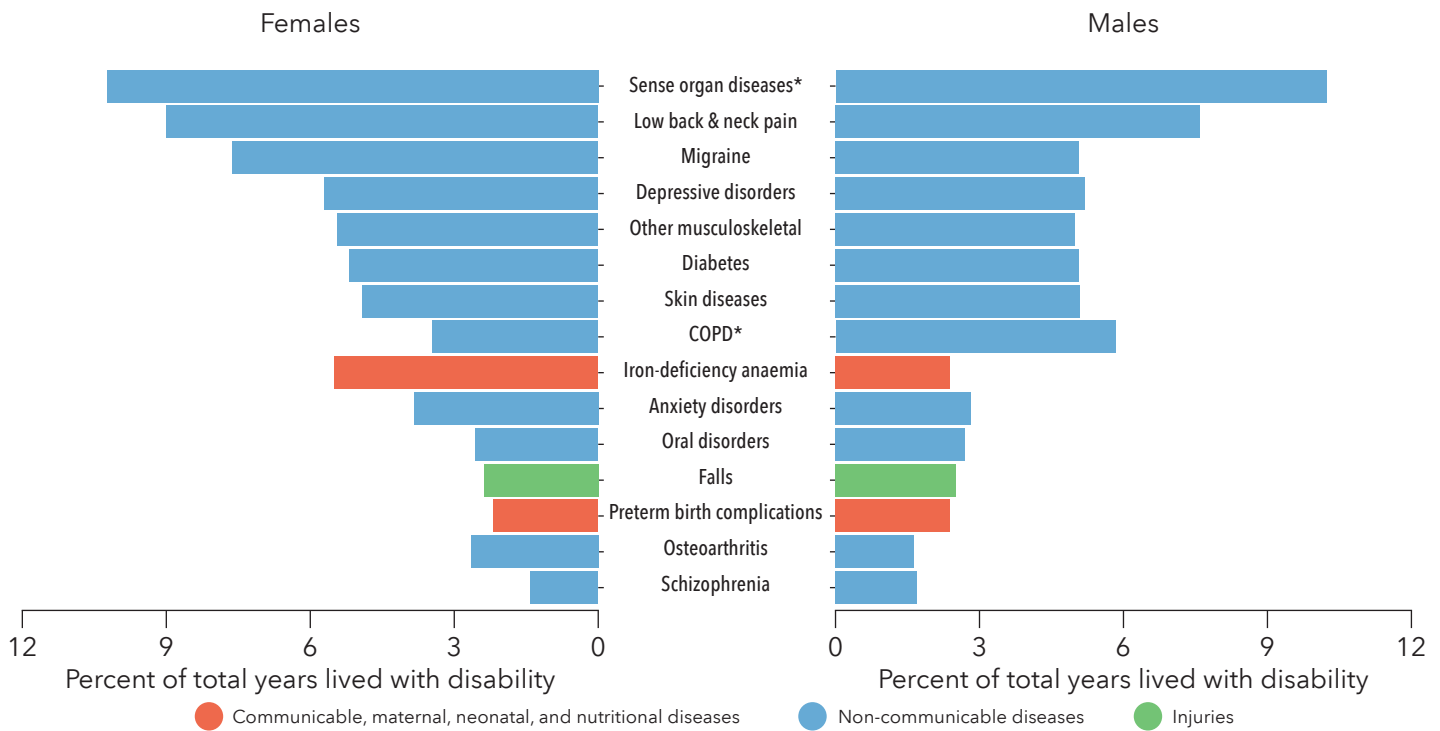
### What caused the most years of life lost, by sex, in 2016?

Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



### What caused the most years lived with disability, by sex, in 2016?

Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

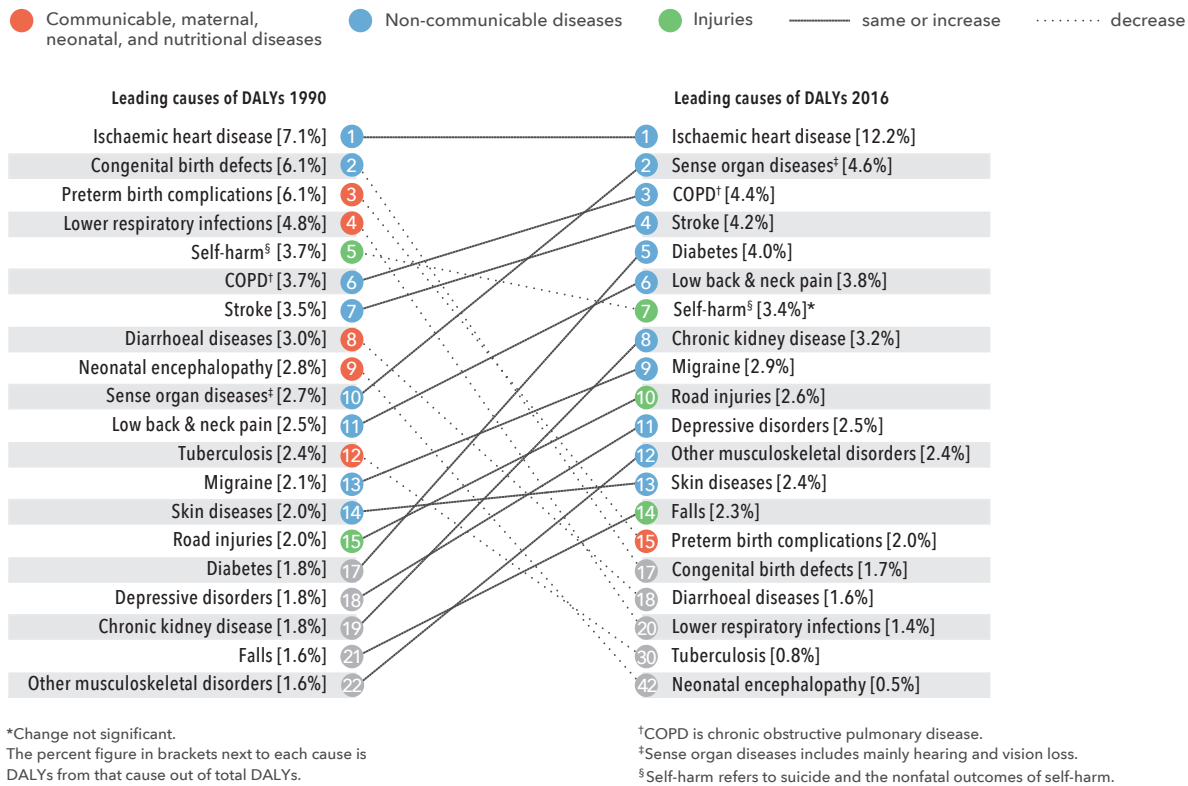


\*COPD is chronic obstructive pulmonary disease.  
\*Sense organ diseases includes mainly hearing and vision loss.

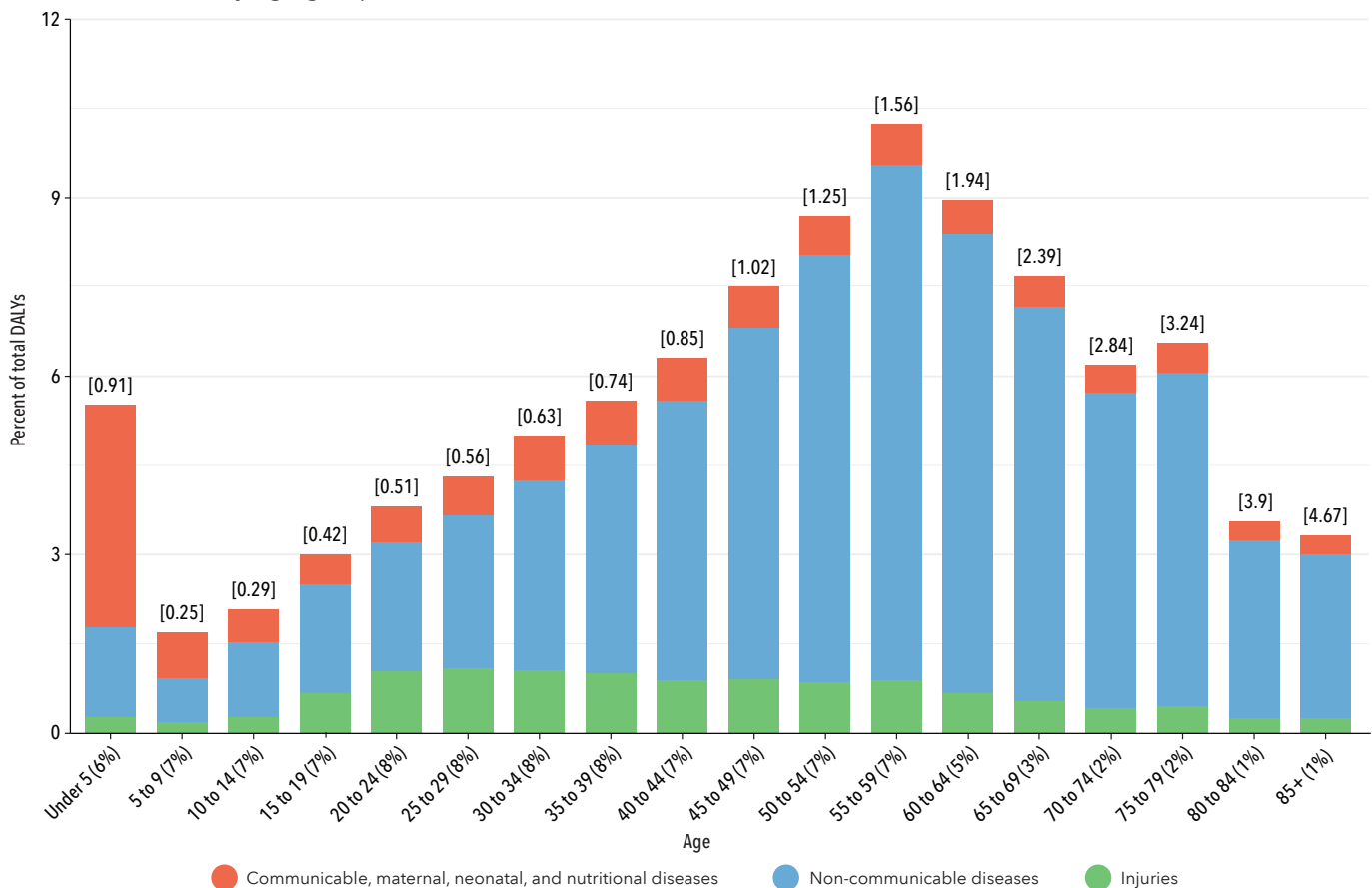


## Proportion of total disease burden from: CMNNDs: 13.6% | NCDs: 74.6% | Injuries: 11.8%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016



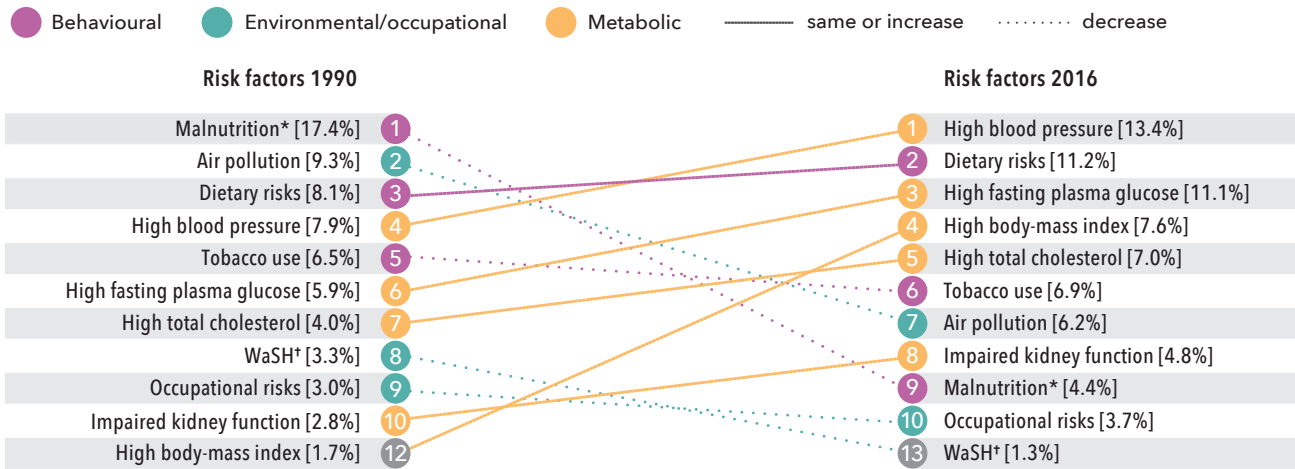
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group.  
The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

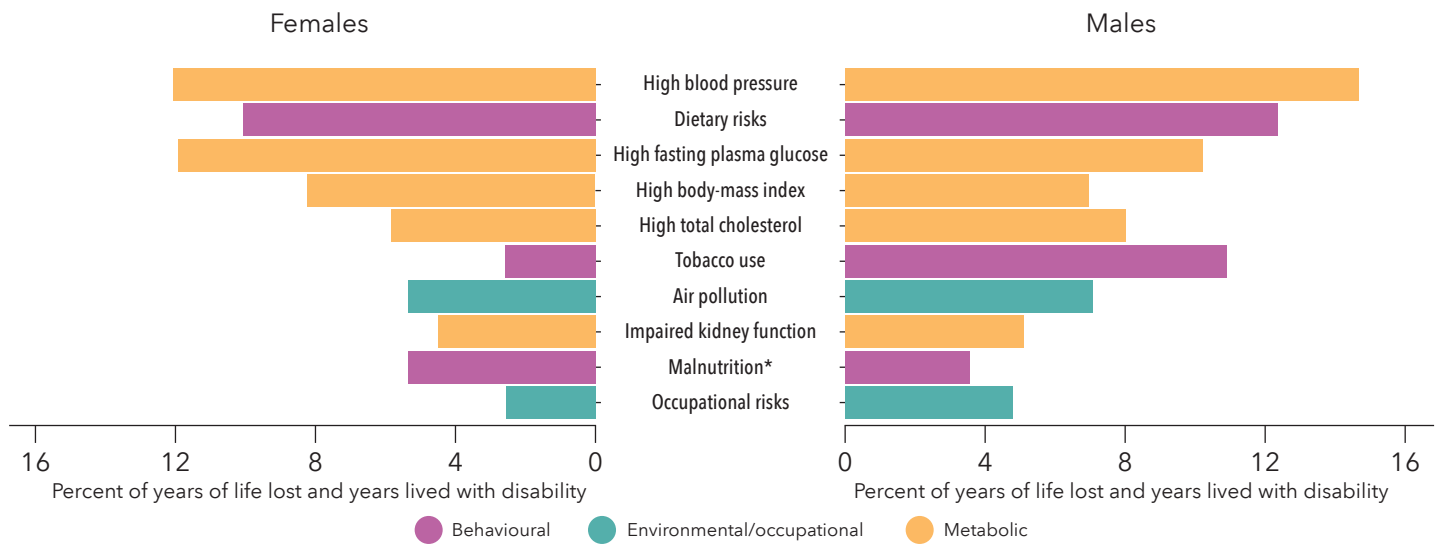


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Madhya Pradesh

**1990 life expectancy**

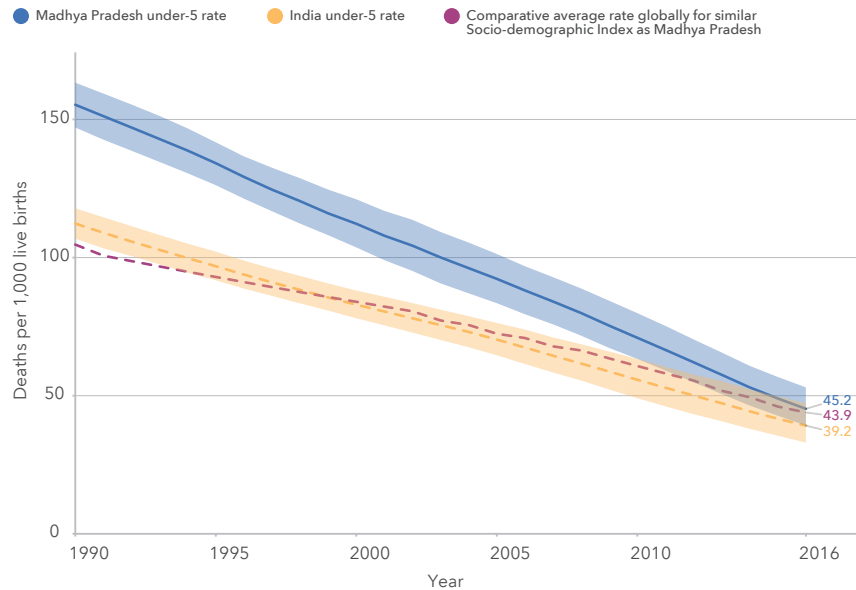
Females: 55.9 years Males: 55.6 years

**2016 life expectancy**

Females: 69.3 years Males: 65.3 years

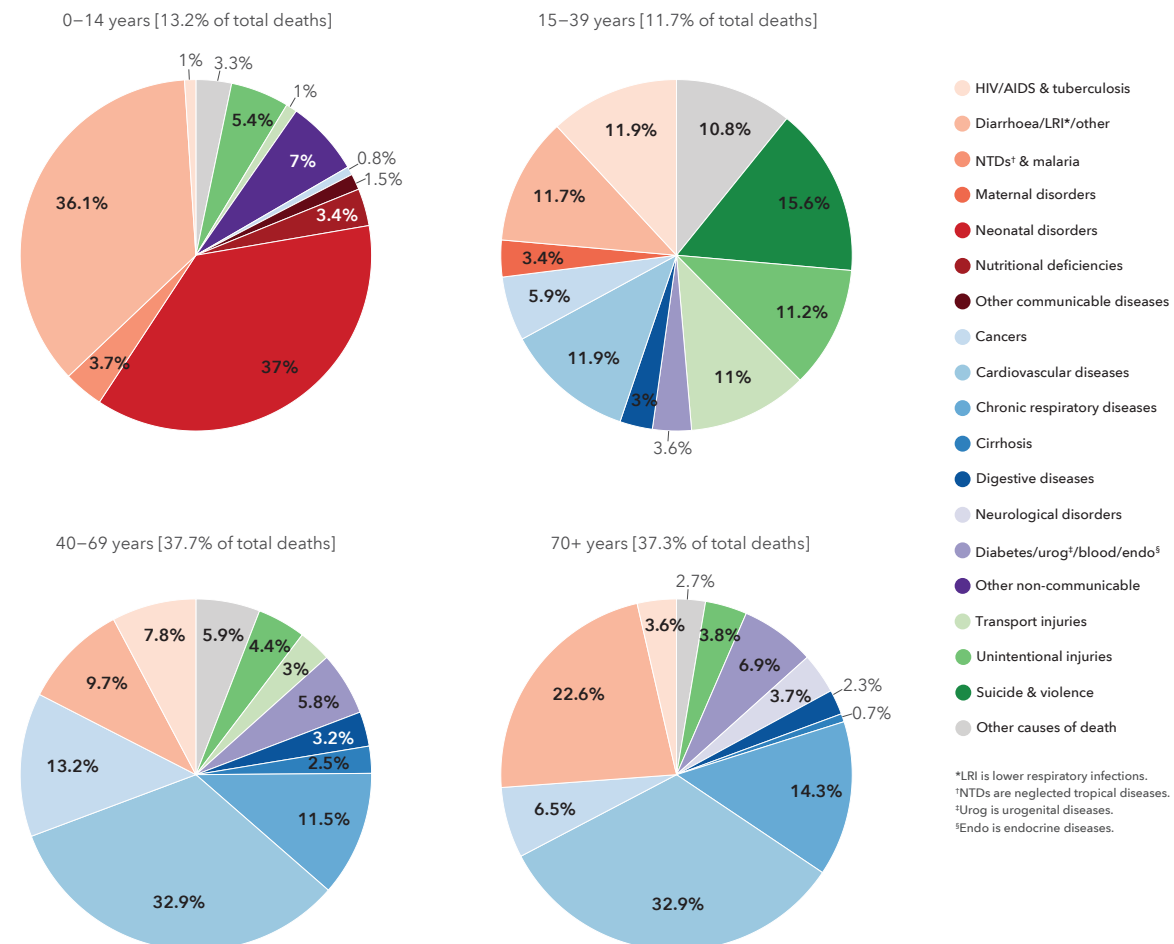
## How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



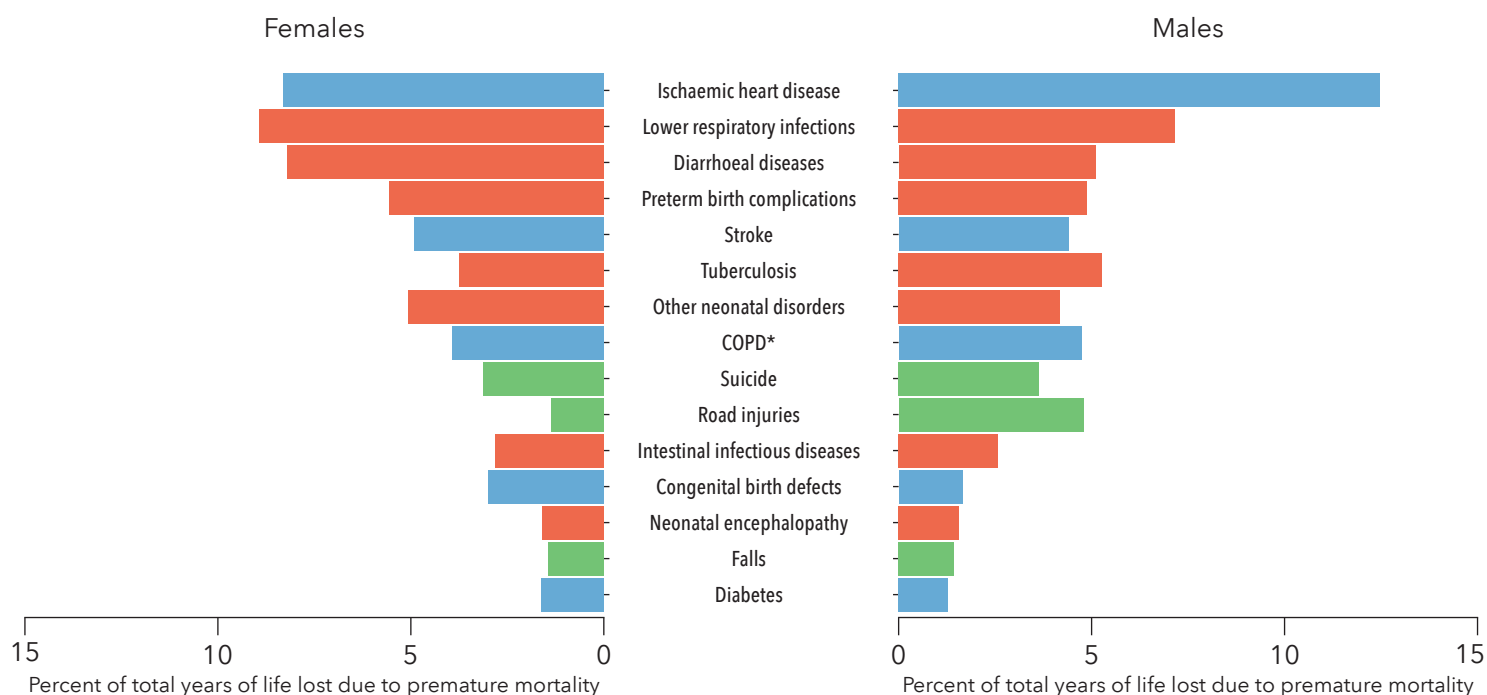
## What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

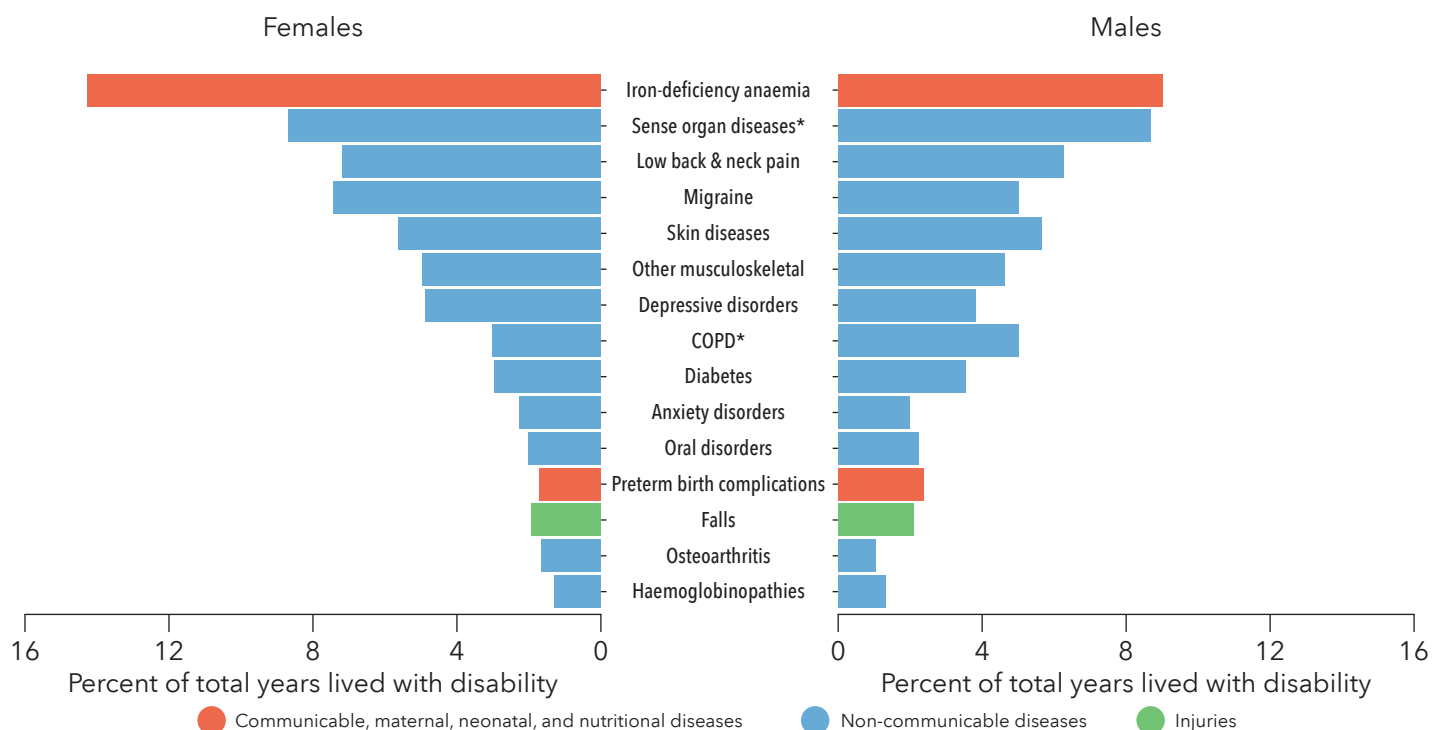


**Proportion of total disease burden from:**  
 Premature death: 69.9% | Disability or morbidity: 30.1%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

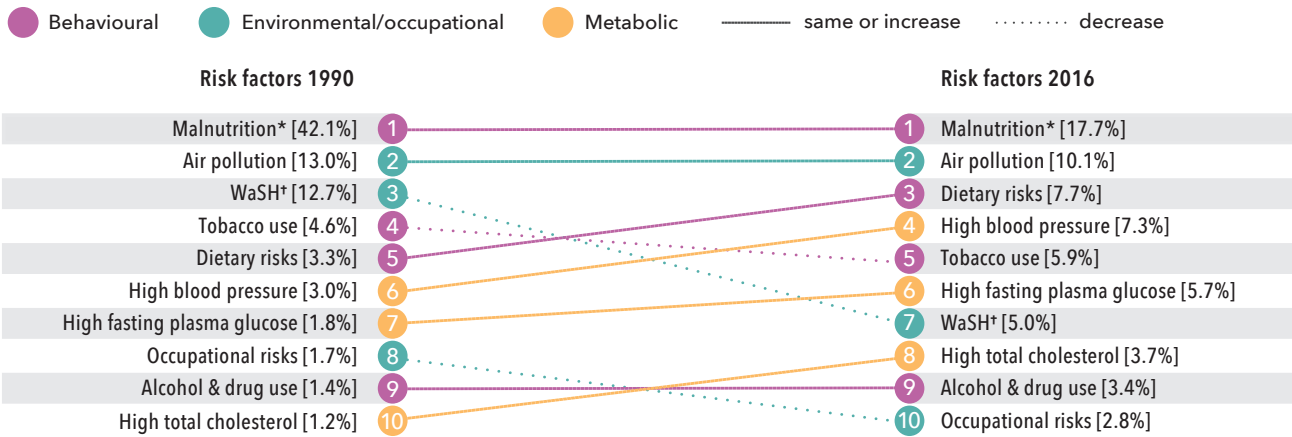


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.



### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

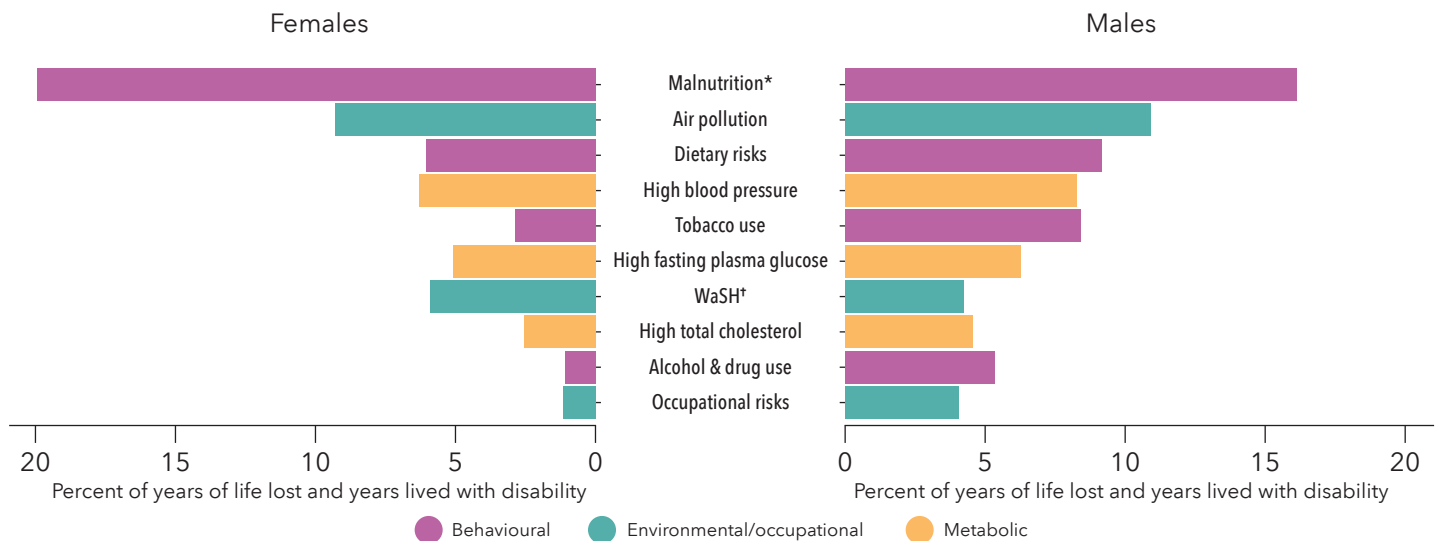


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Maharashtra

1990 life expectancy

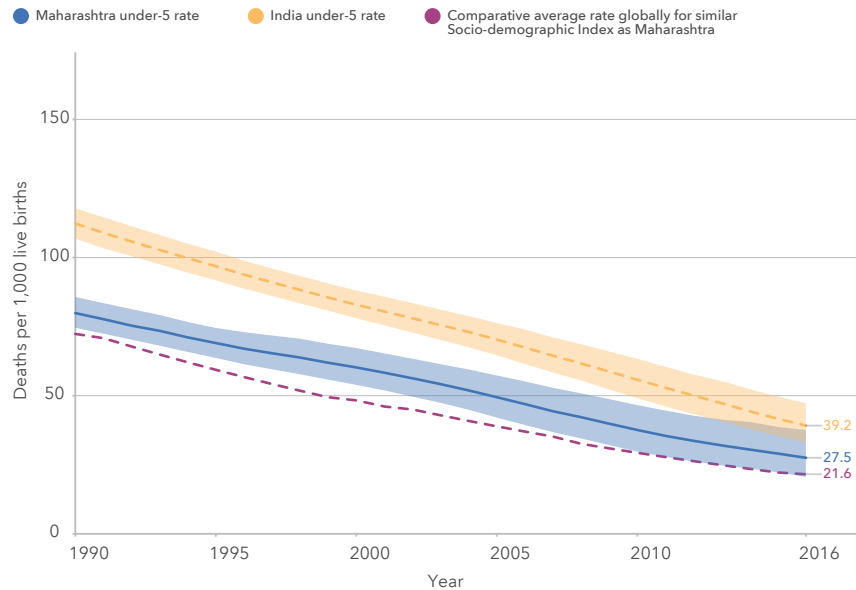
Females: 55.9 years Males: 55.6 years

2016 life expectancy

Females: 69.3 years Males: 65.3 years

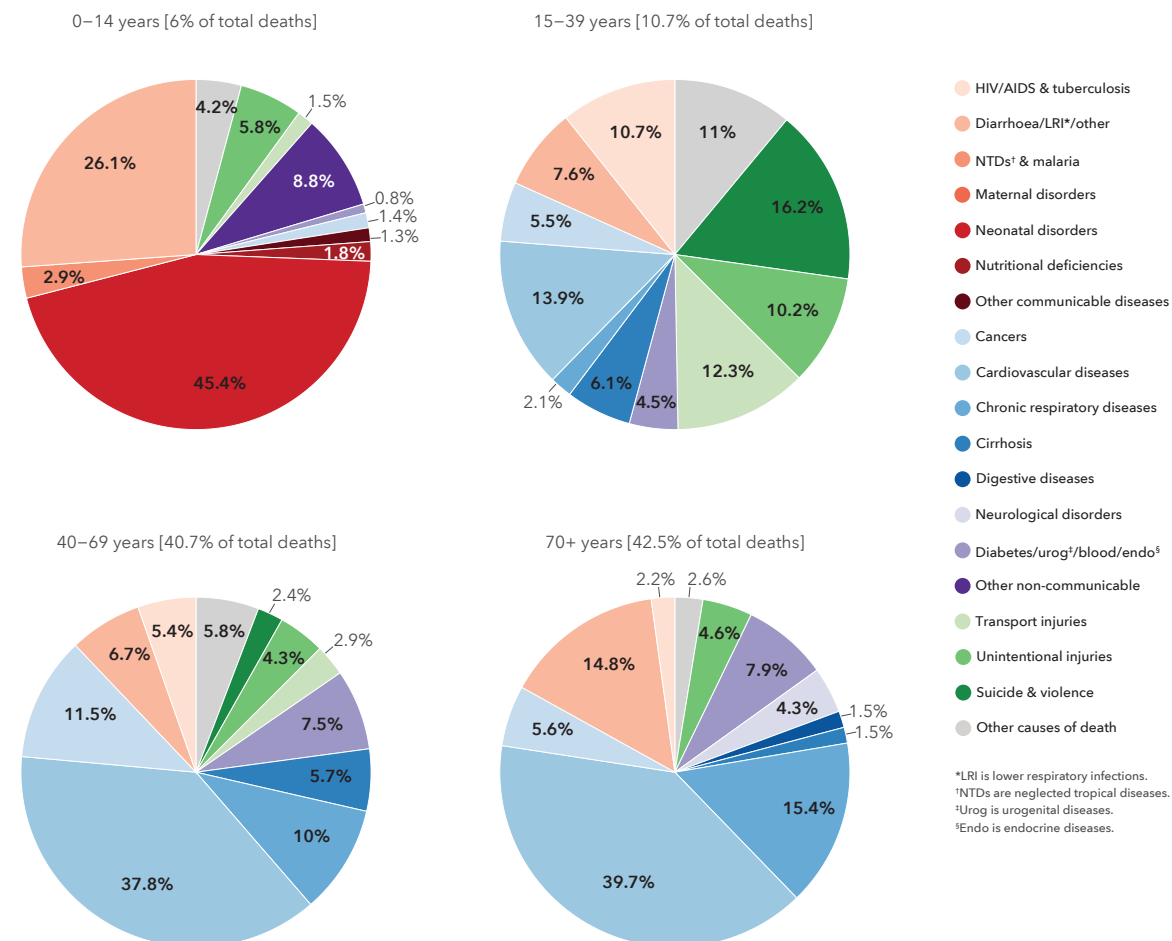
## How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



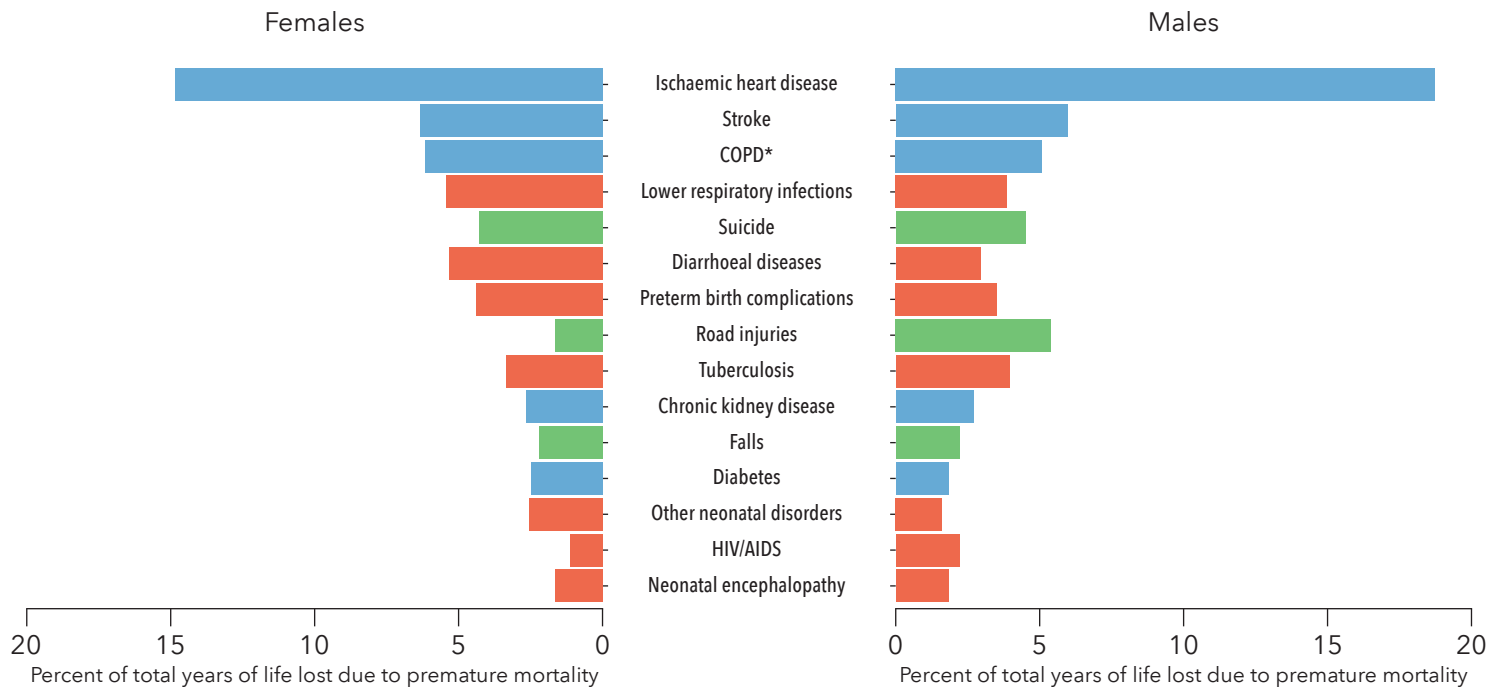
## What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

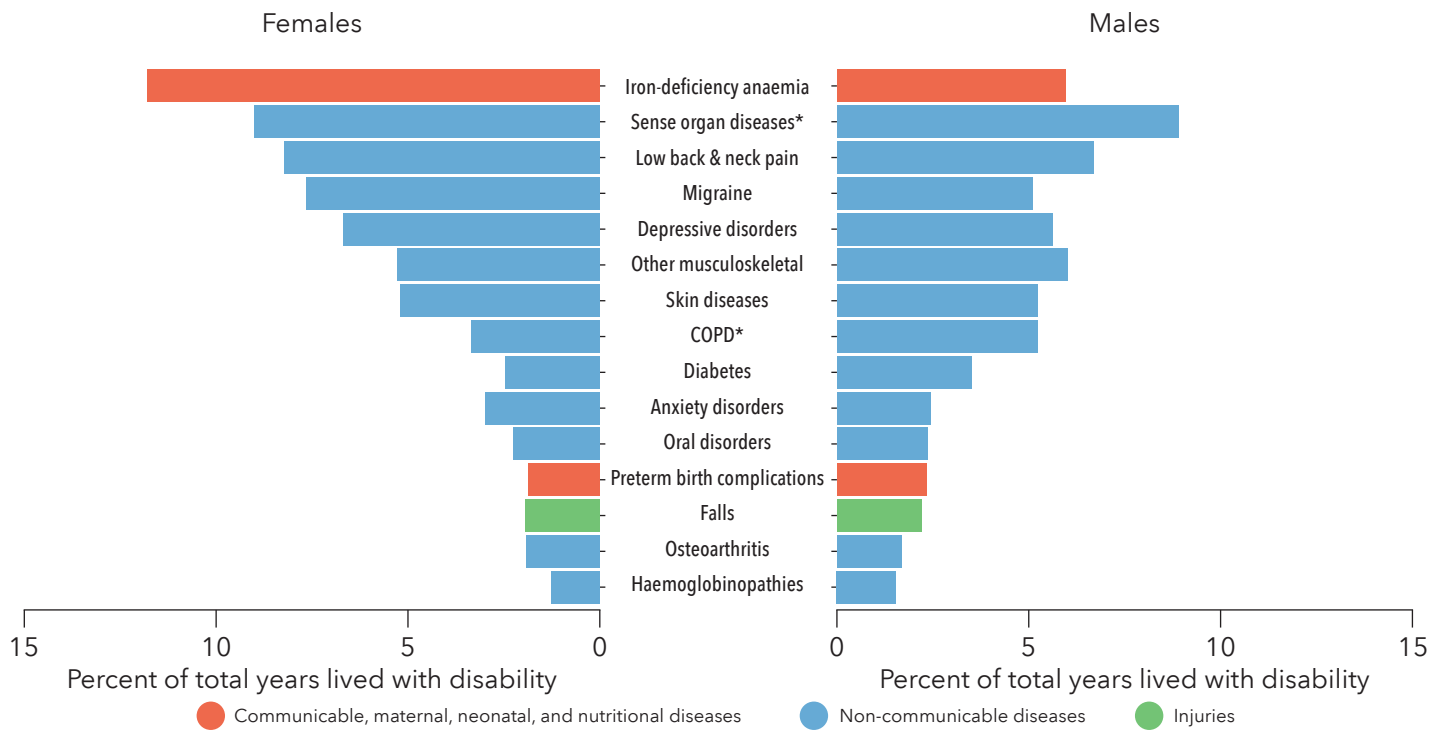


**Proportion of total disease burden from:**  
 Premature death: 63.7% | Disability or morbidity: 36.3%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

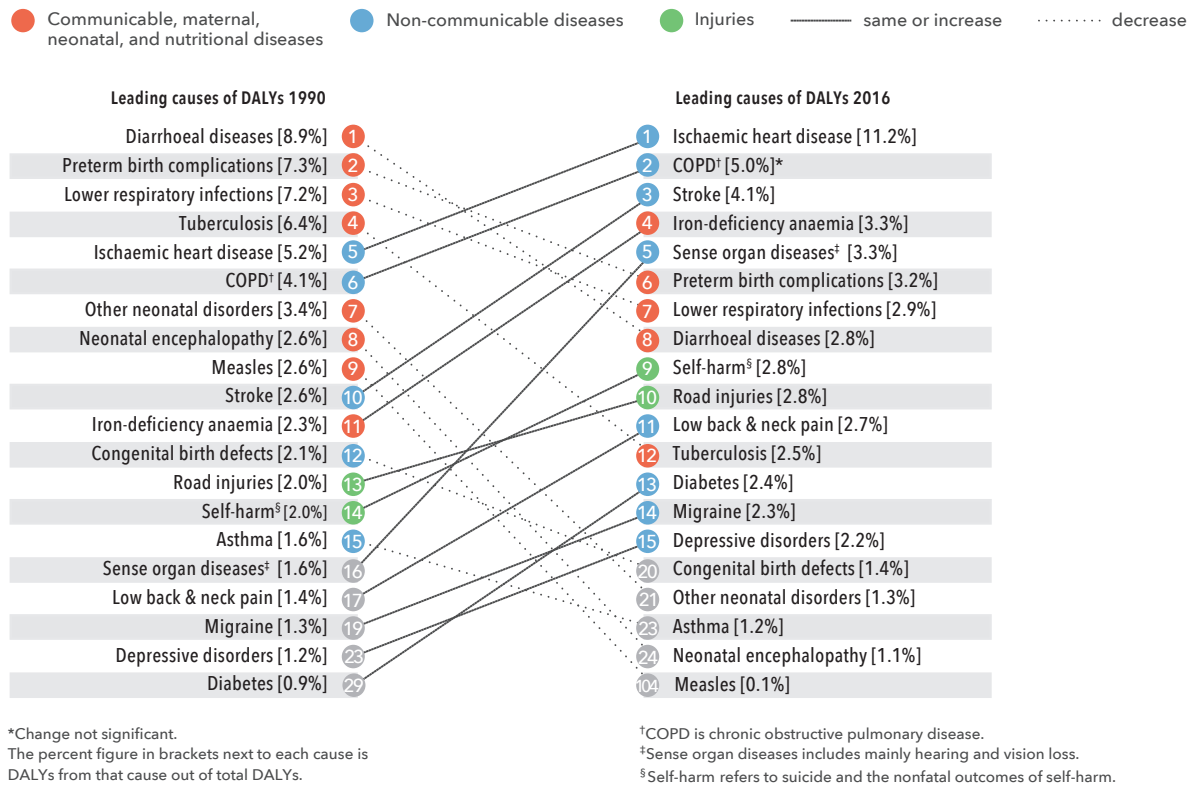


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

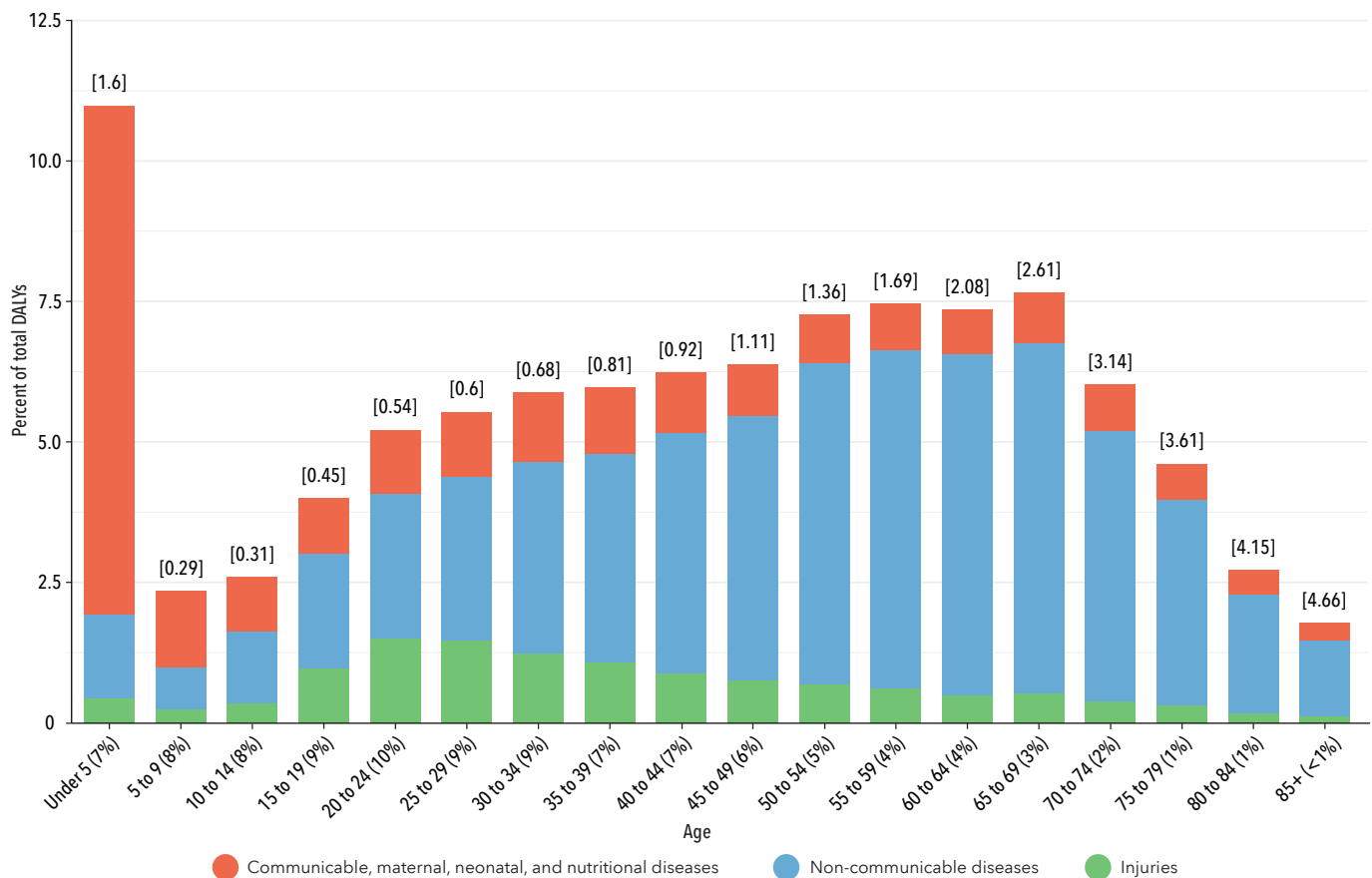


## Proportion of total disease burden from: CMNNDs: 24.6% | NCDs: 63.1% | Injuries: 12.3%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016

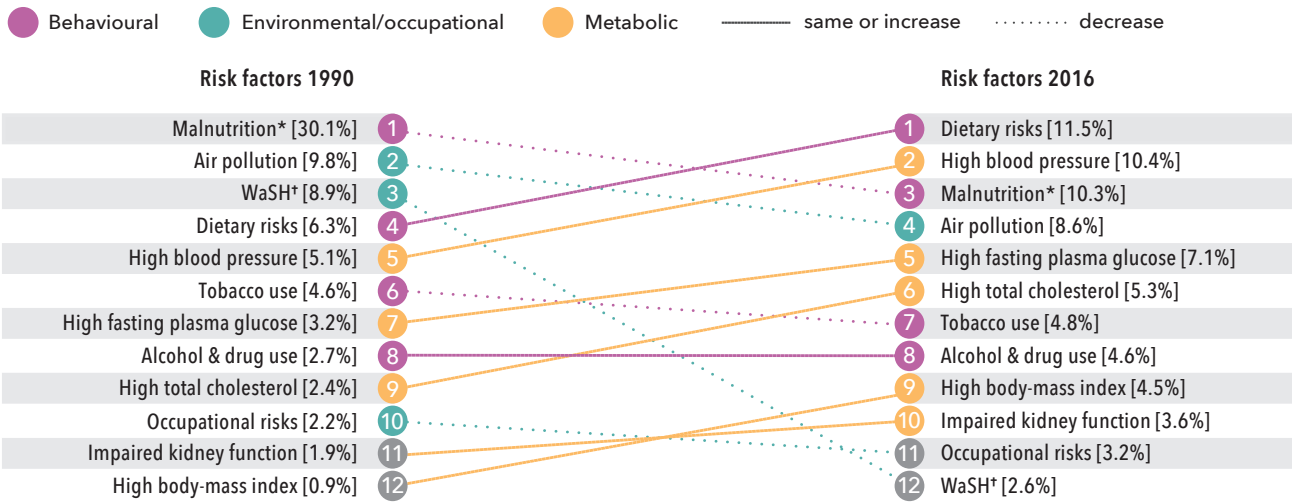


## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

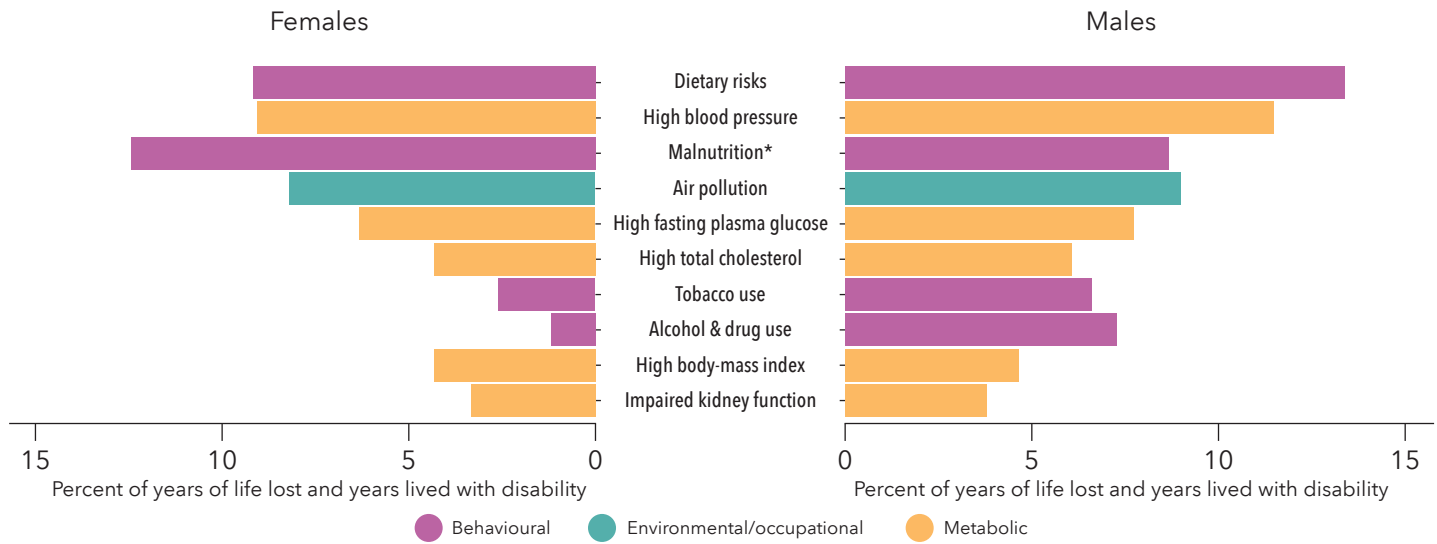


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Manipur

## 1990 life expectancy

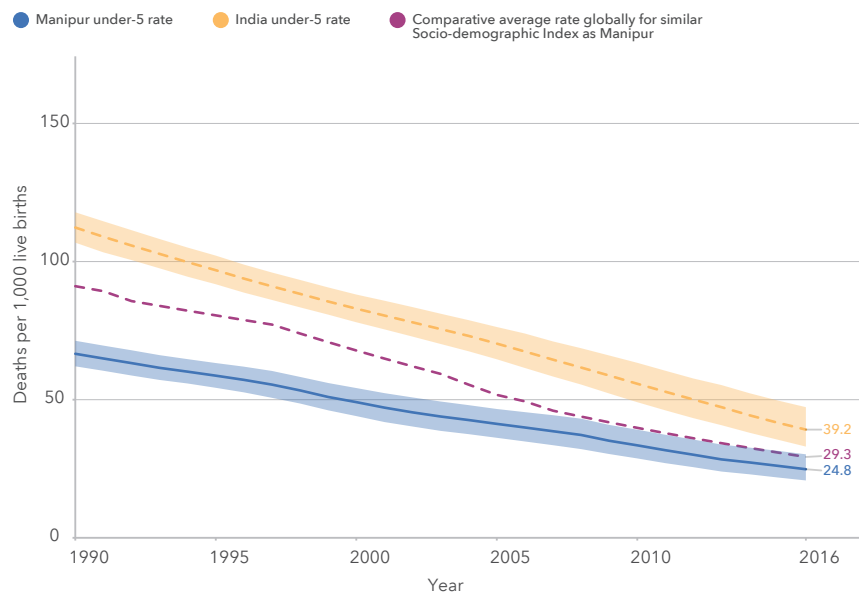
Females: 65.0 years Males: 62.9 years

## 2016 life expectancy

Females: 72.8 years Males: 68.0 years

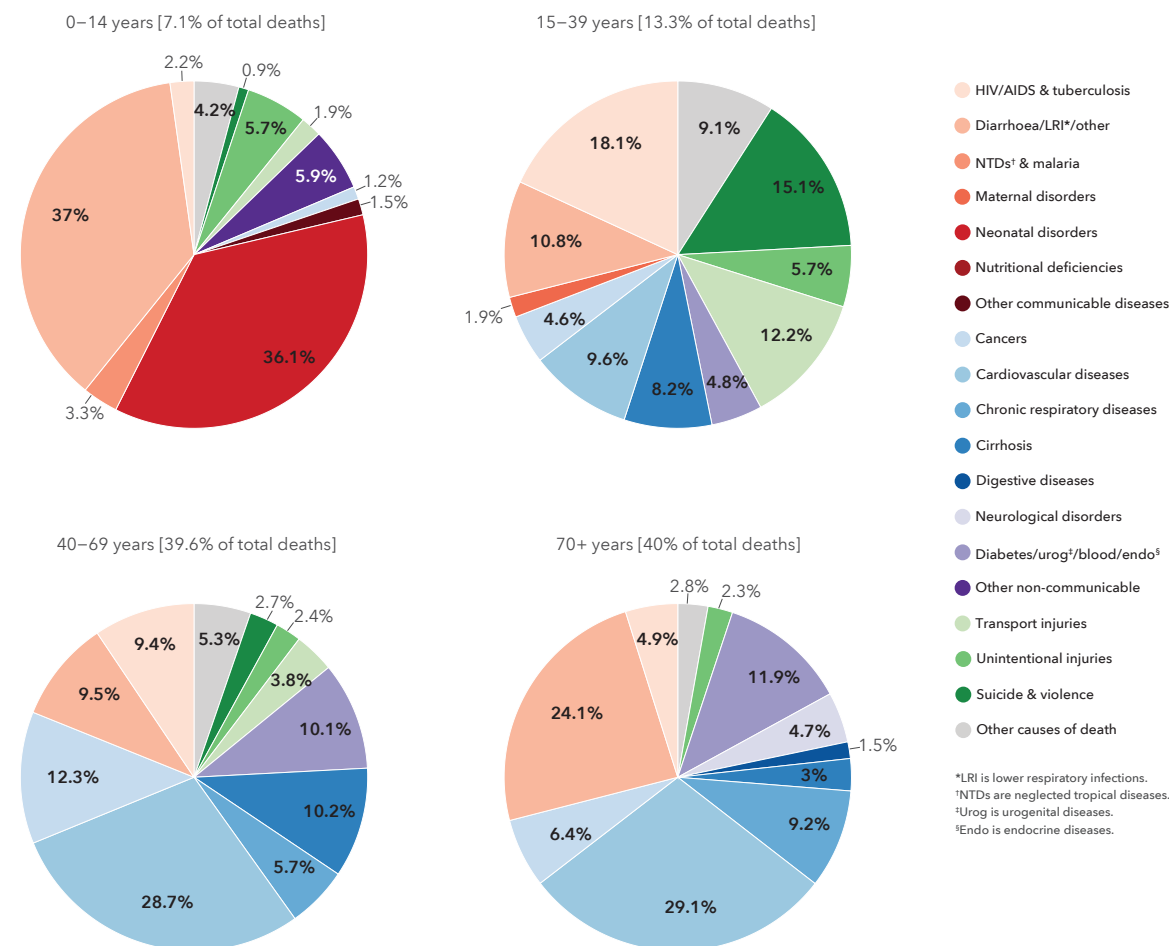
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



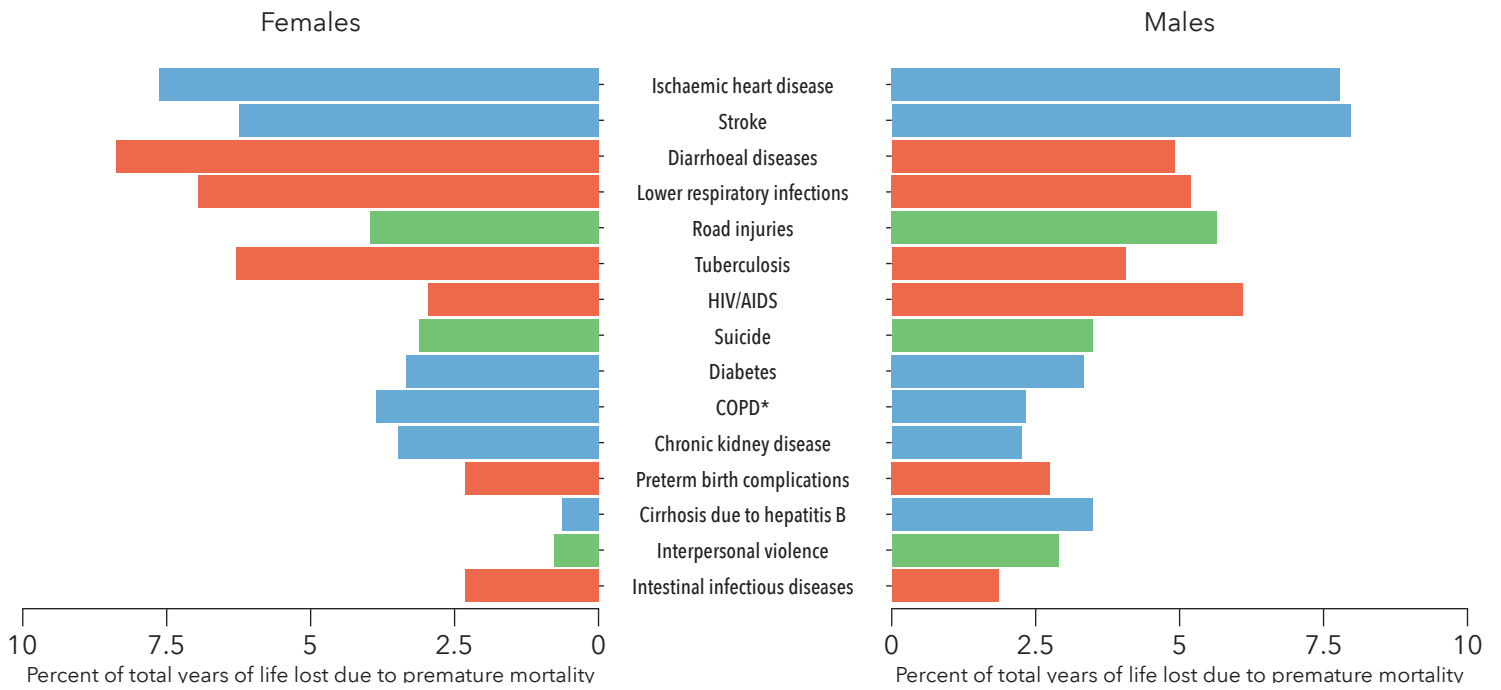
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

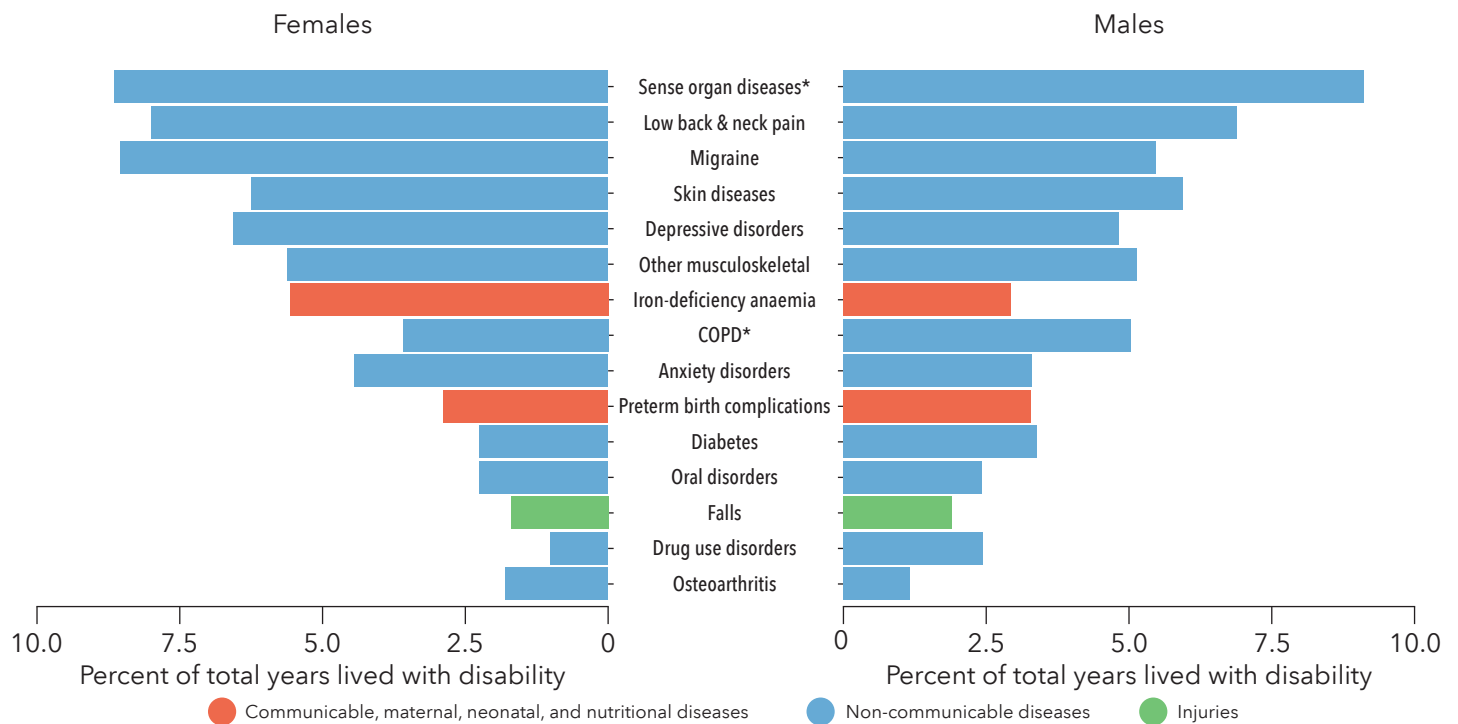


**Proportion of total disease burden from:**  
 Premature death: 64.5% | Disability or morbidity: 35.5%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



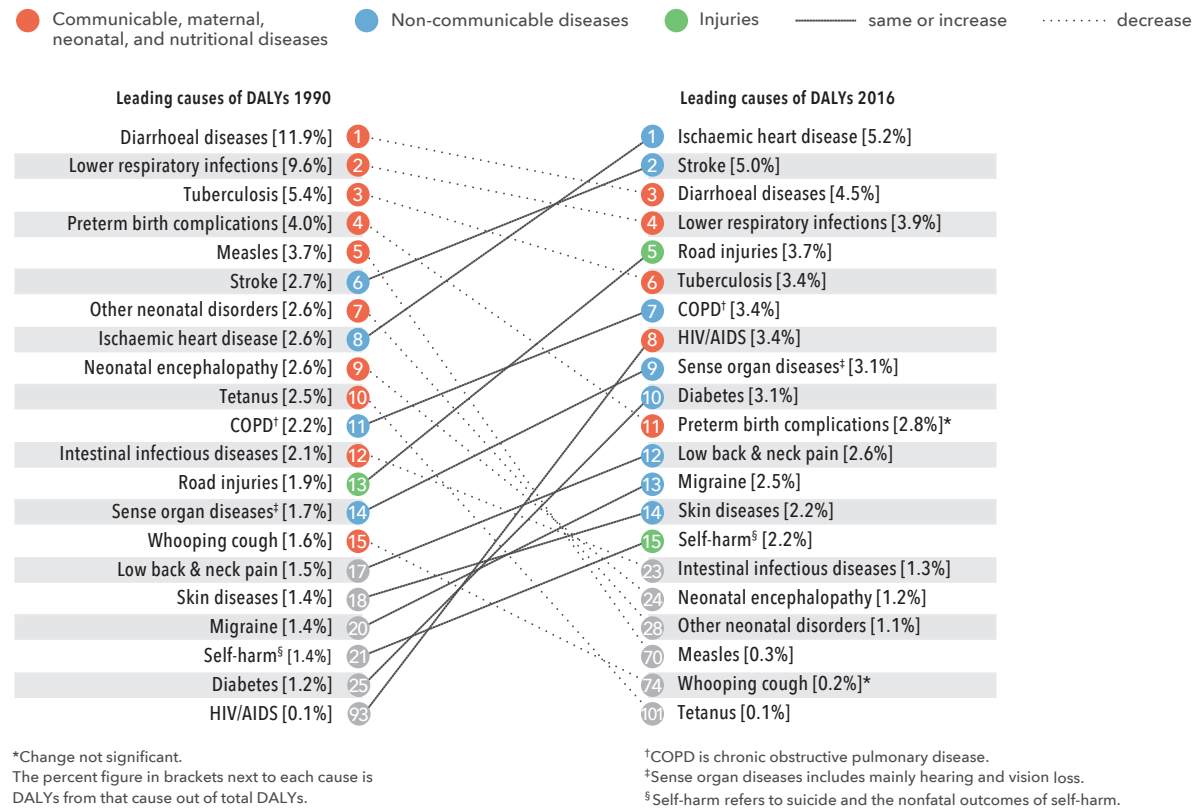
**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



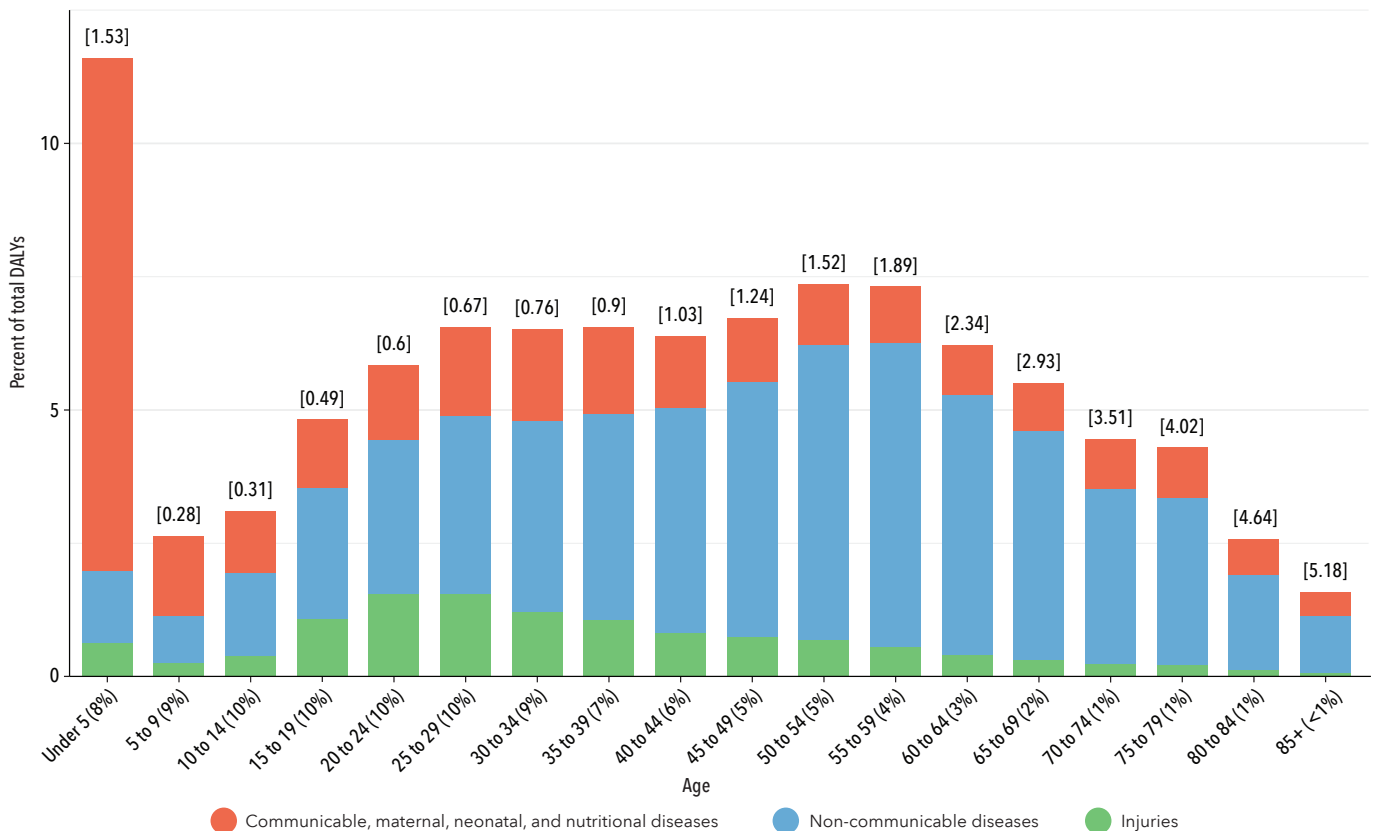
\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 29.5% | NCDs: 58.5% | Injuries: 12.0%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990–2016

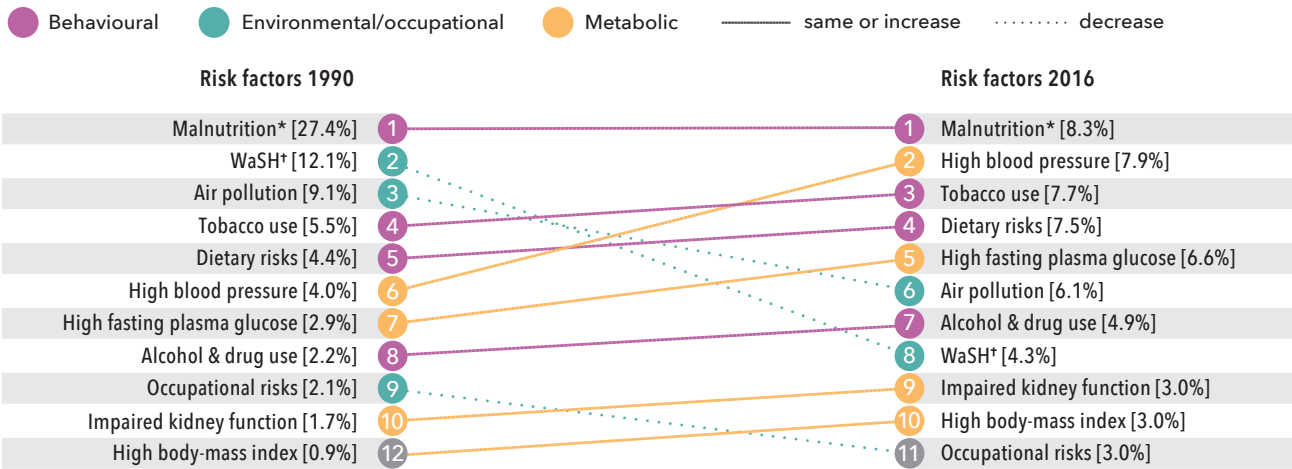


## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

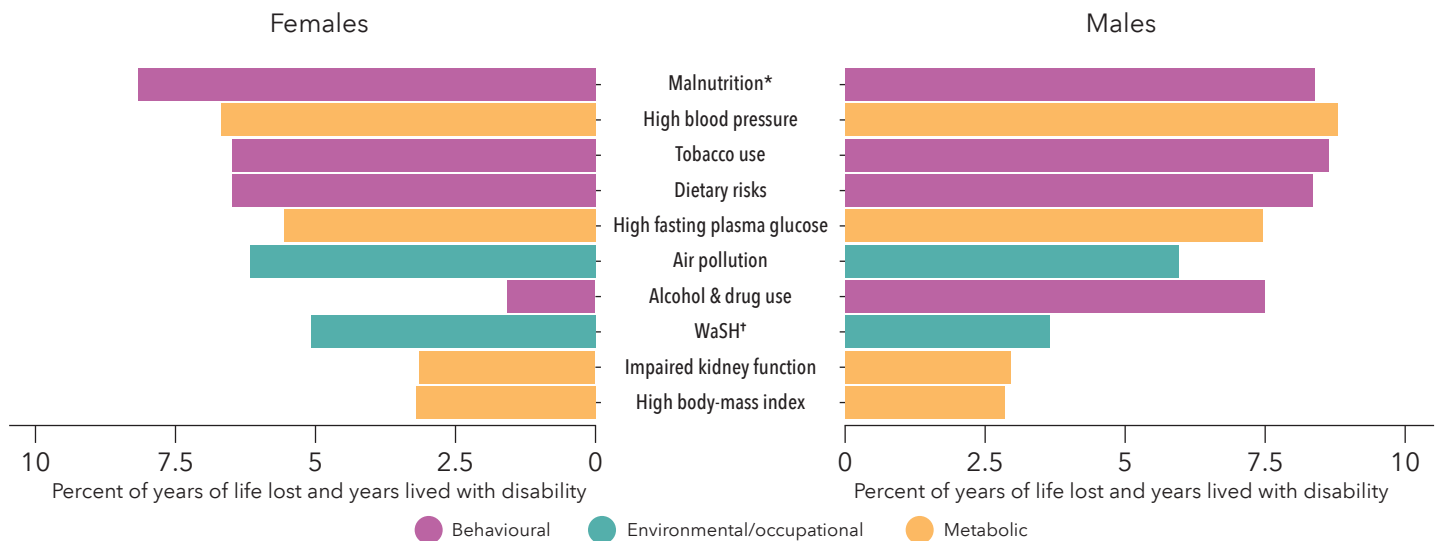


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Meghalaya

## 1990 life expectancy

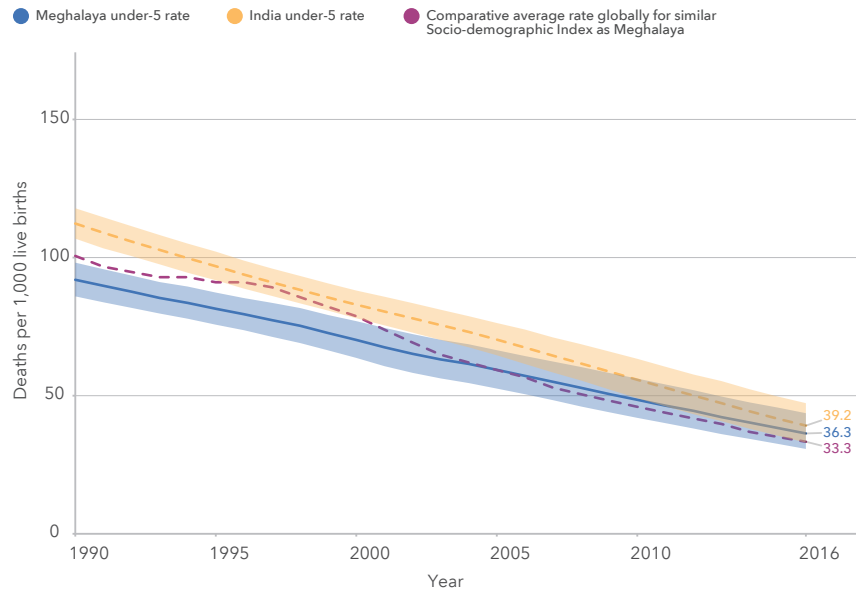
Females: 63.1 years Males: 59.8 years

## 2016 life expectancy

Females: 72.4 years Males: 66.8 years

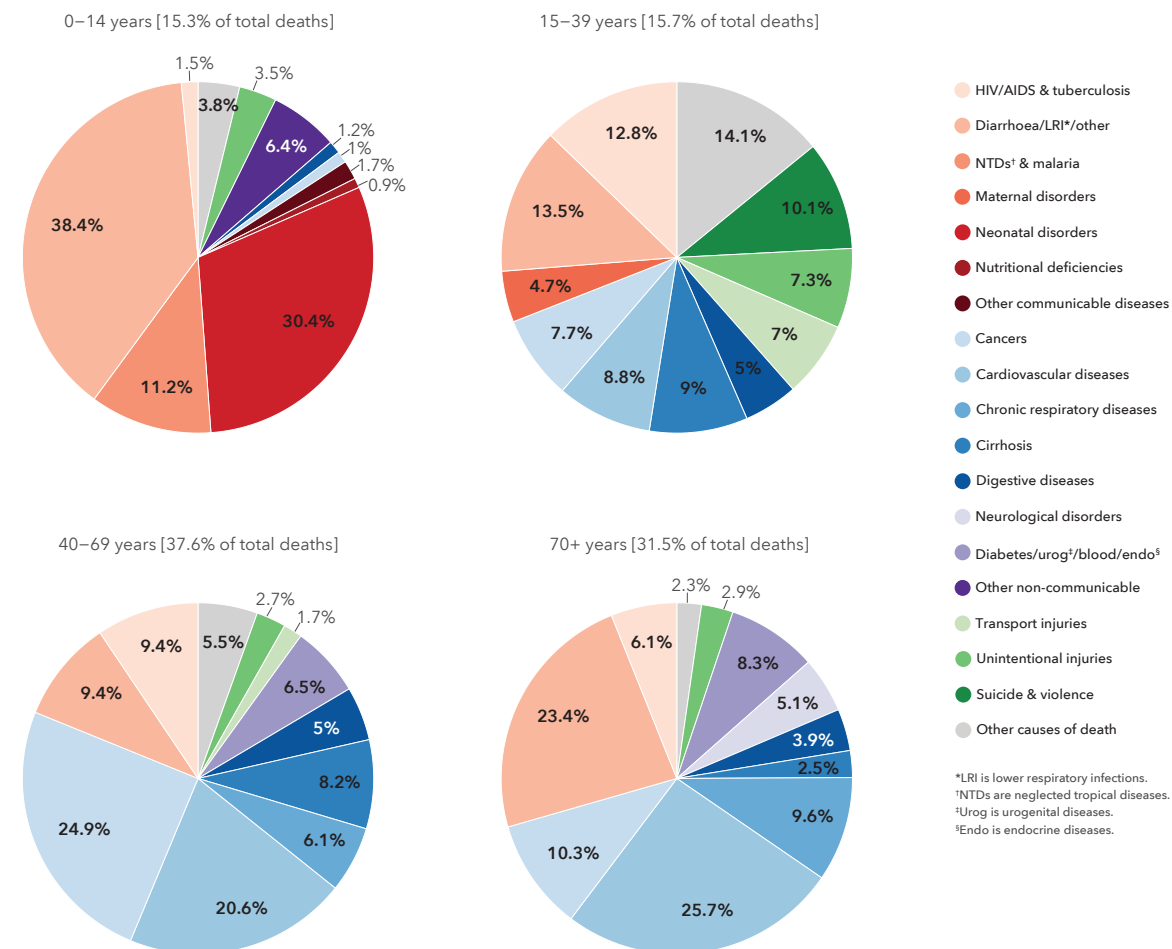
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



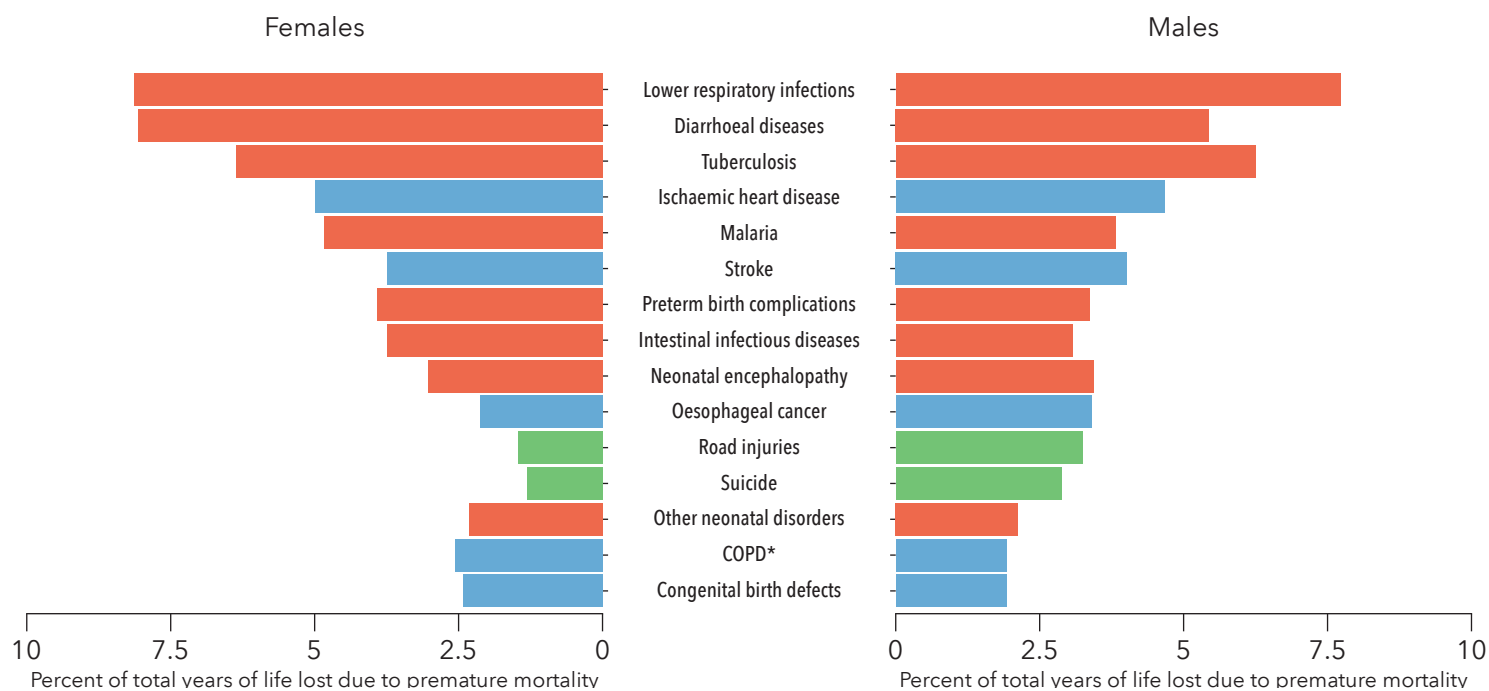
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

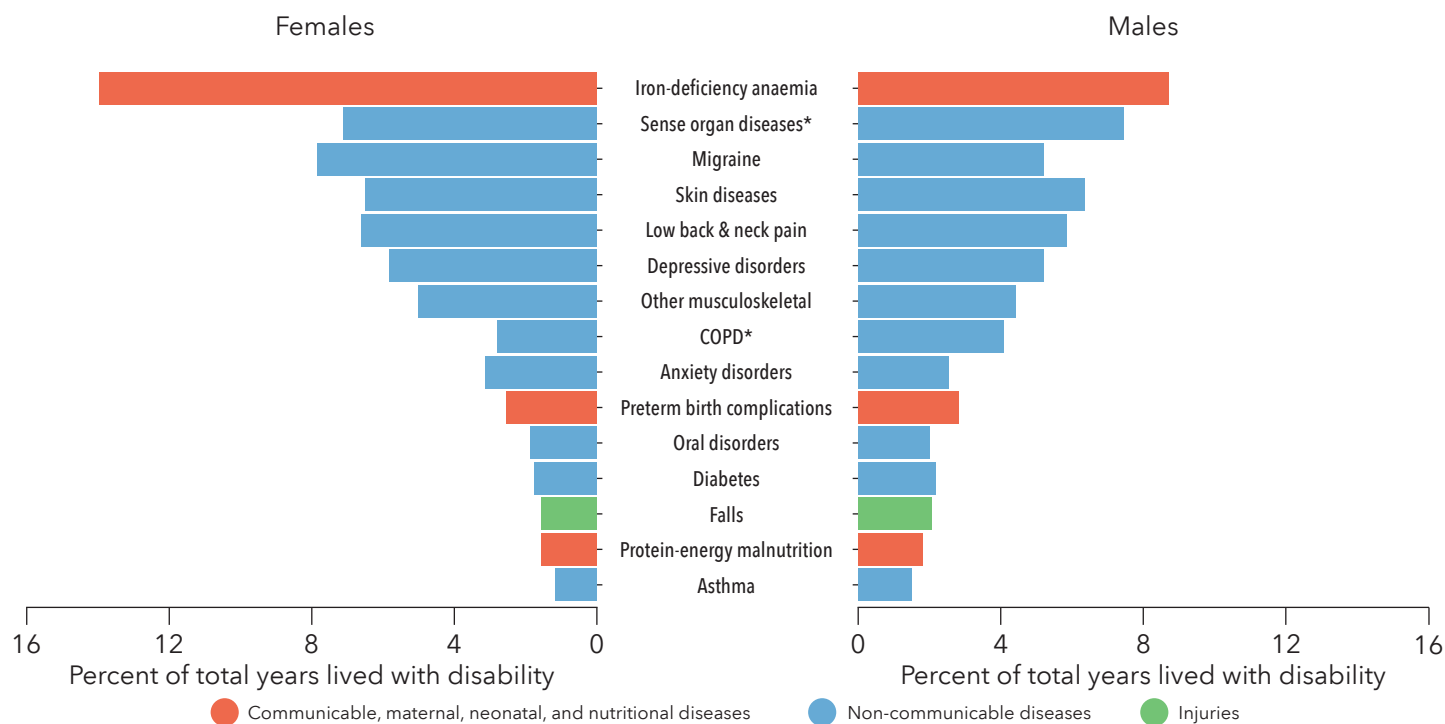


**Proportion of total disease burden from:**  
 Premature death: 64.1% | Disability or morbidity: 35.9%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

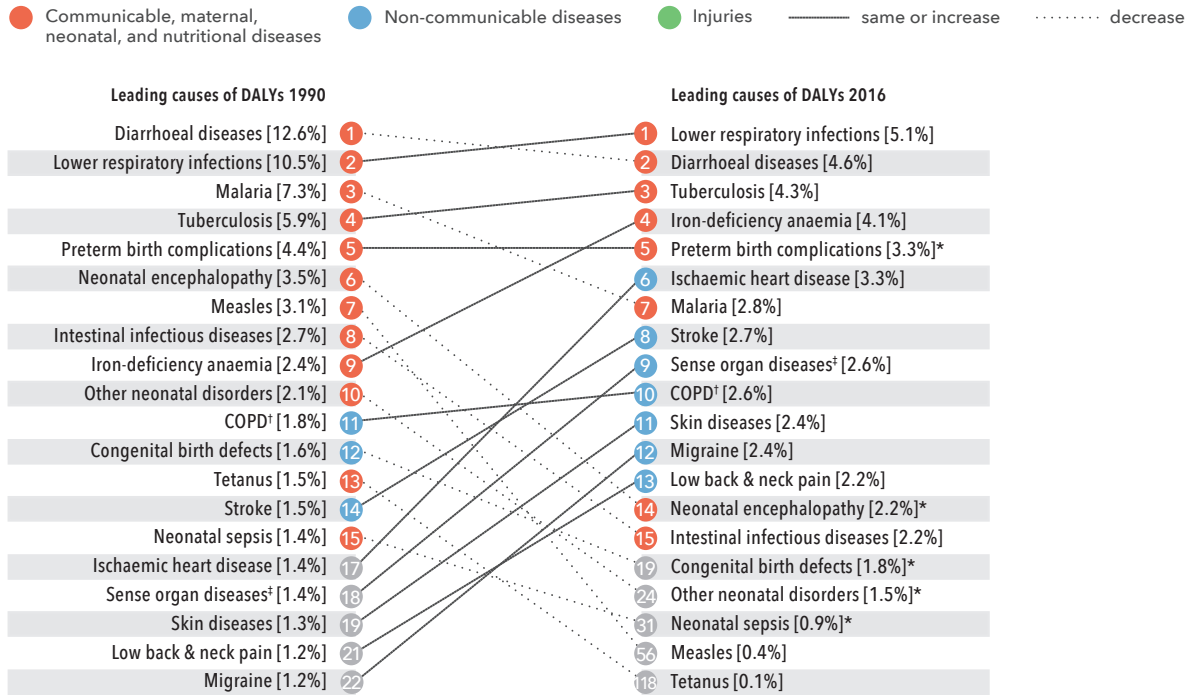


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.



## Proportion of total disease burden from: CMNNDs: 39.1% | NCDs: 52.3% | Injuries: 8.6%

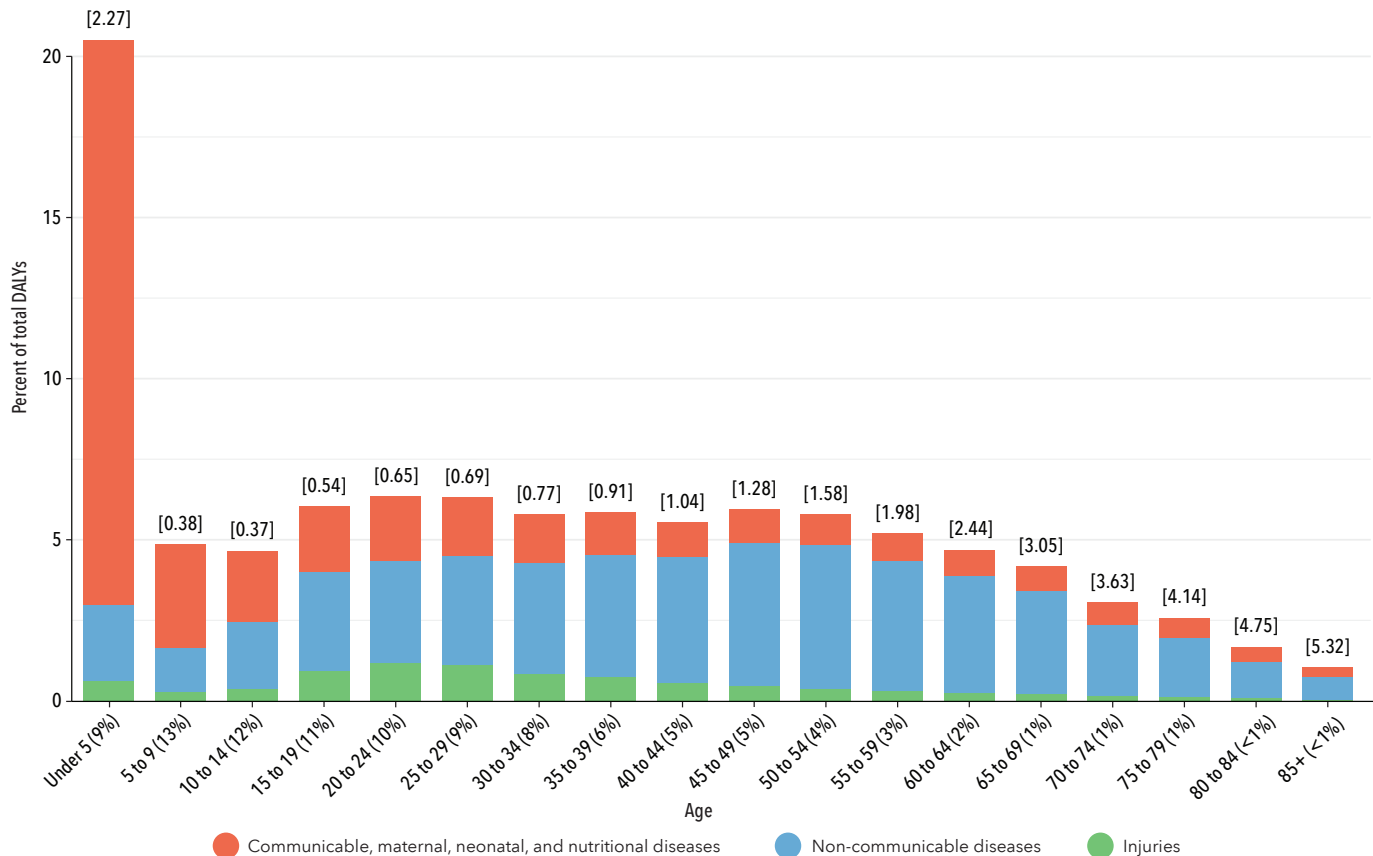
How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016



\*Change not significant.  
The percent figure in brackets next to each cause is DALYs from that cause out of total DALYs.

<sup>†</sup>COPD is chronic obstructive pulmonary disease.  
<sup>‡</sup>Sense organ diseases includes mainly hearing and vision loss.  
<sup>§</sup>Self-harm refers to suicide and the nonfatal outcomes of self-harm.

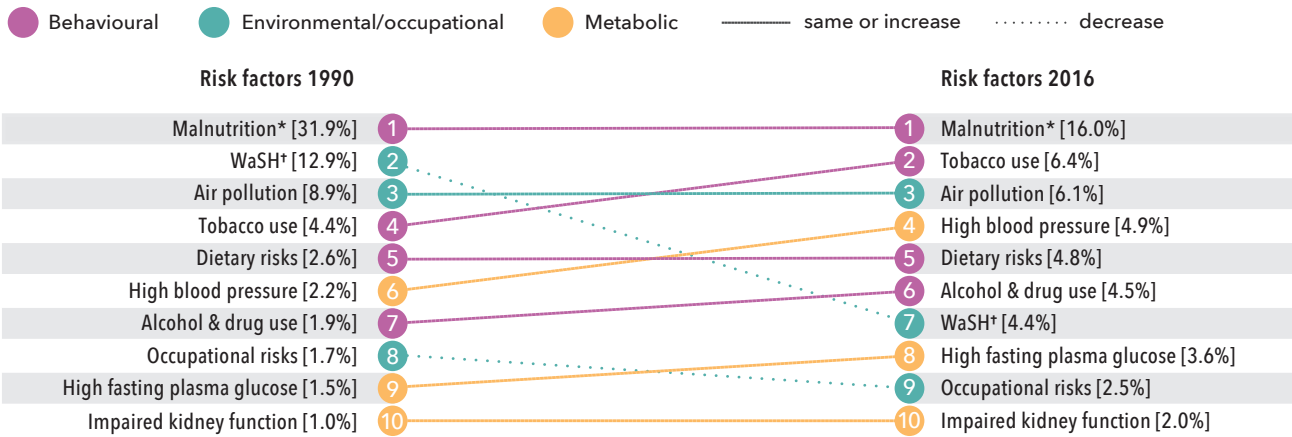
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group.  
The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

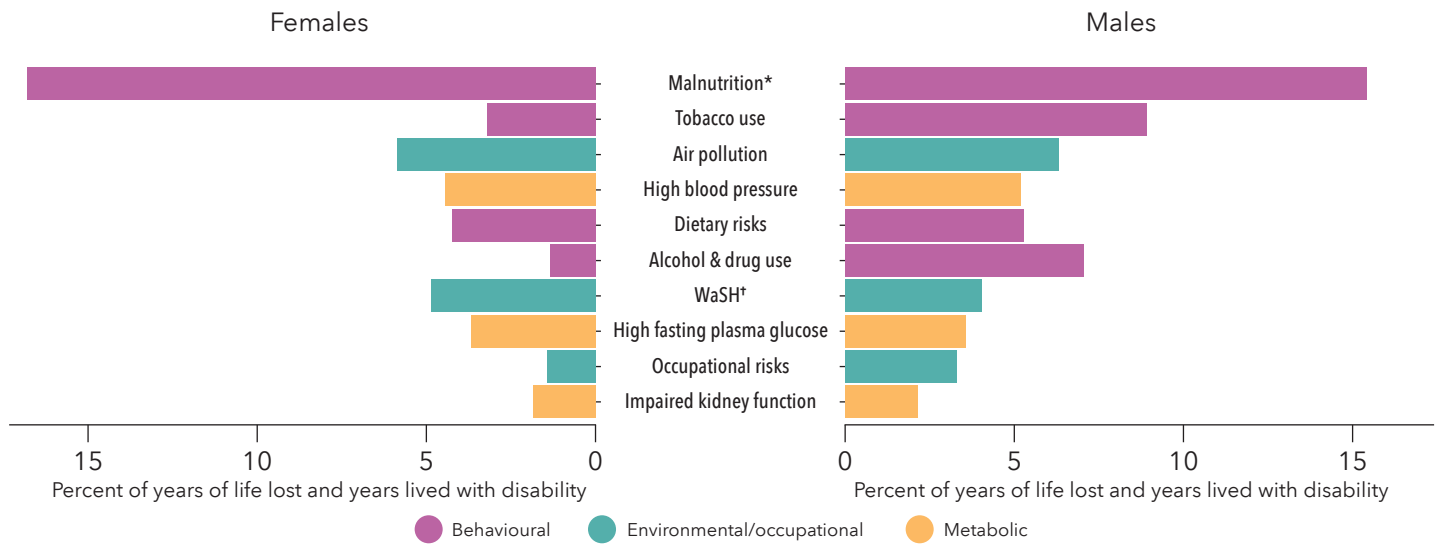


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Mizoram

## 1990 life expectancy

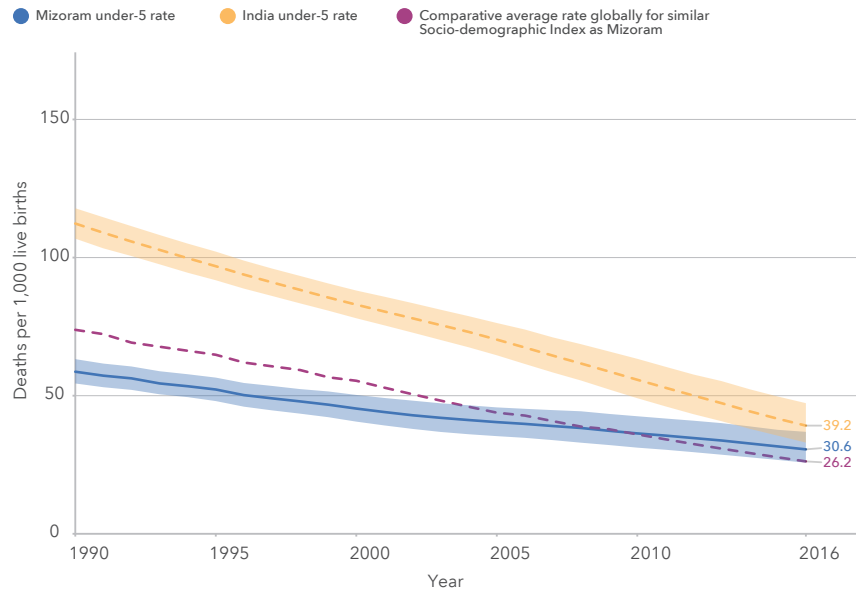
Females: 66.7 years Males: 64.0 years

## 2016 life expectancy

Females: 73.8 years Males: 68.3 years

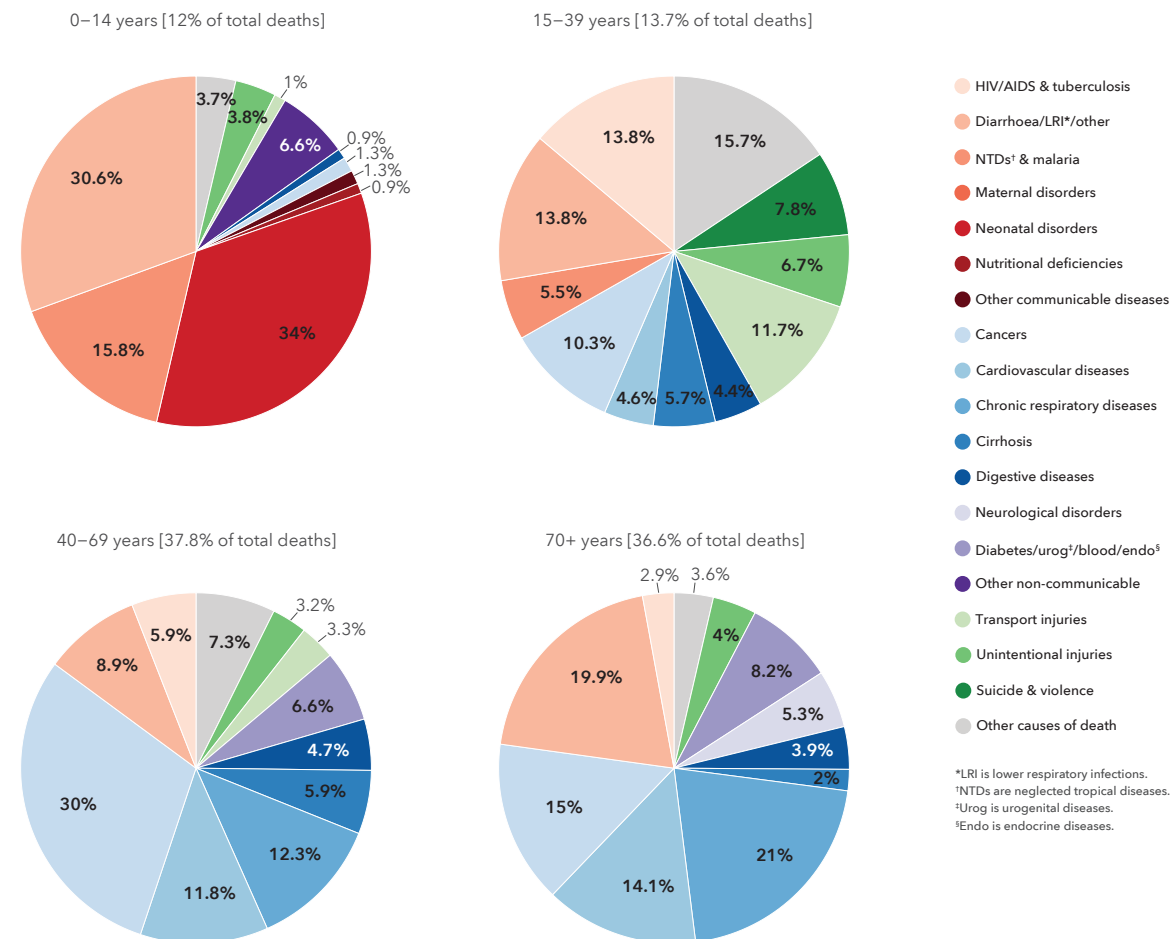
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



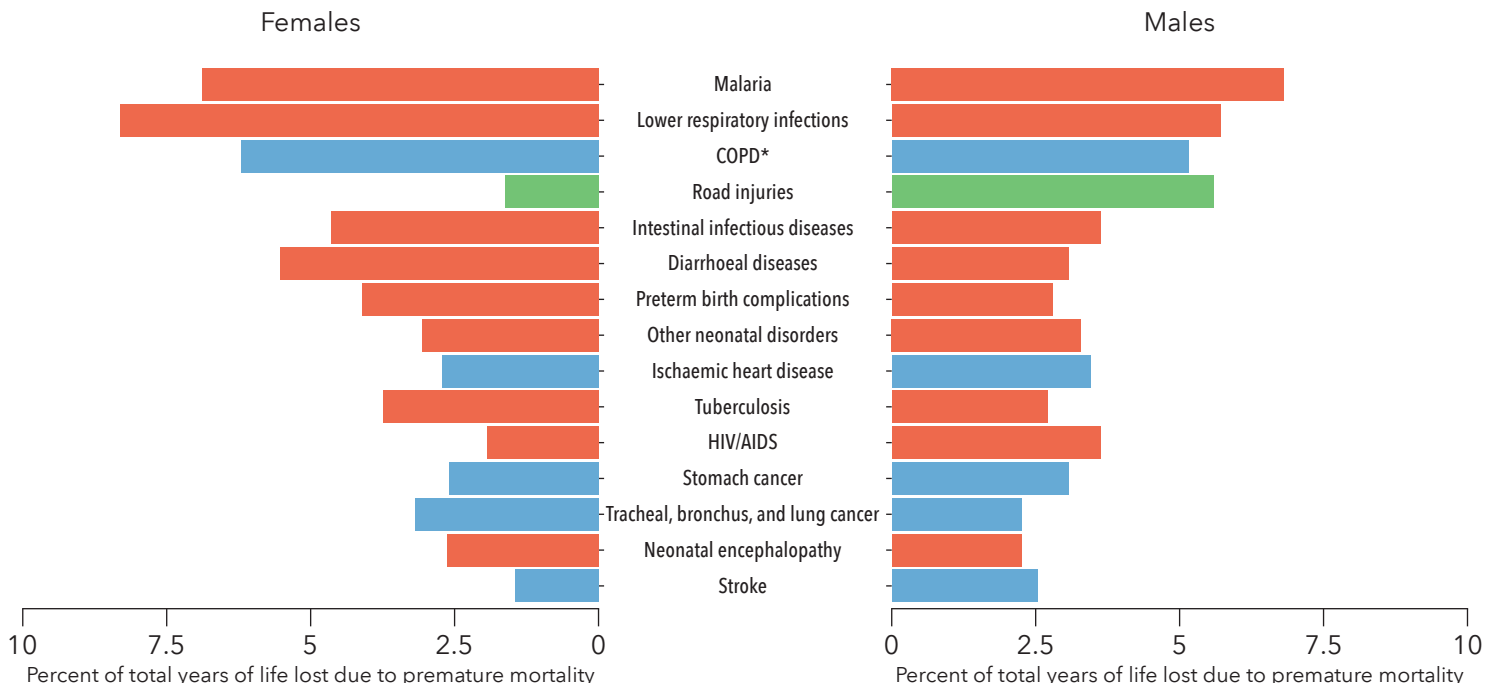
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

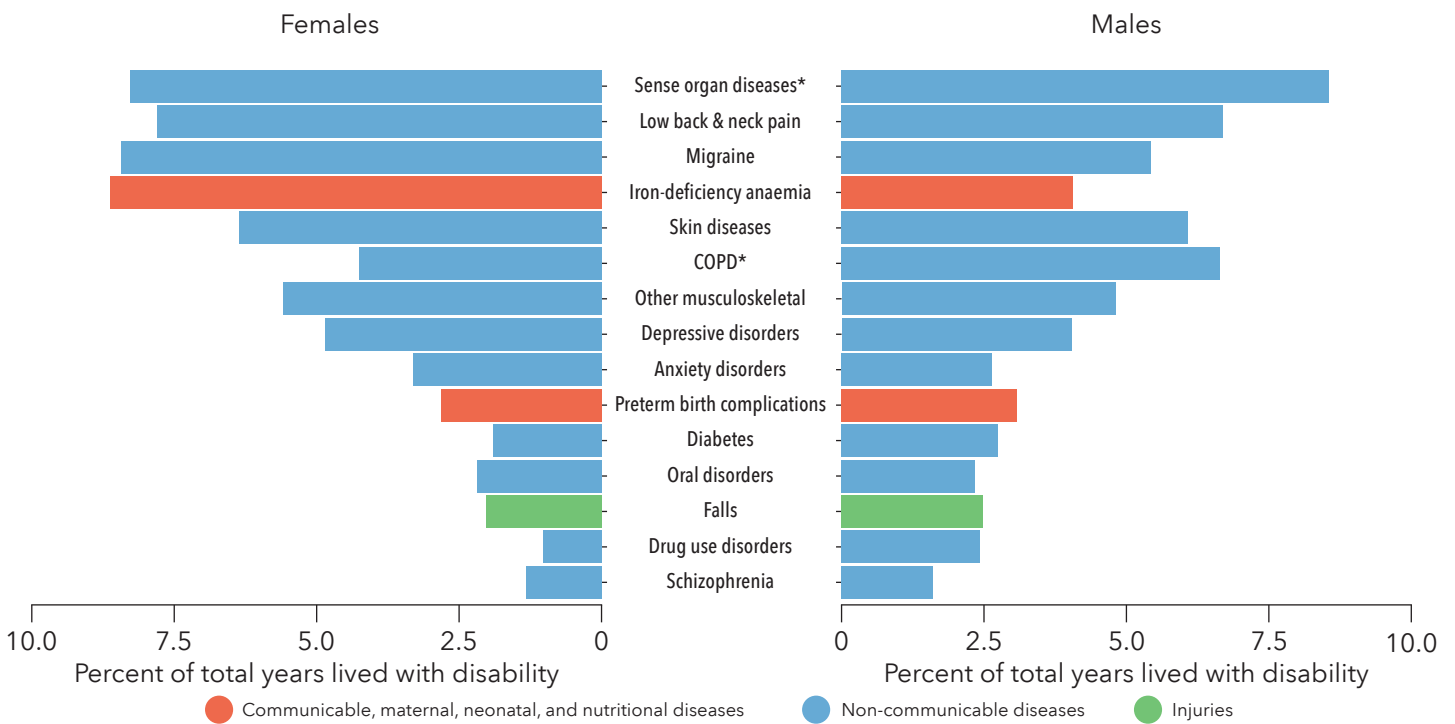


**Proportion of total disease burden from:**  
 Premature death: 64.6% | Disability or morbidity: 35.4%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



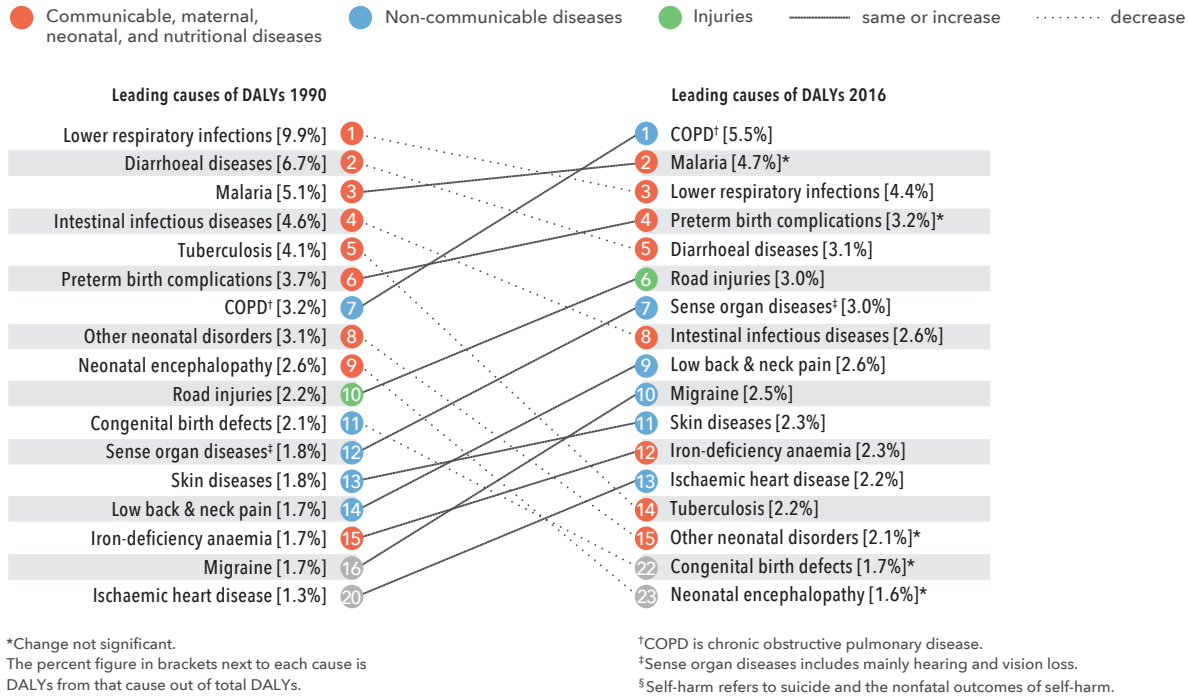
**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



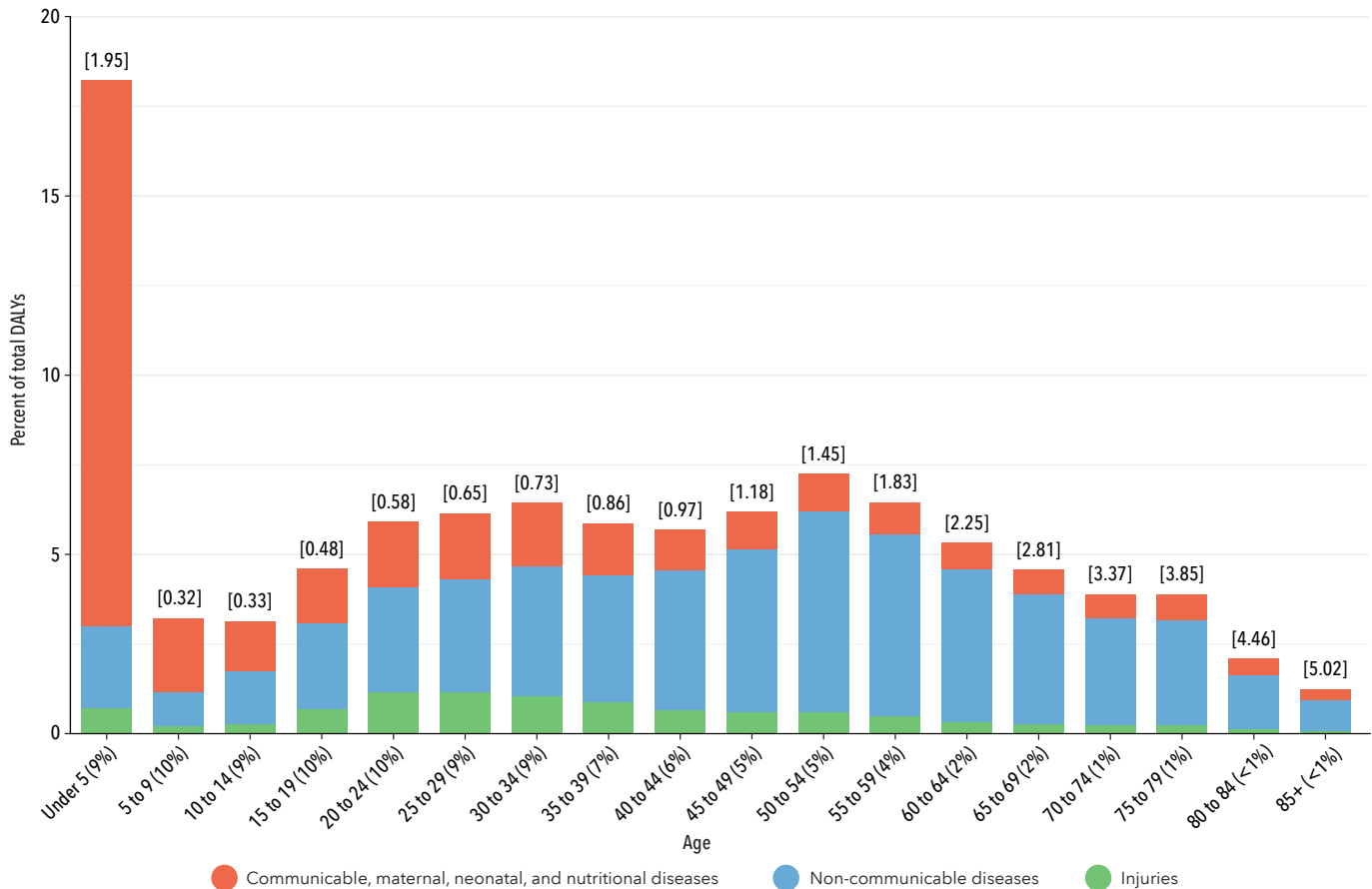
\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 34.6% | NCDs: 55.5% | Injuries: 9.8%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016



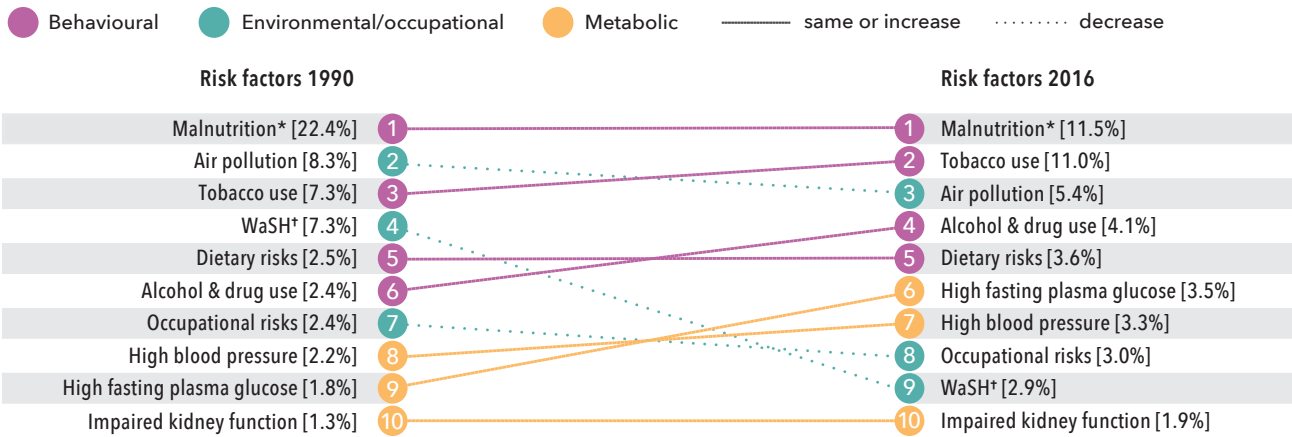
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group.  
The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

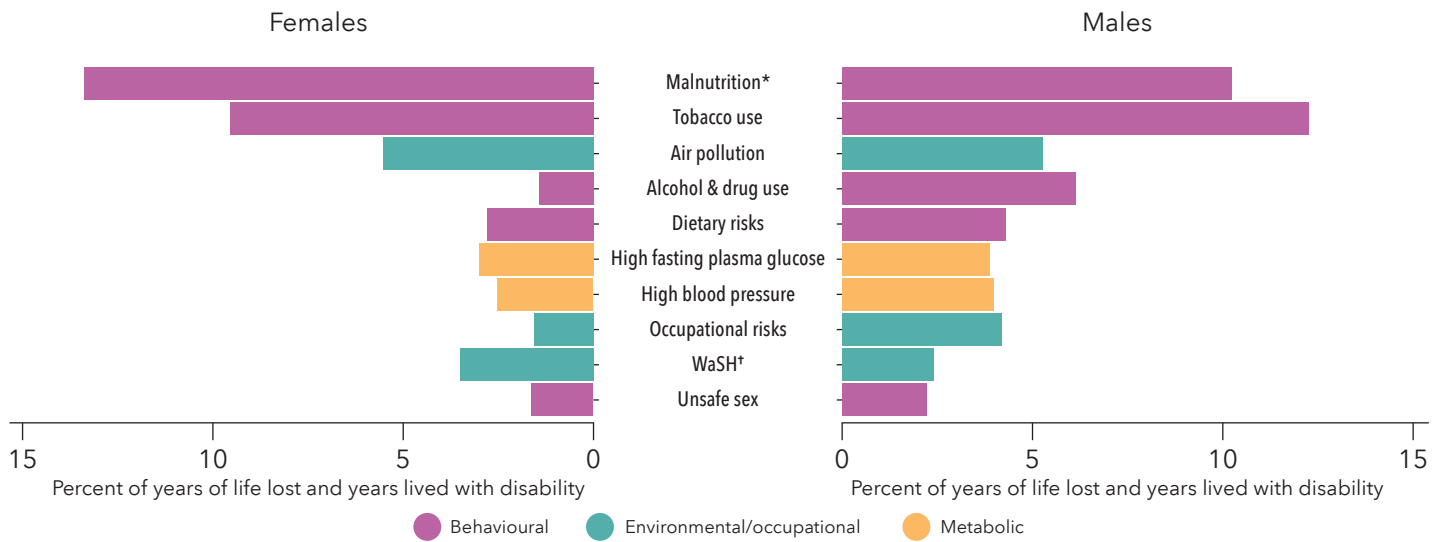


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Nagaland

## 1990 life expectancy

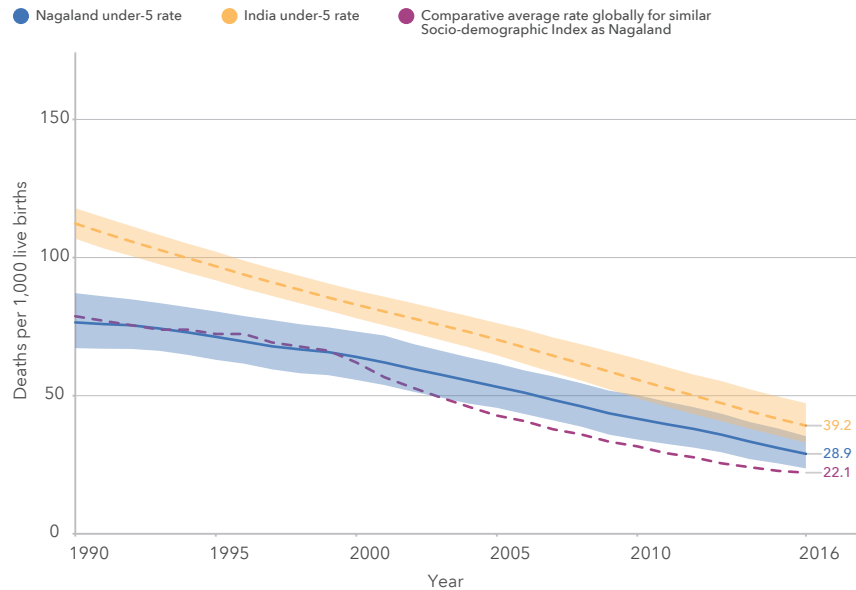
Females: 64.9 years Males: 63.1 years

## 2016 life expectancy

Females: 74.5 years Males: 69.1 years

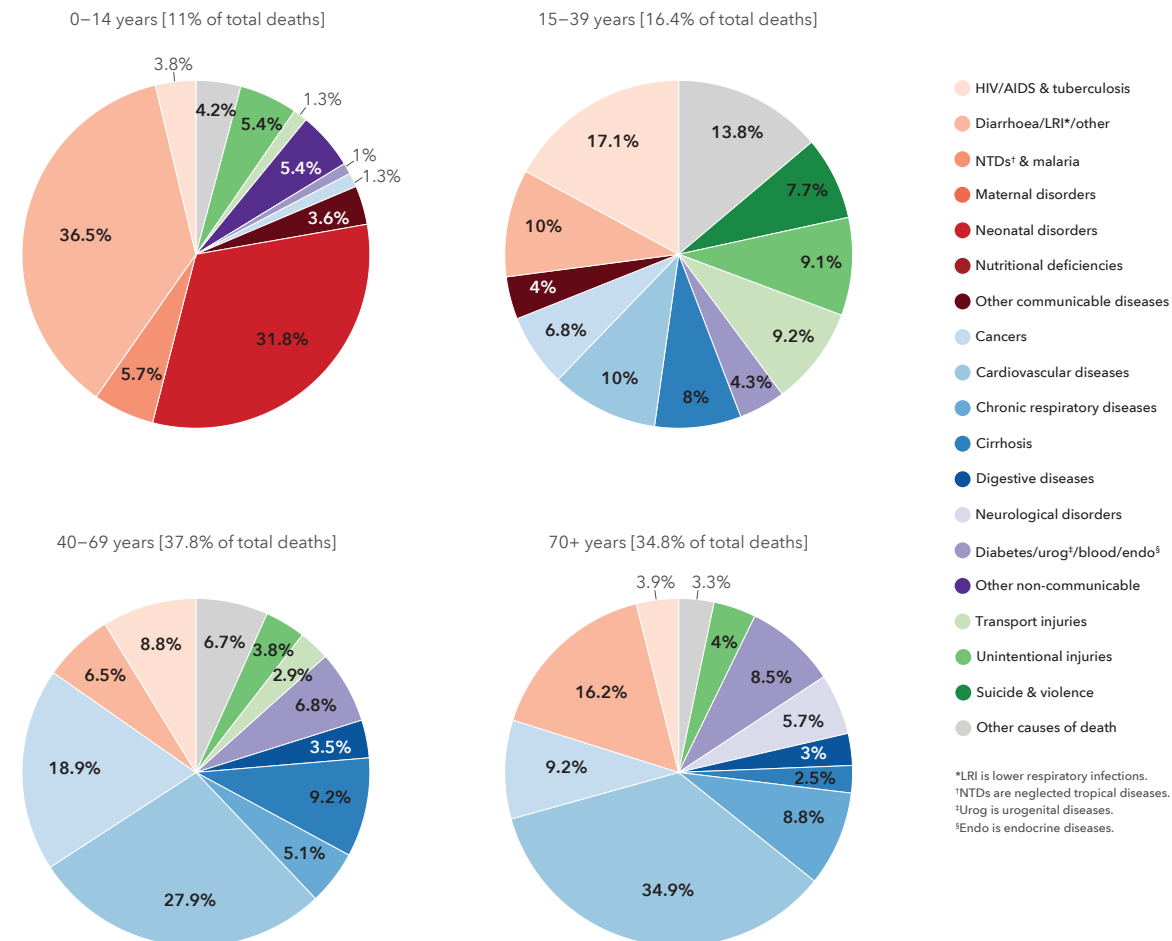
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



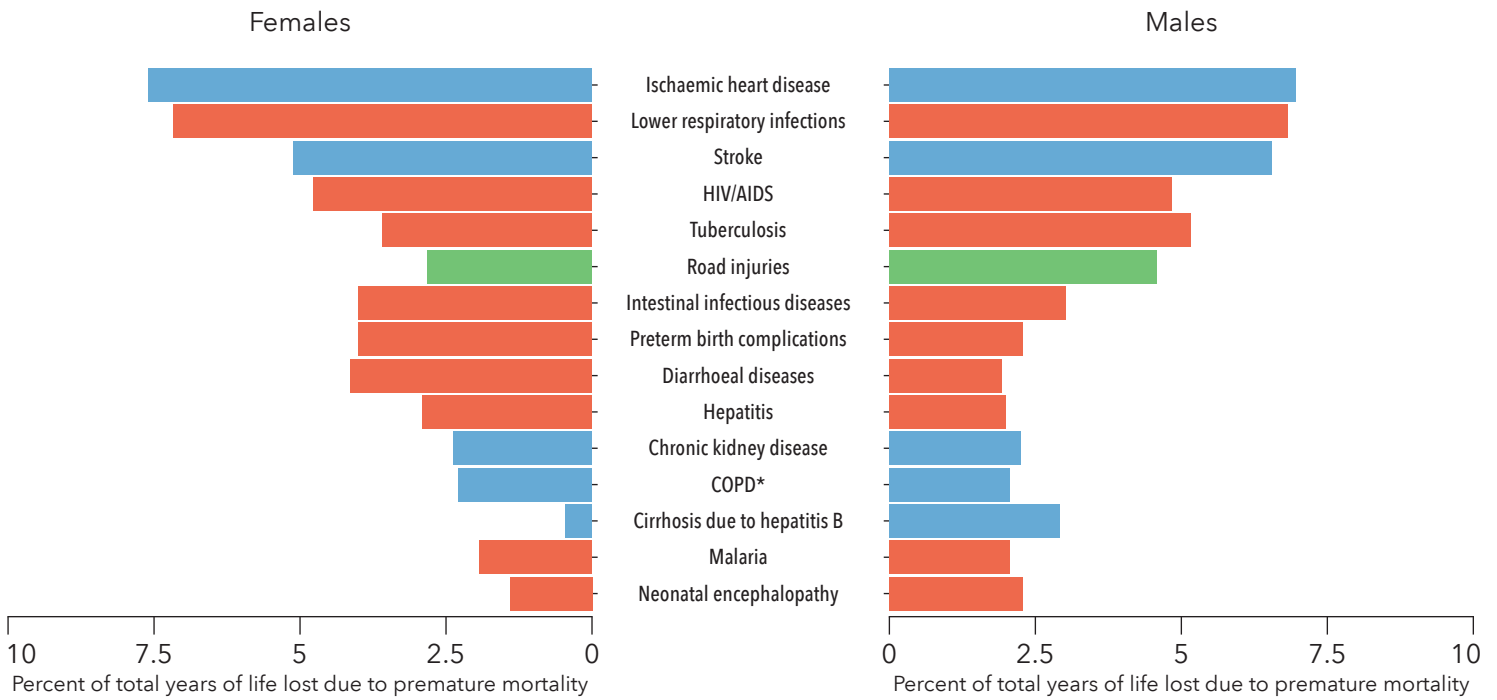
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

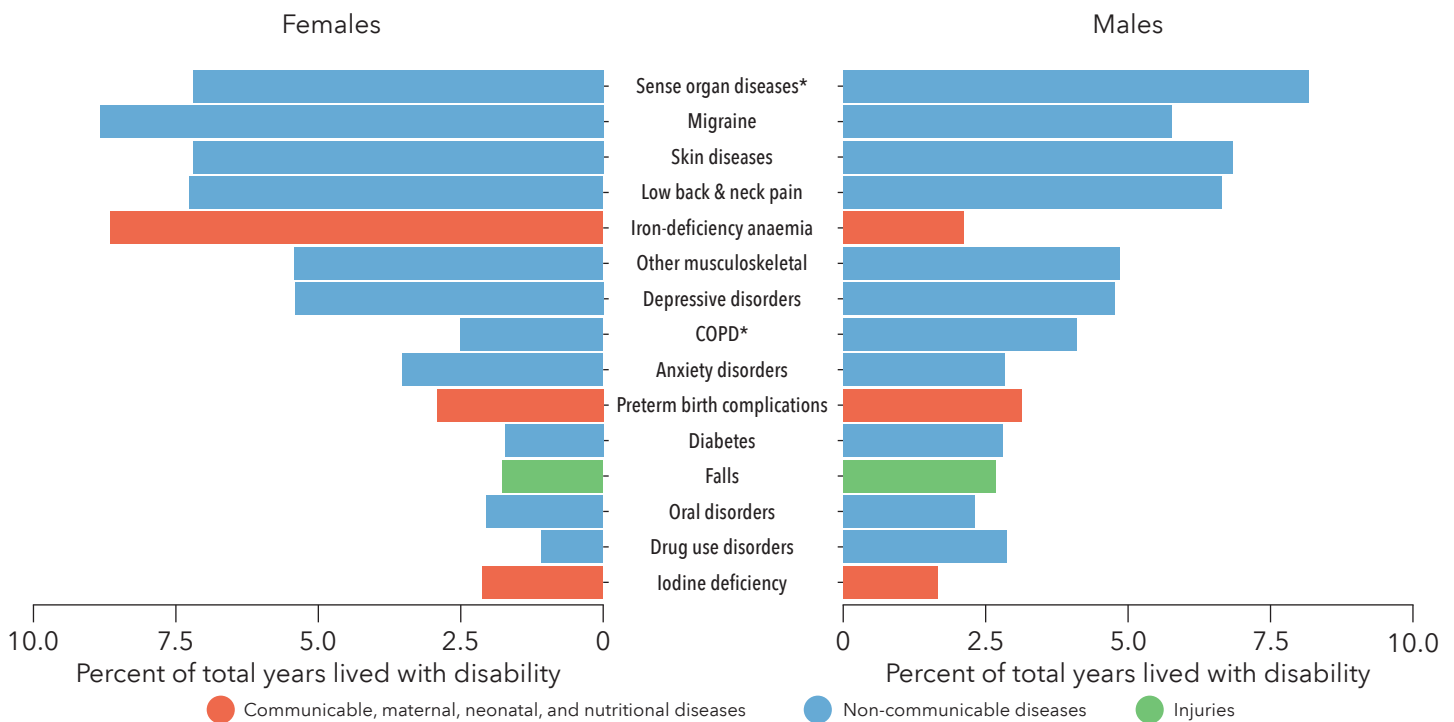


**Proportion of total disease burden from:**  
 Premature death: 61.0% | Disability or morbidity: 39.0%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



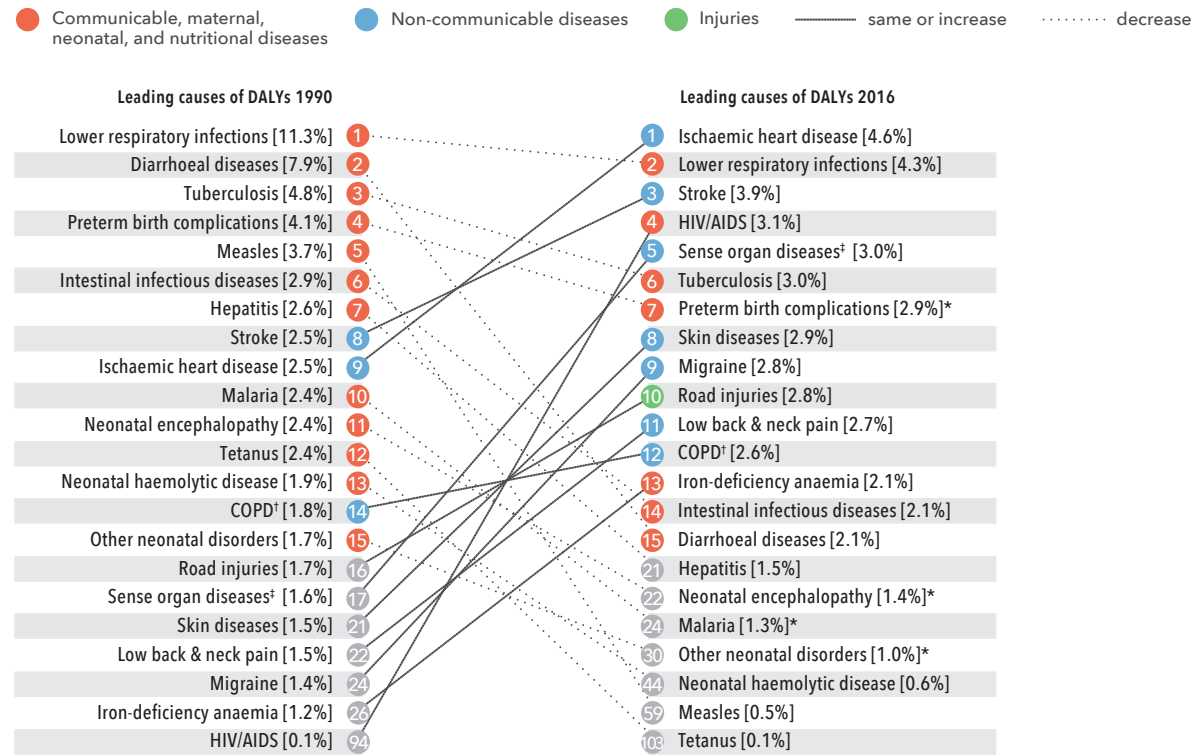
\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.



## Proportion of total disease burden from: CMNNDs: 32.2% | NCDs: 57.2% | Injuries: 10.6%

### How have the leading causes of death and disability combined changed from 1990 to 2016?

Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990–2016

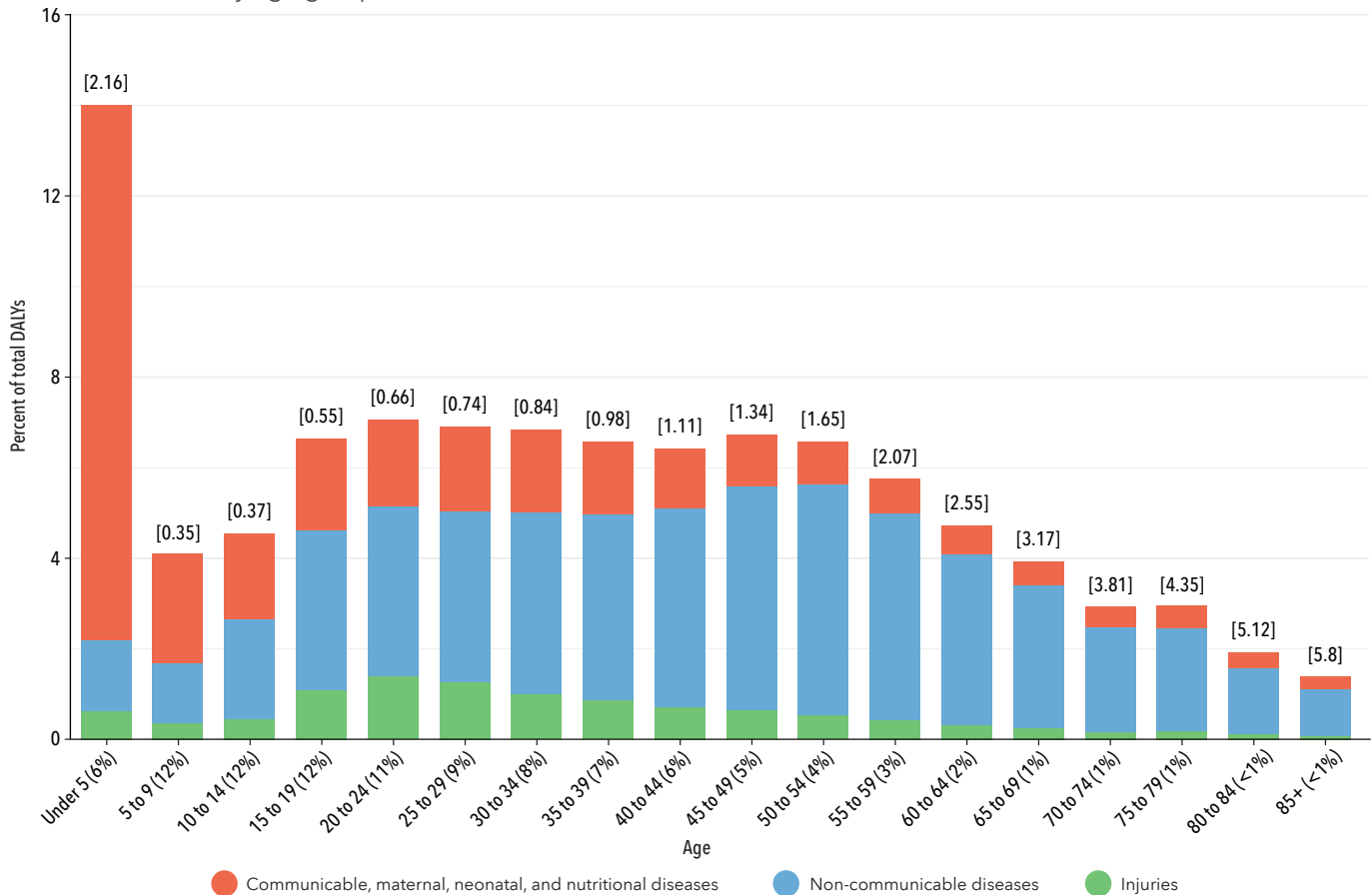


\*Change not significant.  
The percent figure in brackets next to each cause is DALYs from that cause out of total DALYs.

<sup>†</sup>COPD is chronic obstructive pulmonary disease.  
<sup>‡</sup>Sense organ diseases includes mainly hearing and vision loss.  
<sup>§</sup>Self-harm refers to suicide and the nonfatal outcomes of self-harm.

### What caused the most death and disability combined across age groups in 2016?

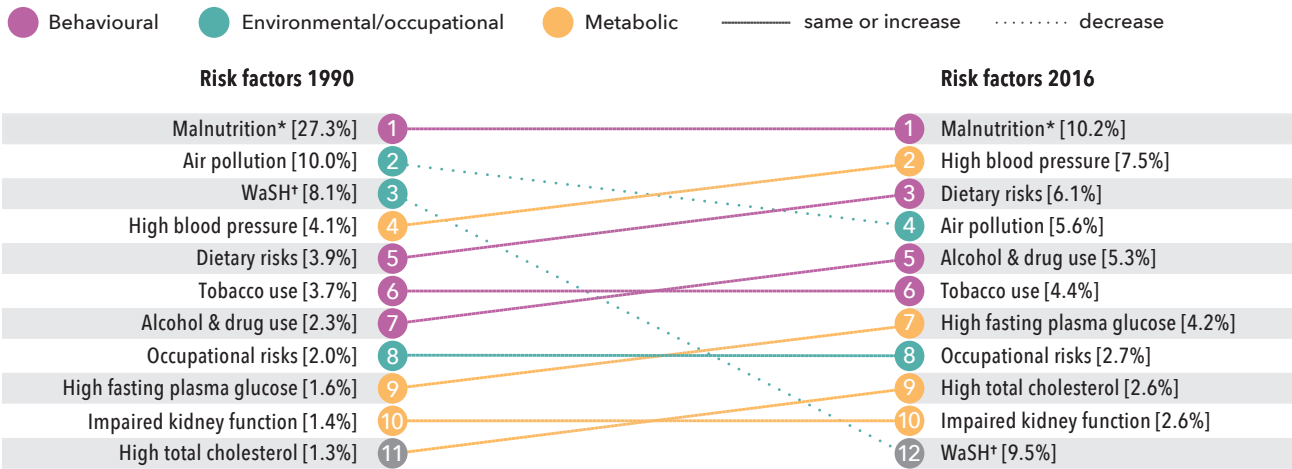
Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

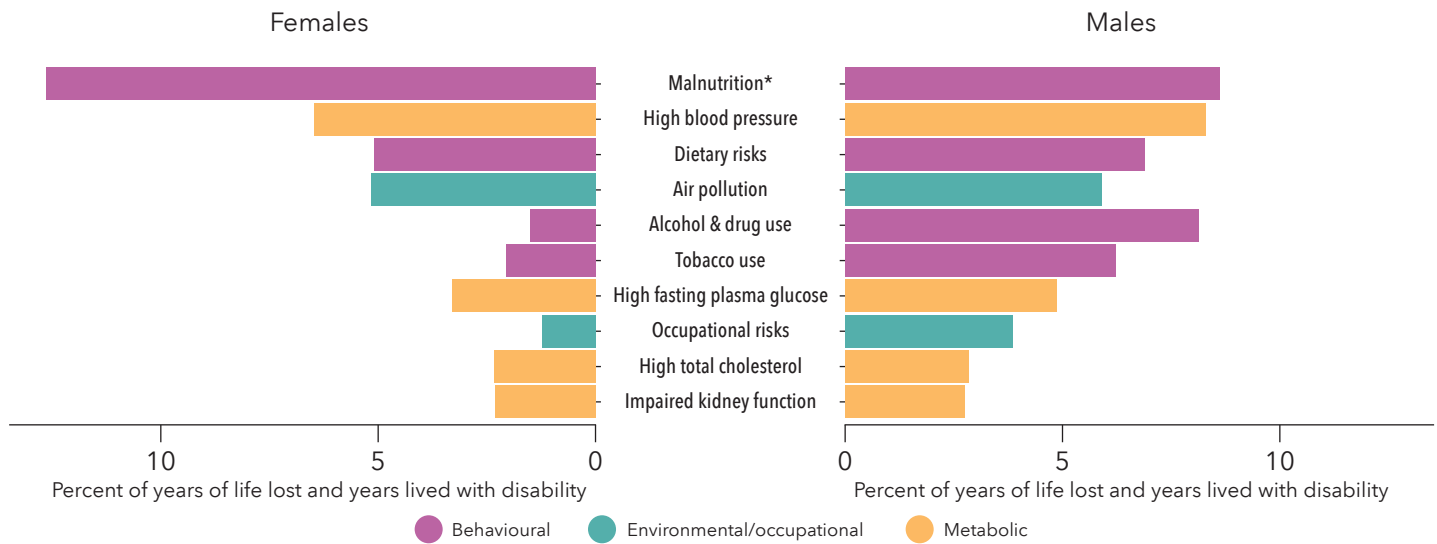


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
 +WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Odisha

## 1990 life expectancy

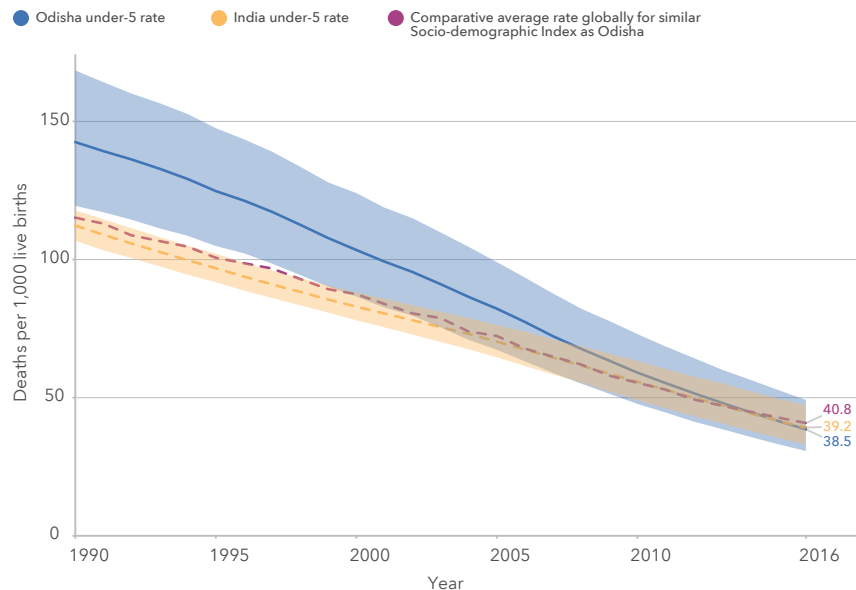
Females: 55.3 years Males: 53.7 years

## 2016 life expectancy

Females: 68.6 years Males: 66.1 years

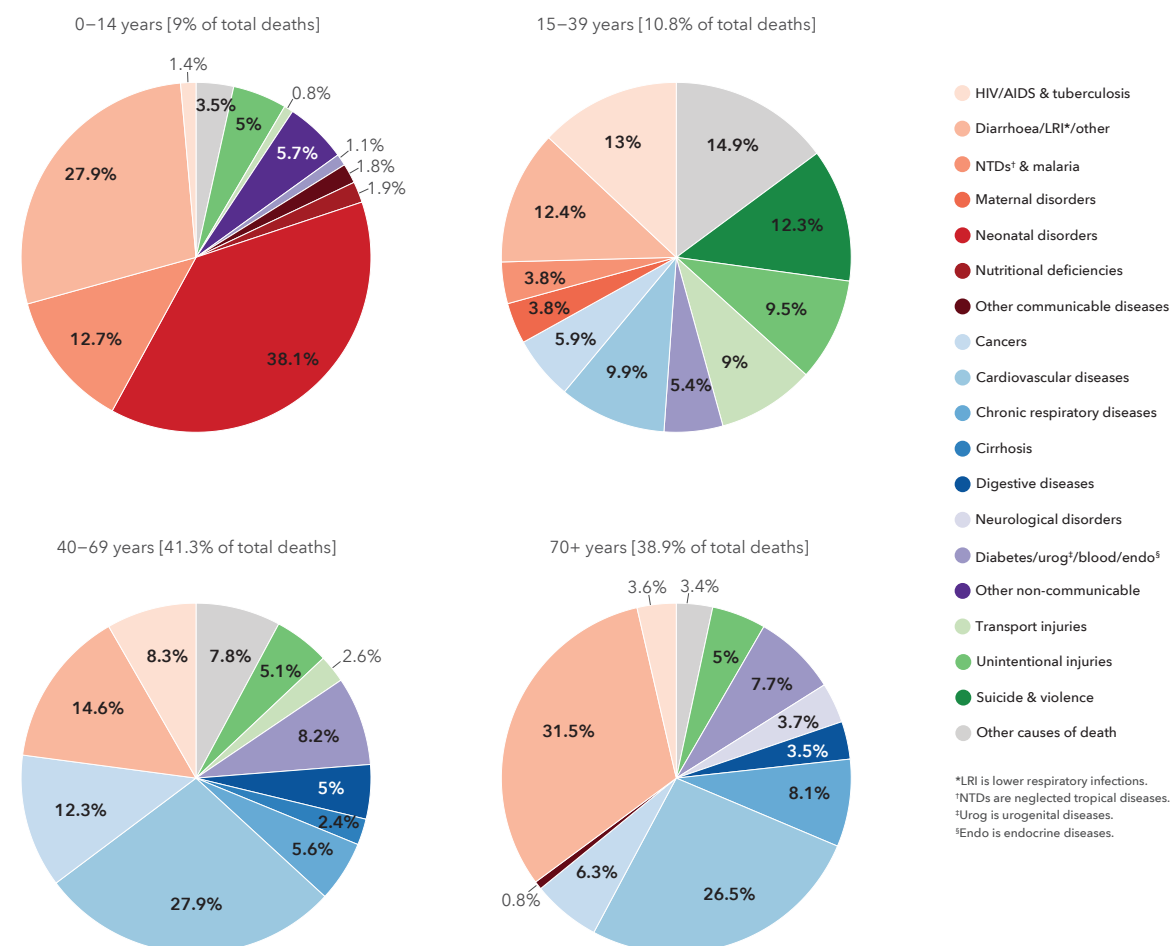
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



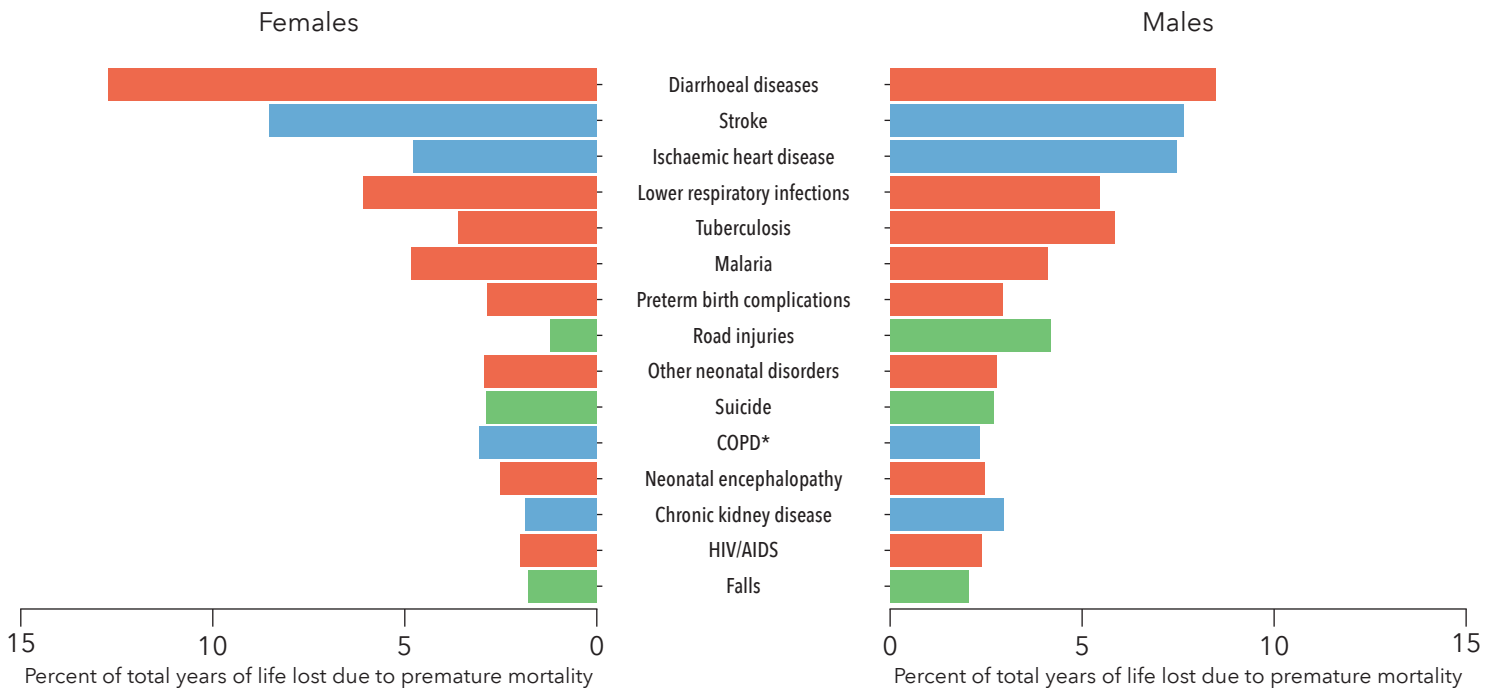
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

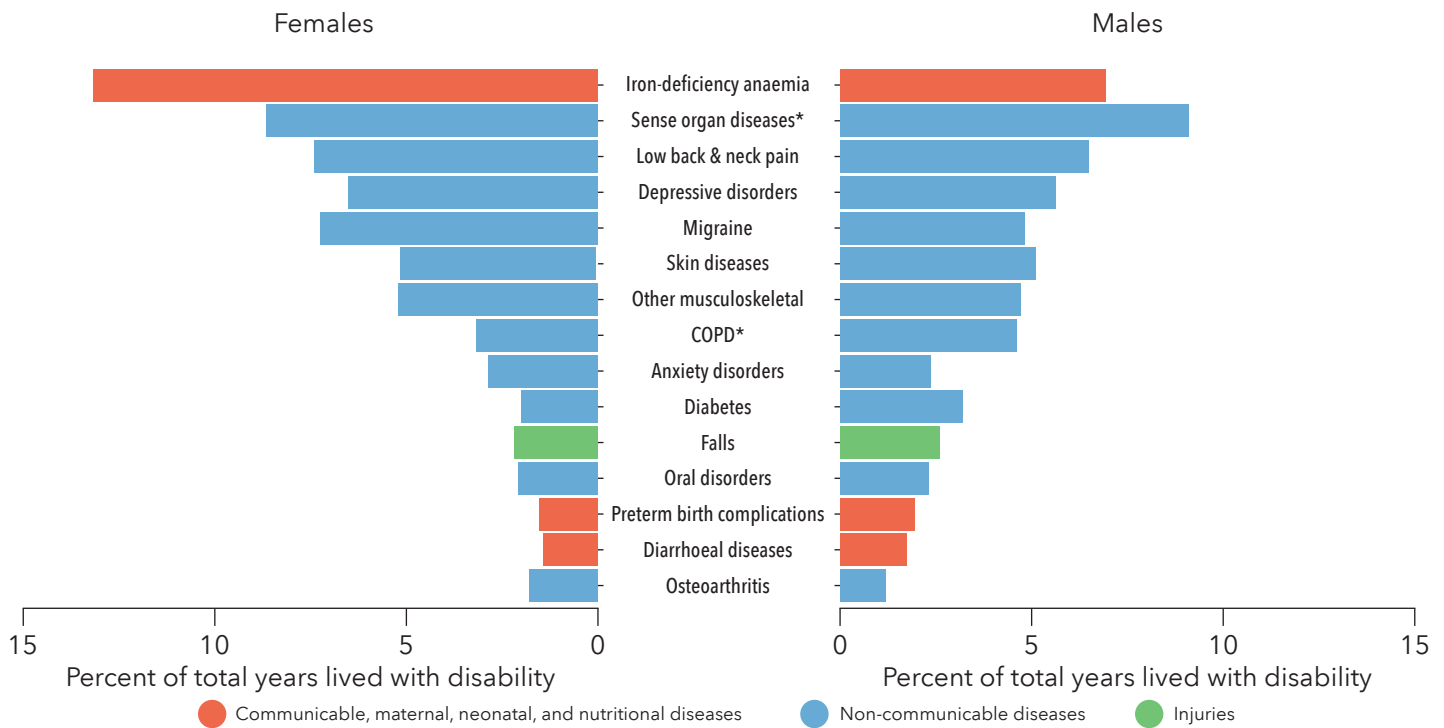


**Proportion of total disease burden from:**  
 Premature death: 69.0% | Disability or morbidity: 31.0%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

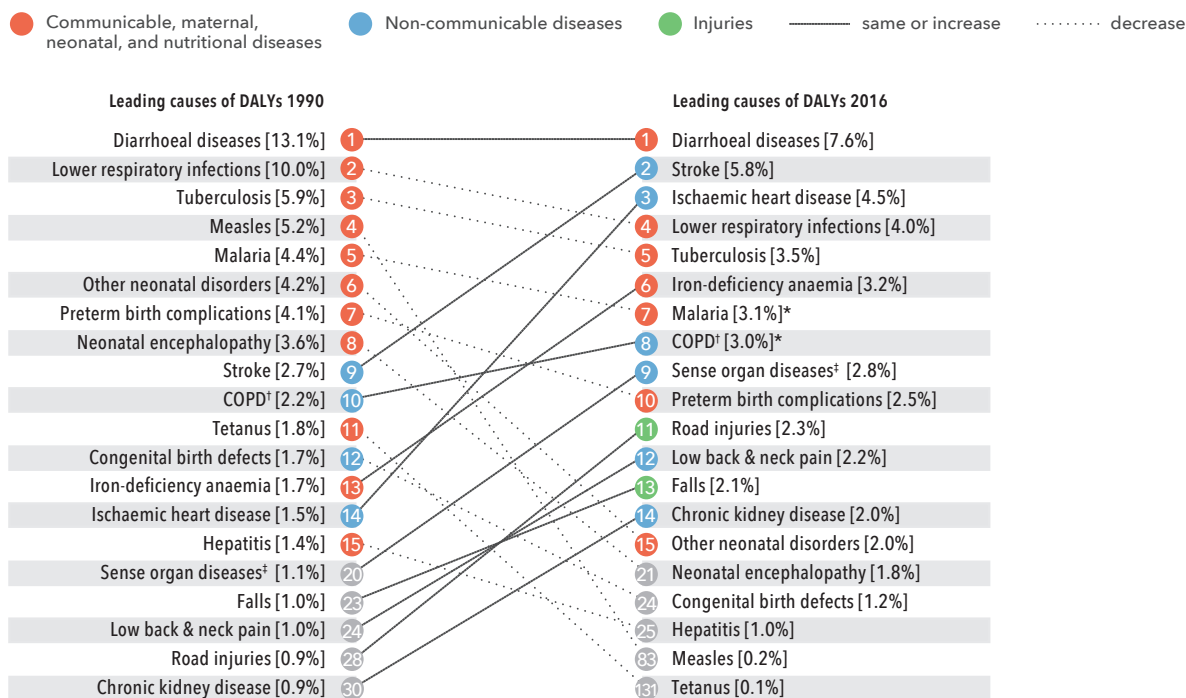


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 36.9% | NCDs: 52.1% | Injuries: 11.1%

### How have the leading causes of death and disability combined changed from 1990 to 2016?

Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016

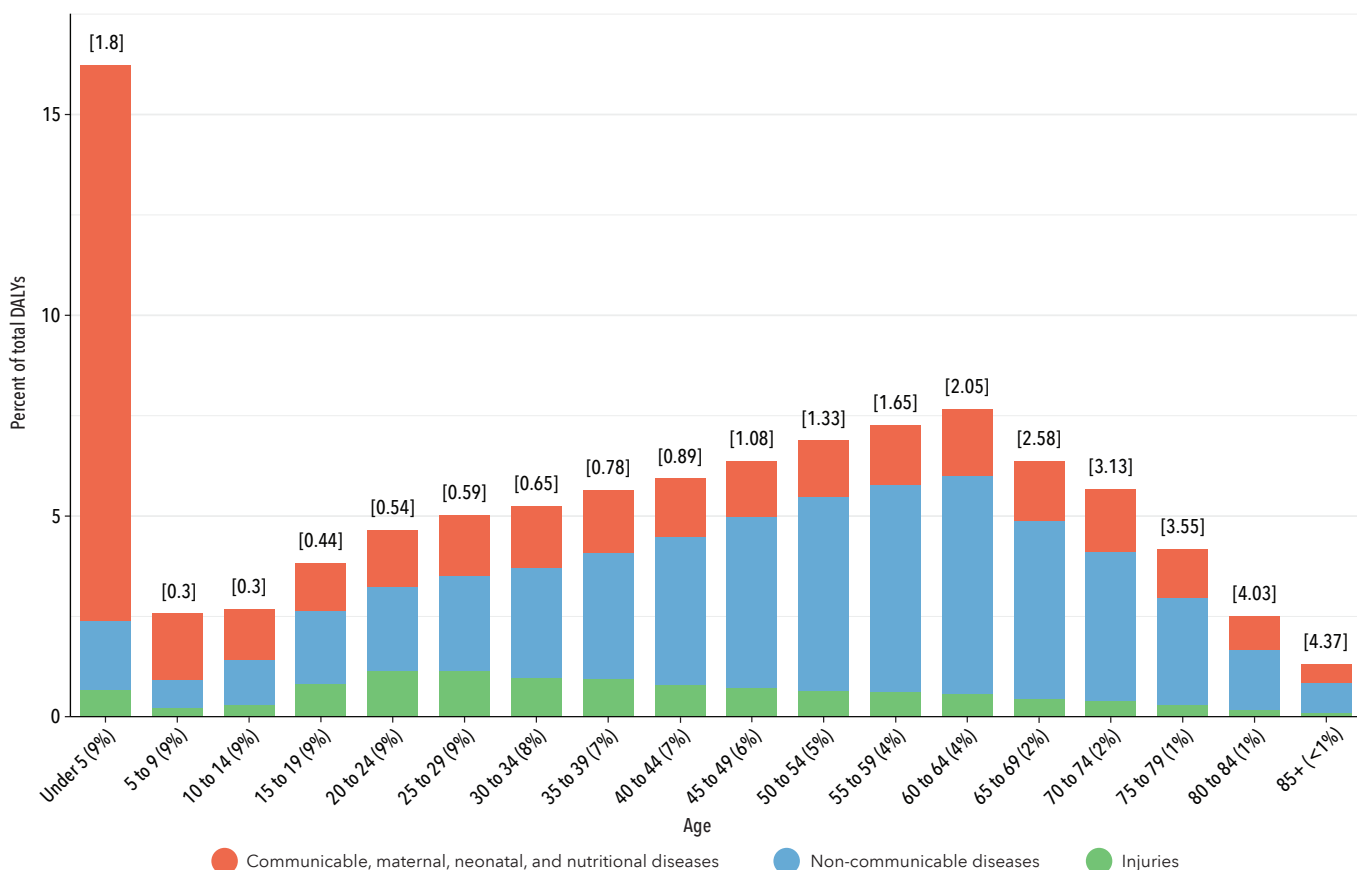


\*Change not significant.  
The percent figure in brackets next to each cause is DALYs from that cause out of total DALYs.

†COPD is chronic obstructive pulmonary disease.  
‡Sense organ diseases includes mainly hearing and vision loss.  
§Self-harm refers to suicide and the nonfatal outcomes of self-harm.

### What caused the most death and disability combined across age groups in 2016?

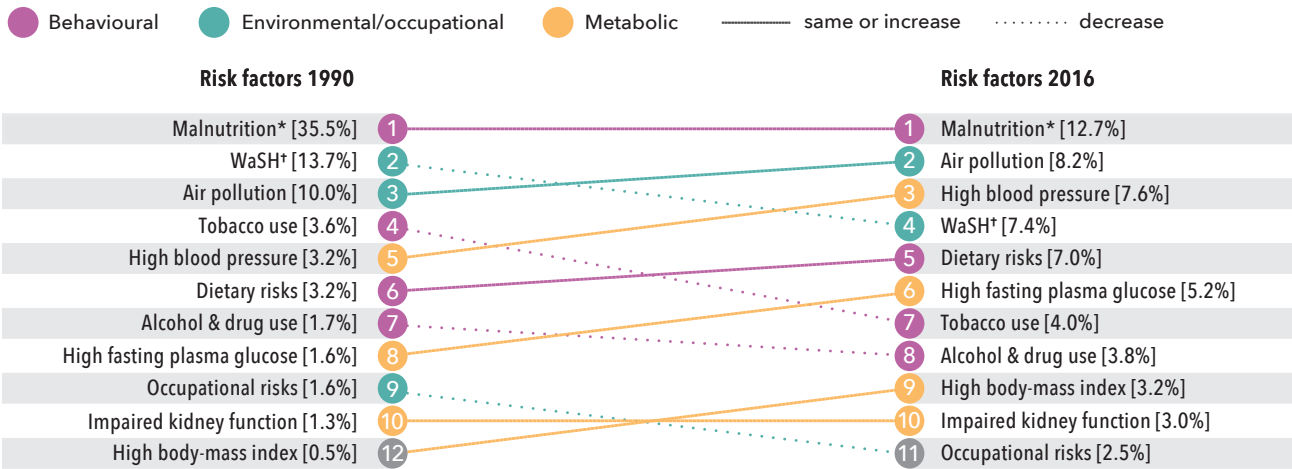
Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group.  
The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

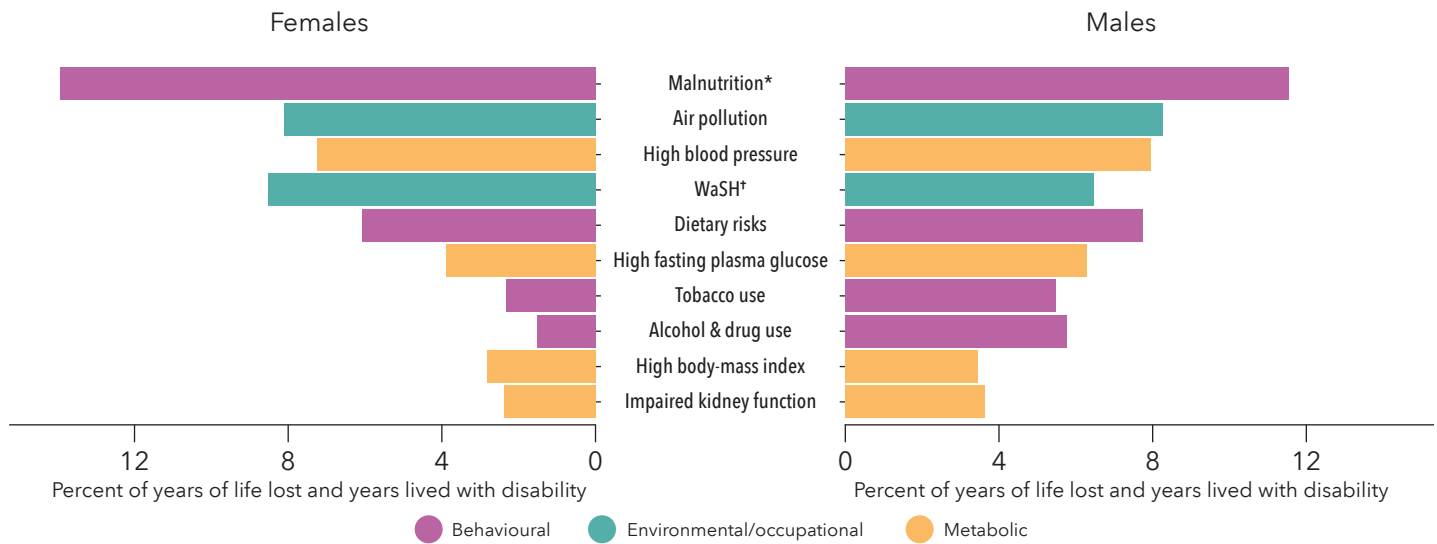


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Punjab

## 1990 life expectancy

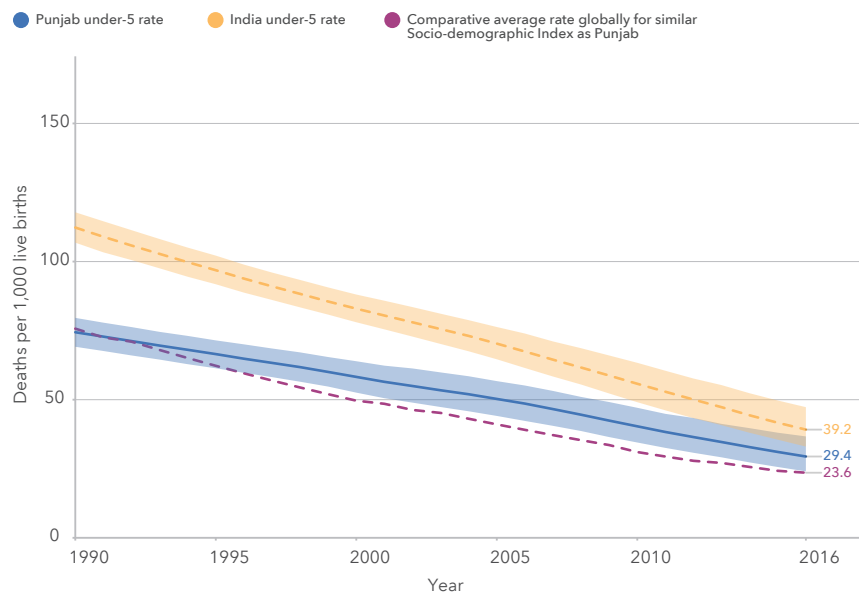
Females: 64.2 years Males: 62.2 years

## 2016 life expectancy

Females: 72.2 years Males: 68.0 years

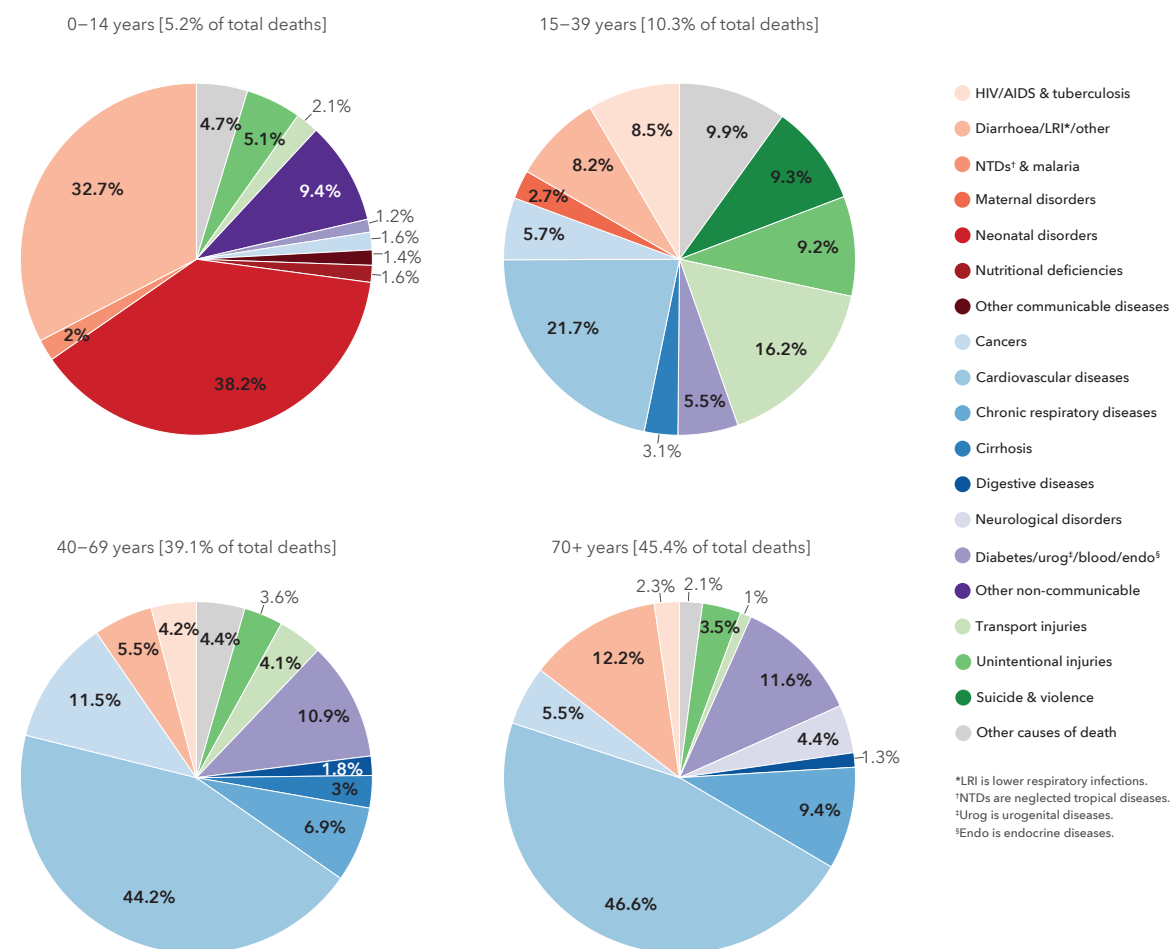
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

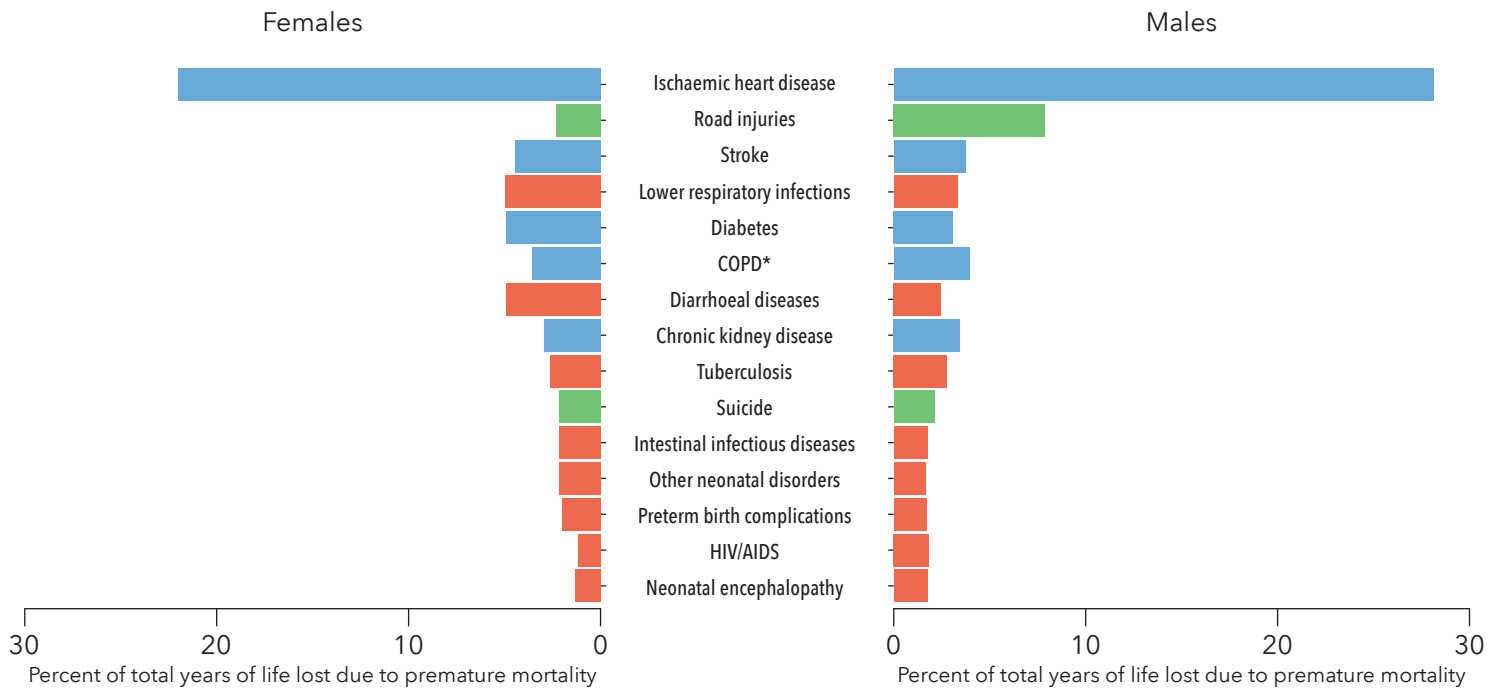


## Proportion of total disease burden from:

Premature death: 64.9% | Disability or morbidity: 35.1%

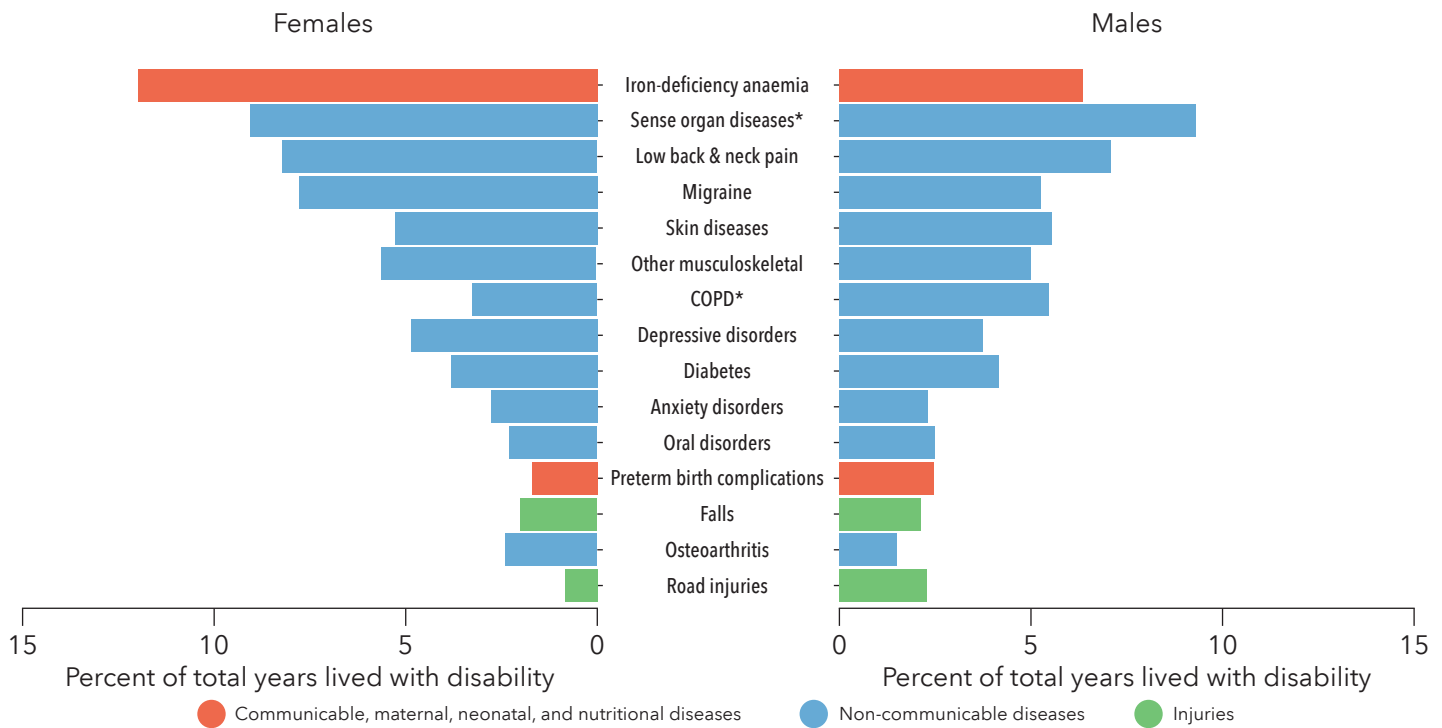
### What caused the most years of life lost, by sex, in 2016?

Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



### What caused the most years lived with disability, by sex, in 2016?

Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



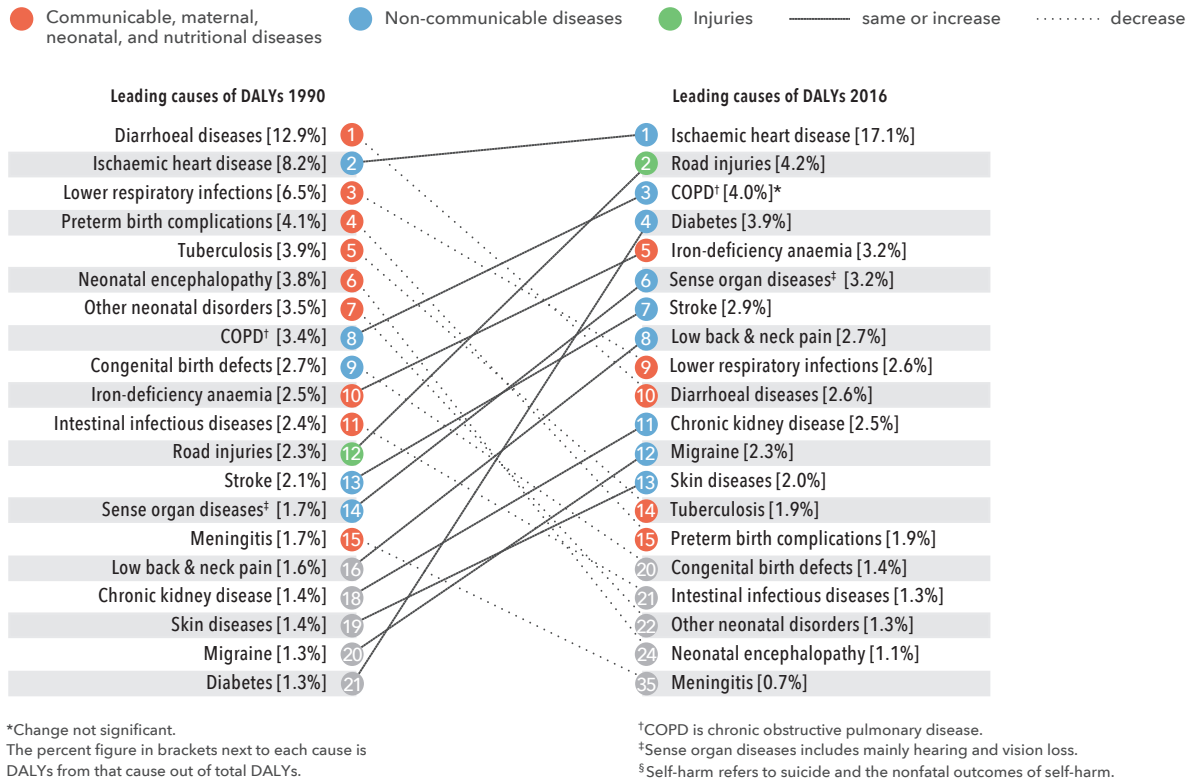
\*COPD is chronic obstructive pulmonary disease.

\*Sense organ diseases includes mainly hearing and vision loss.

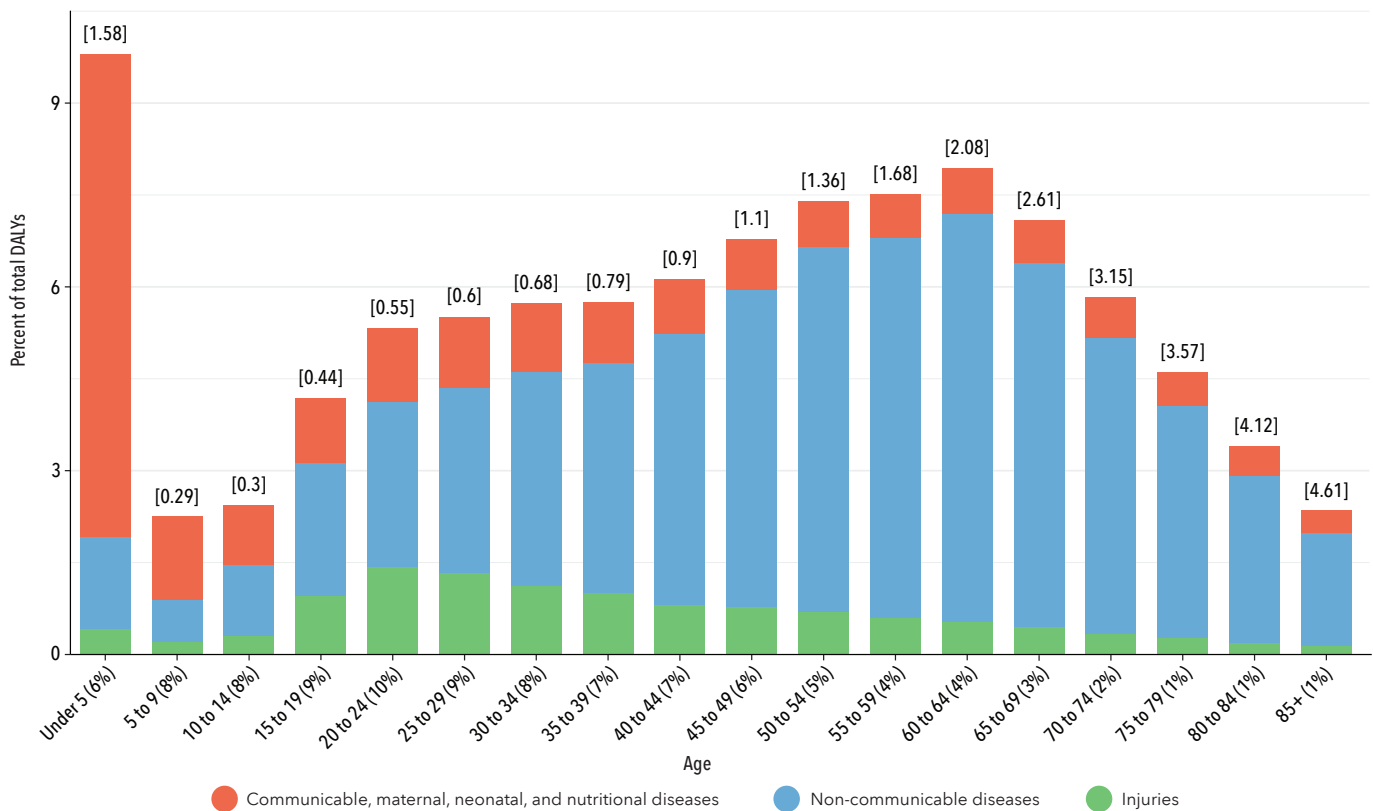


## Proportion of total disease burden from: CMNNDs: 22.4% | NCDs: 66.0% | Injuries: 11.6%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016

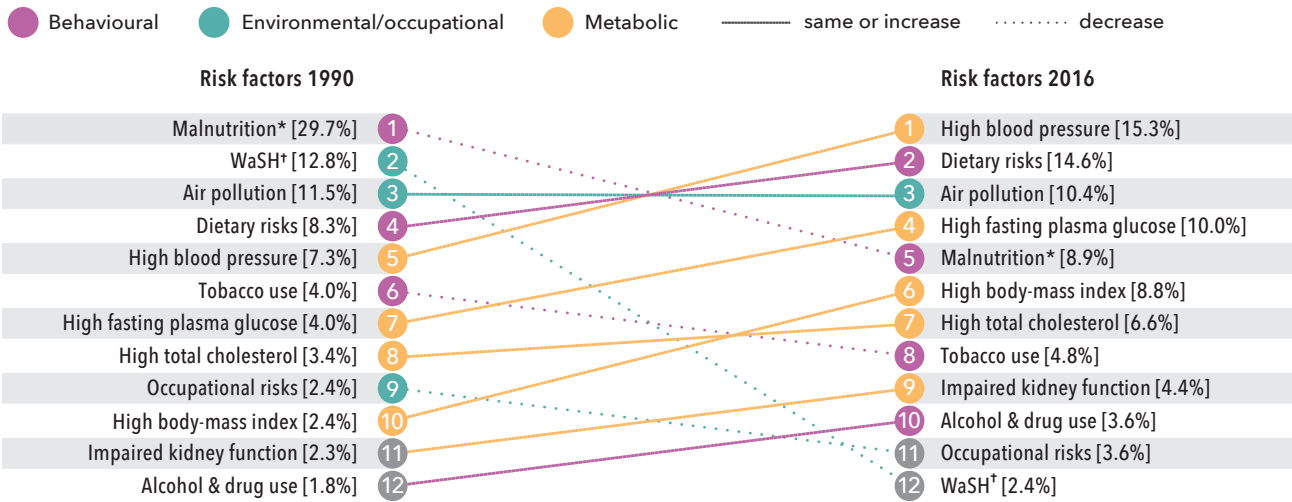


## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

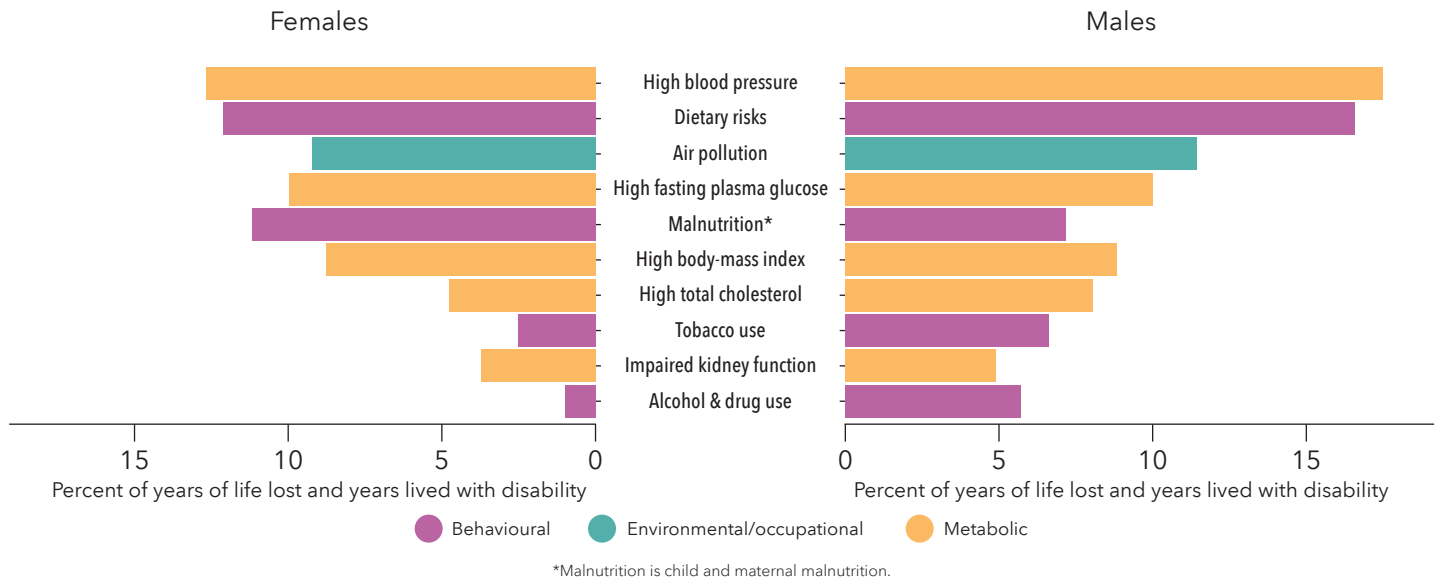


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



# Rajasthan

## 1990 life expectancy

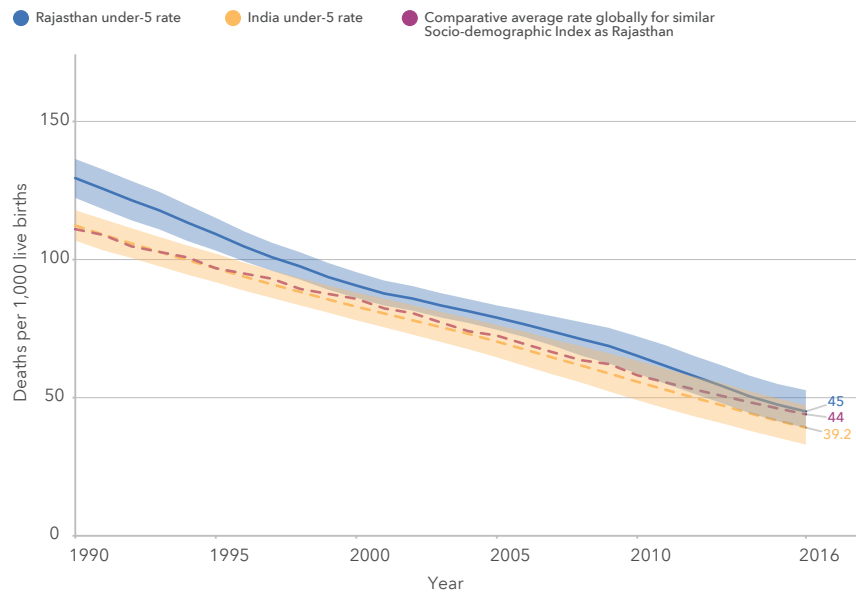
Females: 59.4 years Males: 57.2 years

## 2016 life expectancy

Females: 70.1 years Males: 65.5 years

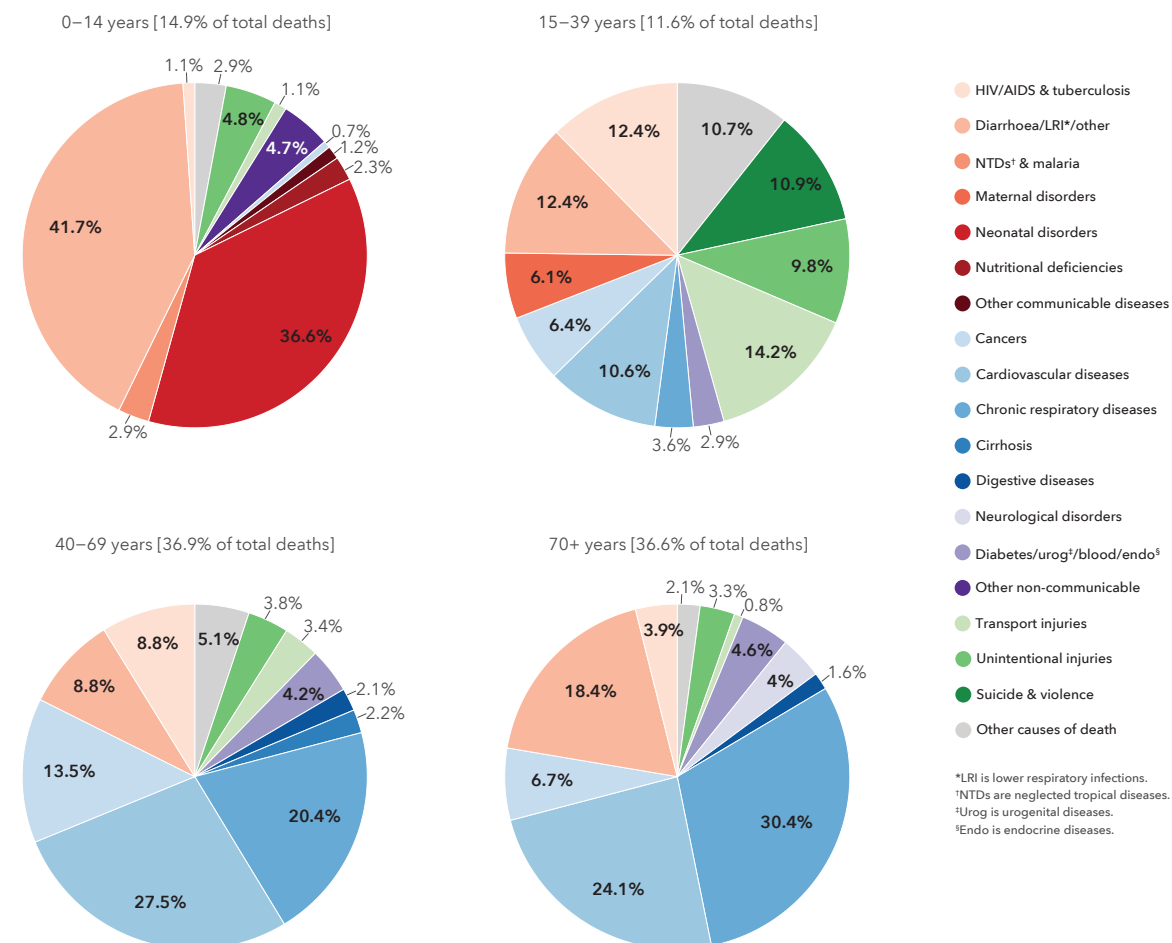
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

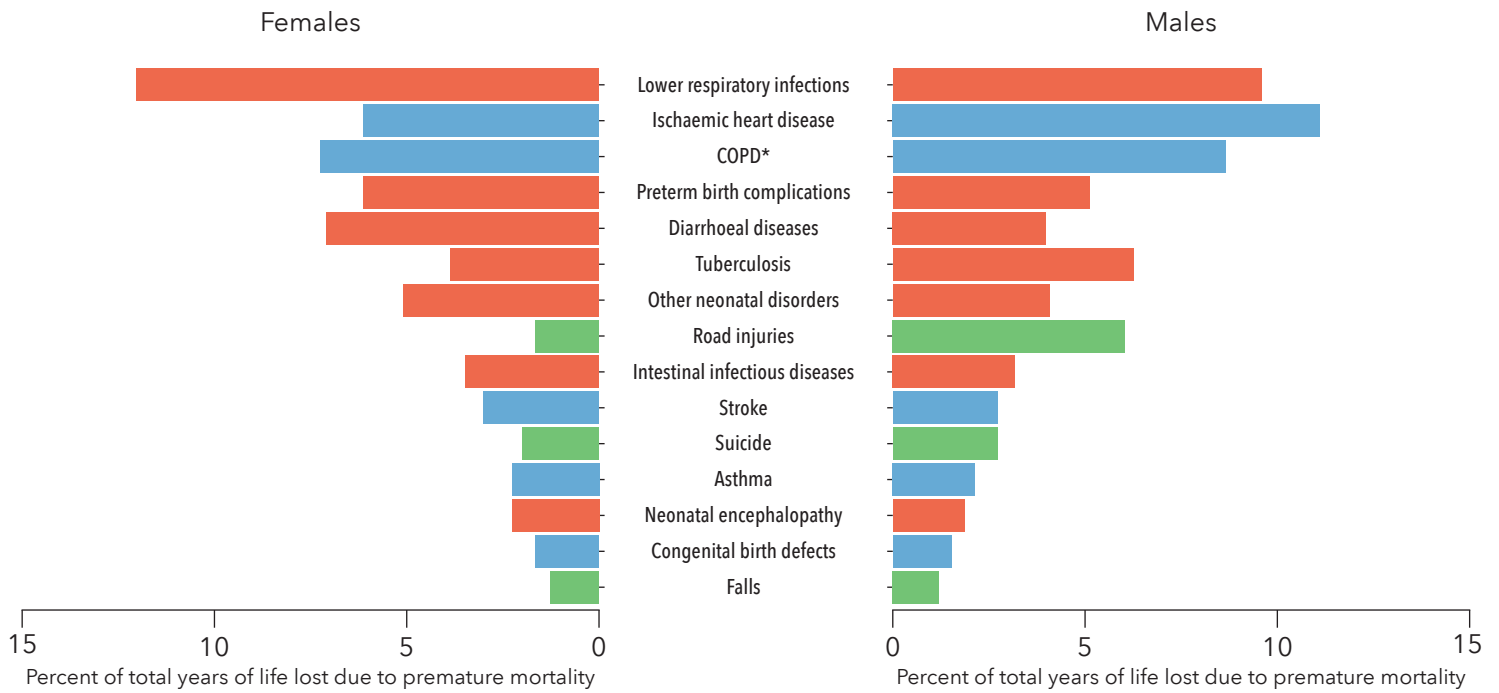


## Proportion of total disease burden from:

Premature death: 69.7% | Disability or morbidity: 30.3%

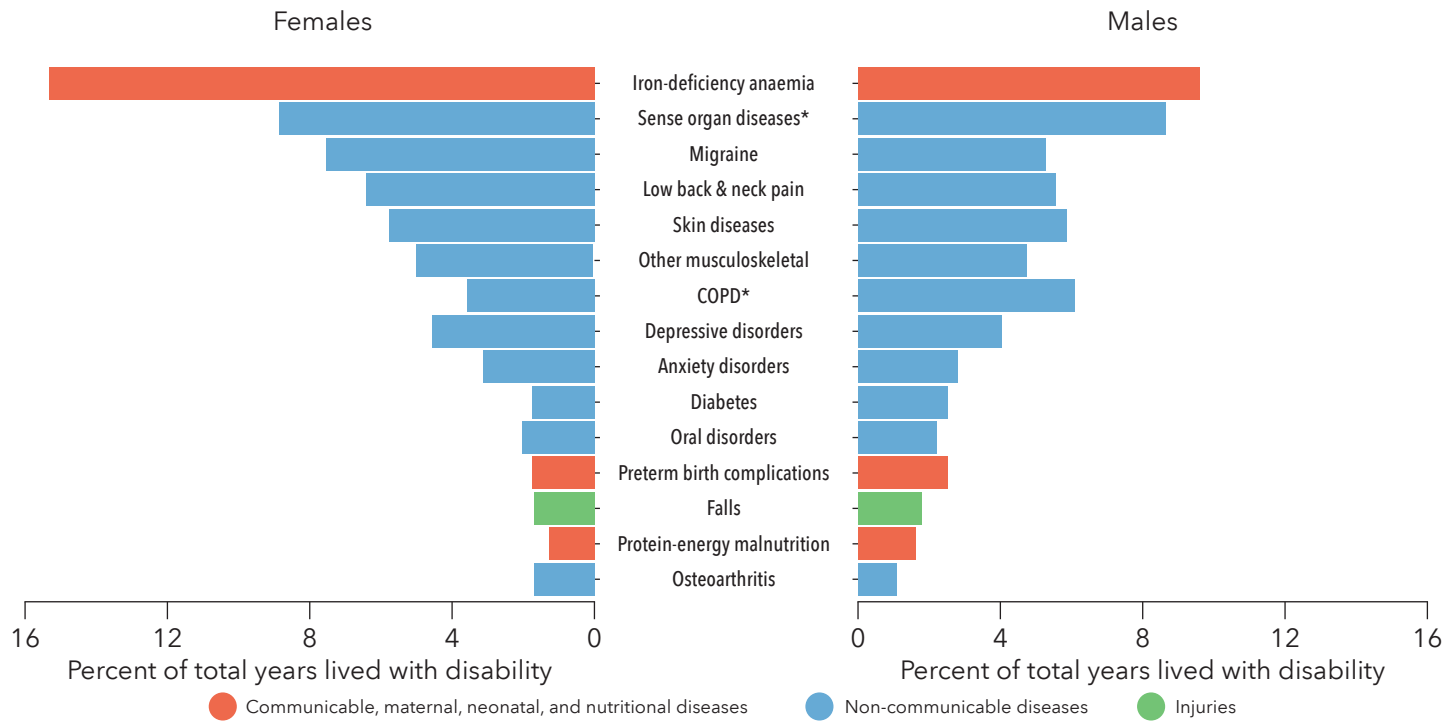
### What caused the most years of life lost, by sex, in 2016?

Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



### What caused the most years lived with disability, by sex, in 2016?

Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

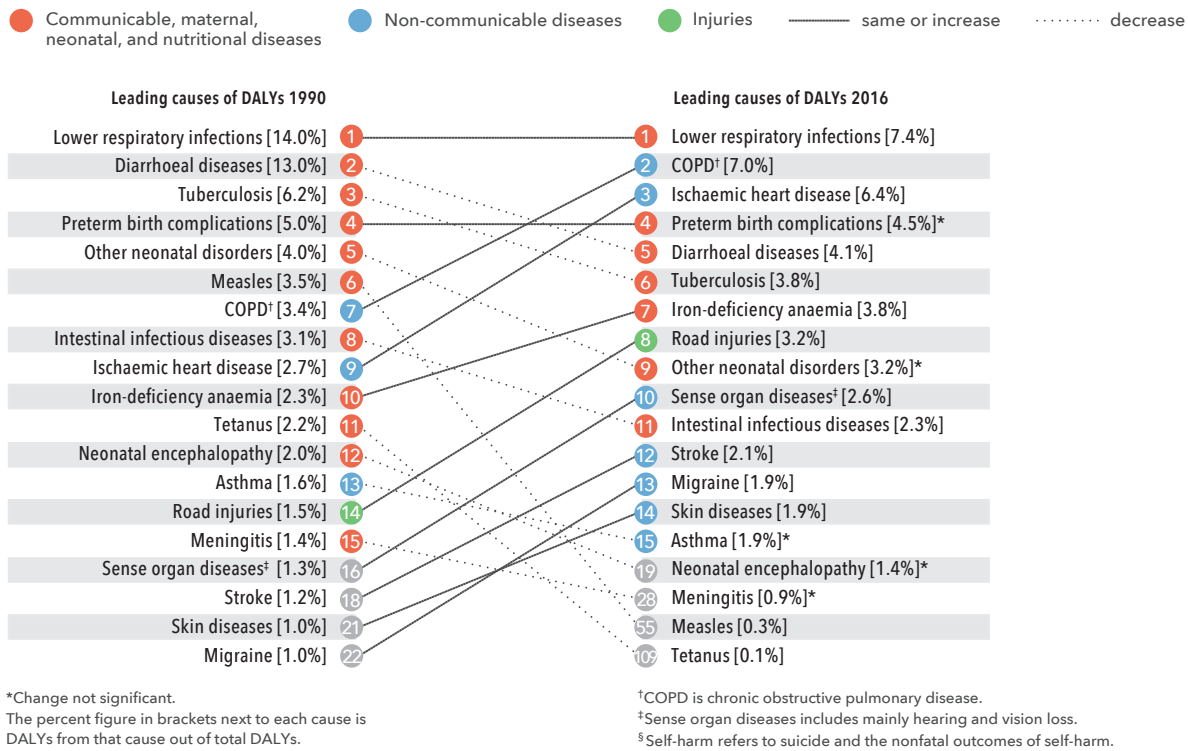


\*COPD is chronic obstructive pulmonary disease.

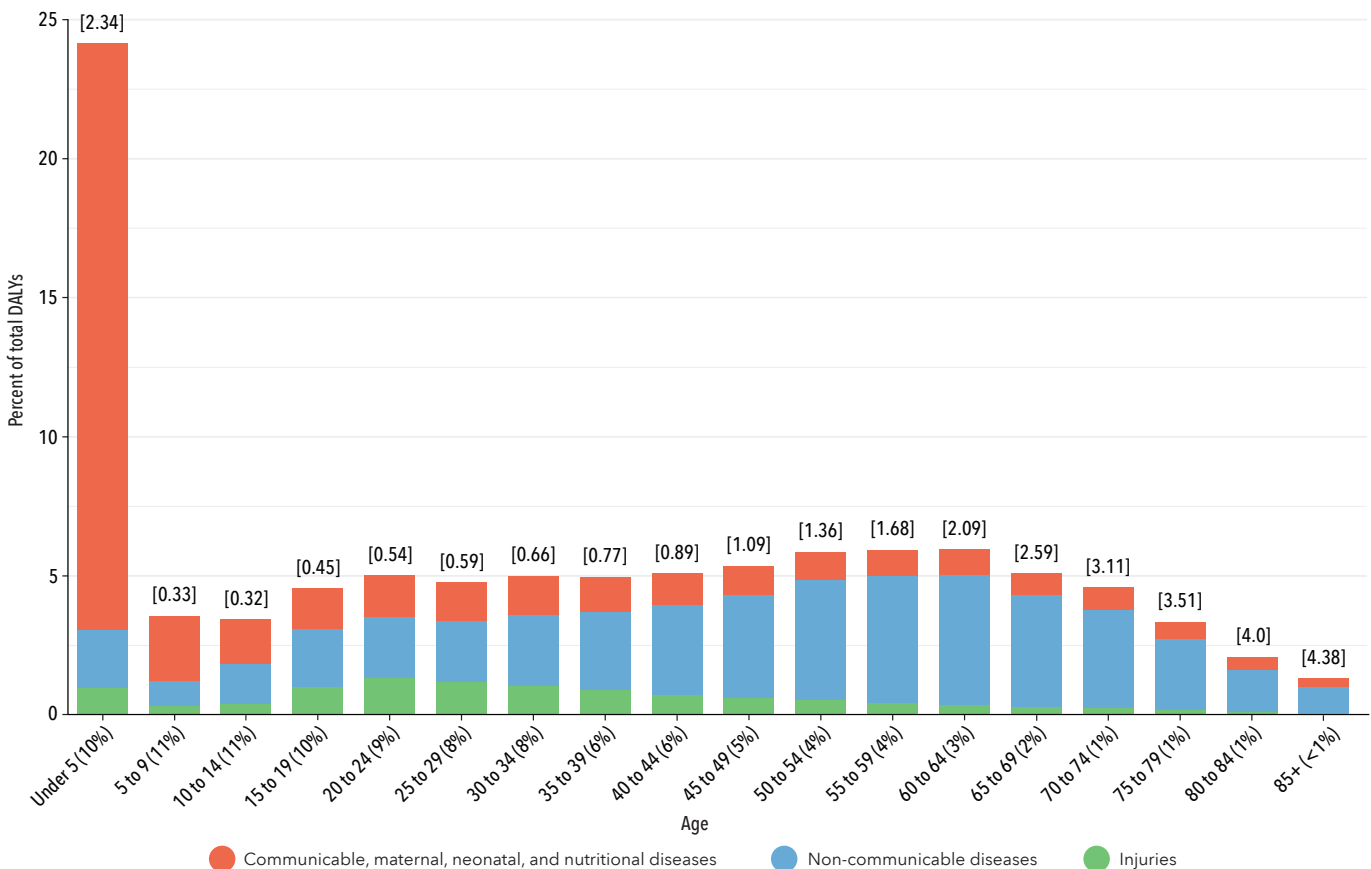
\*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 39.9% | NCDs: 49.3% | Injuries: 10.8%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990–2016

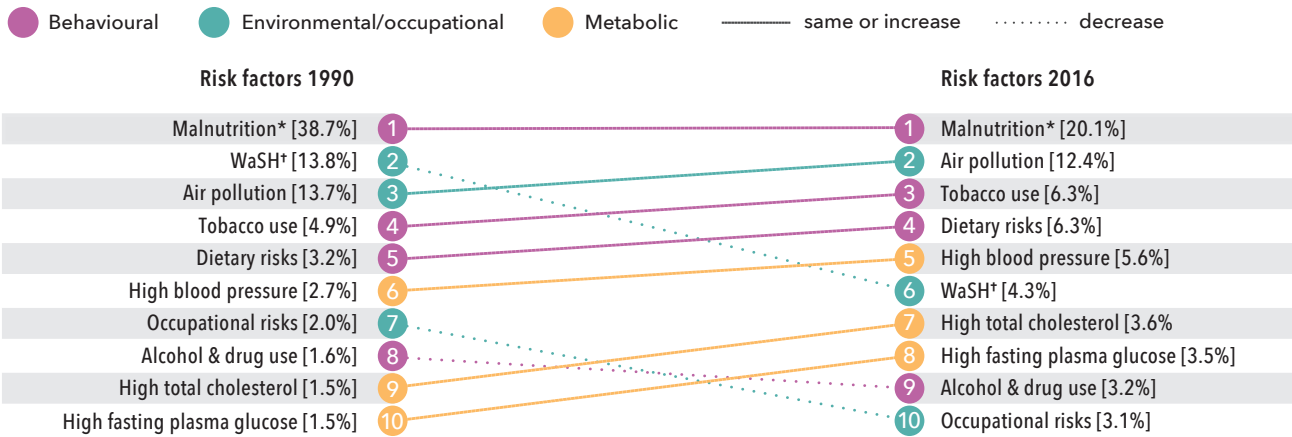


## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

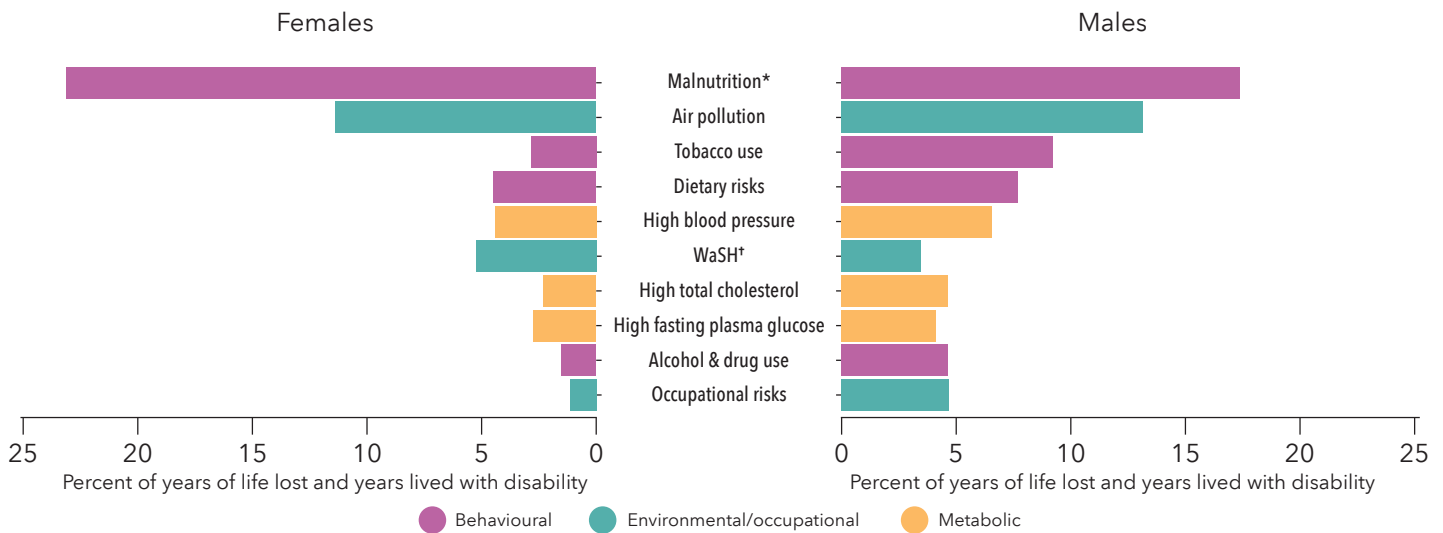


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Sikkim

## 1990 life expectancy

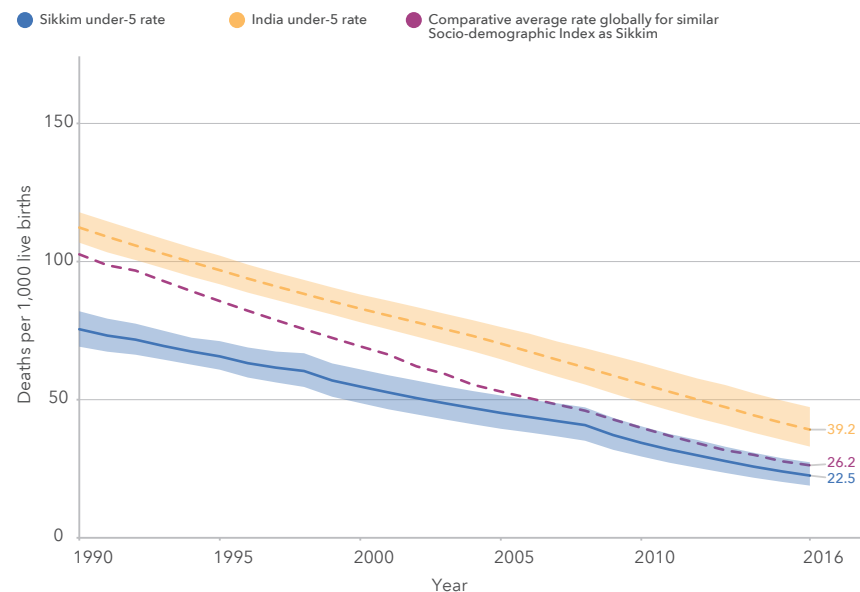
Females: 63.5 years Males: 61.9 years

## 2016 life expectancy

Females: 75.8 years Males: 70.5 years

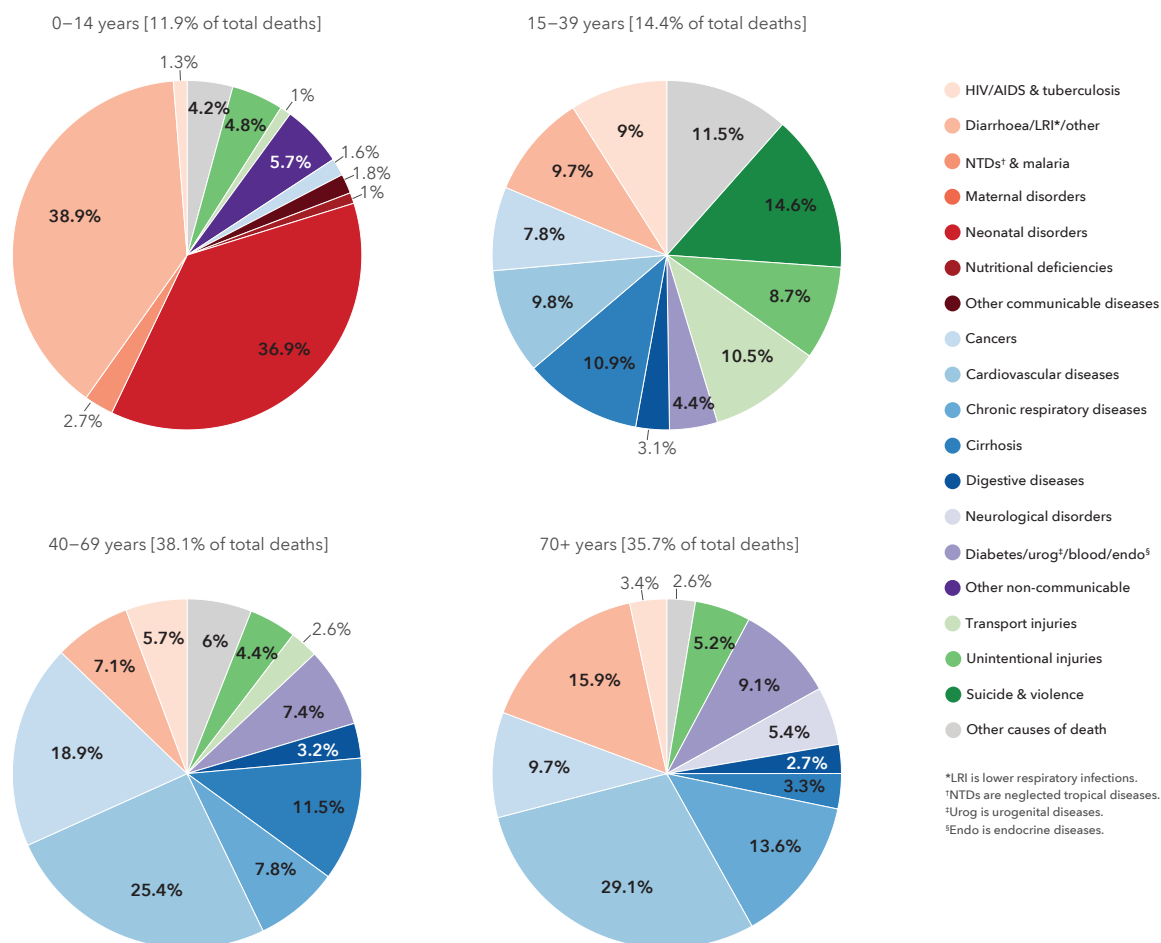
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

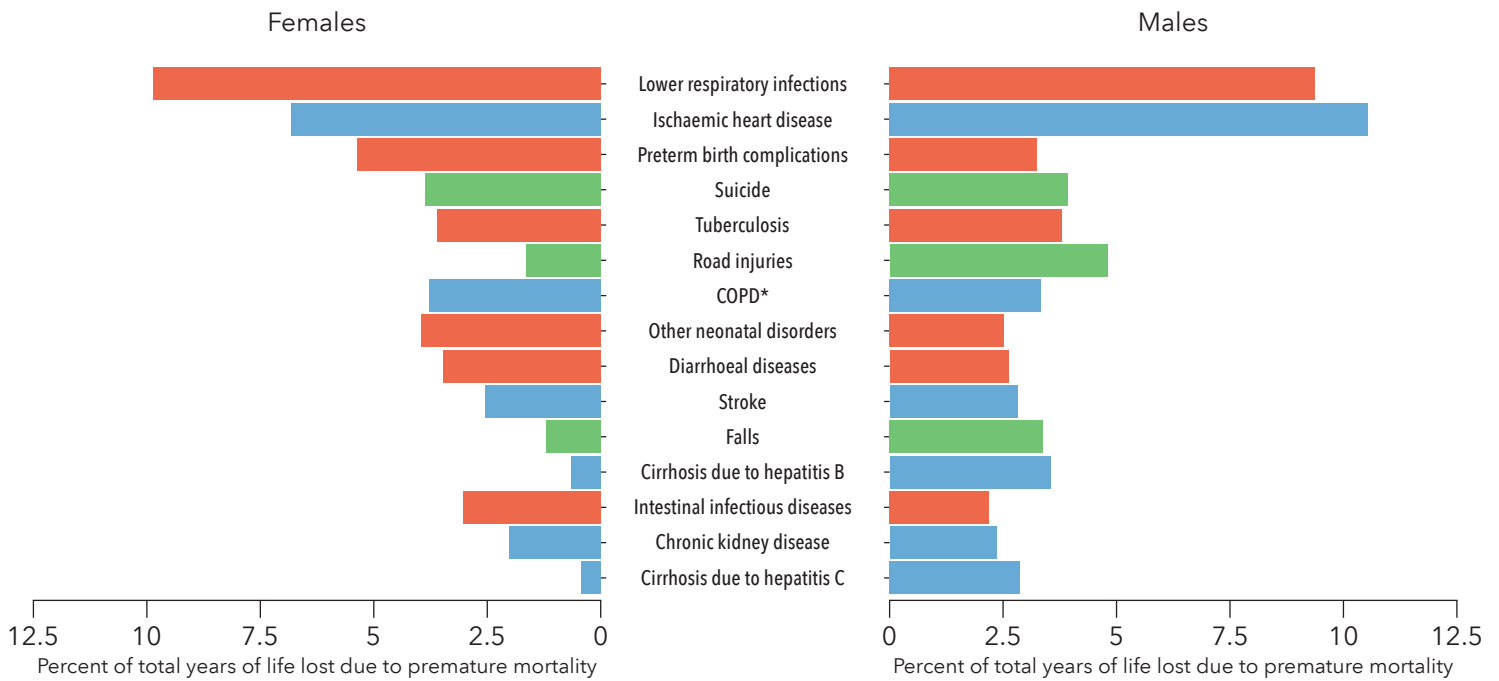
Percent contribution of top 10 causes of death by age group, both sexes, 2016



**Proportion of total disease burden from:**  
 Premature death: 60.2% | Disability or morbidity: 39.8%

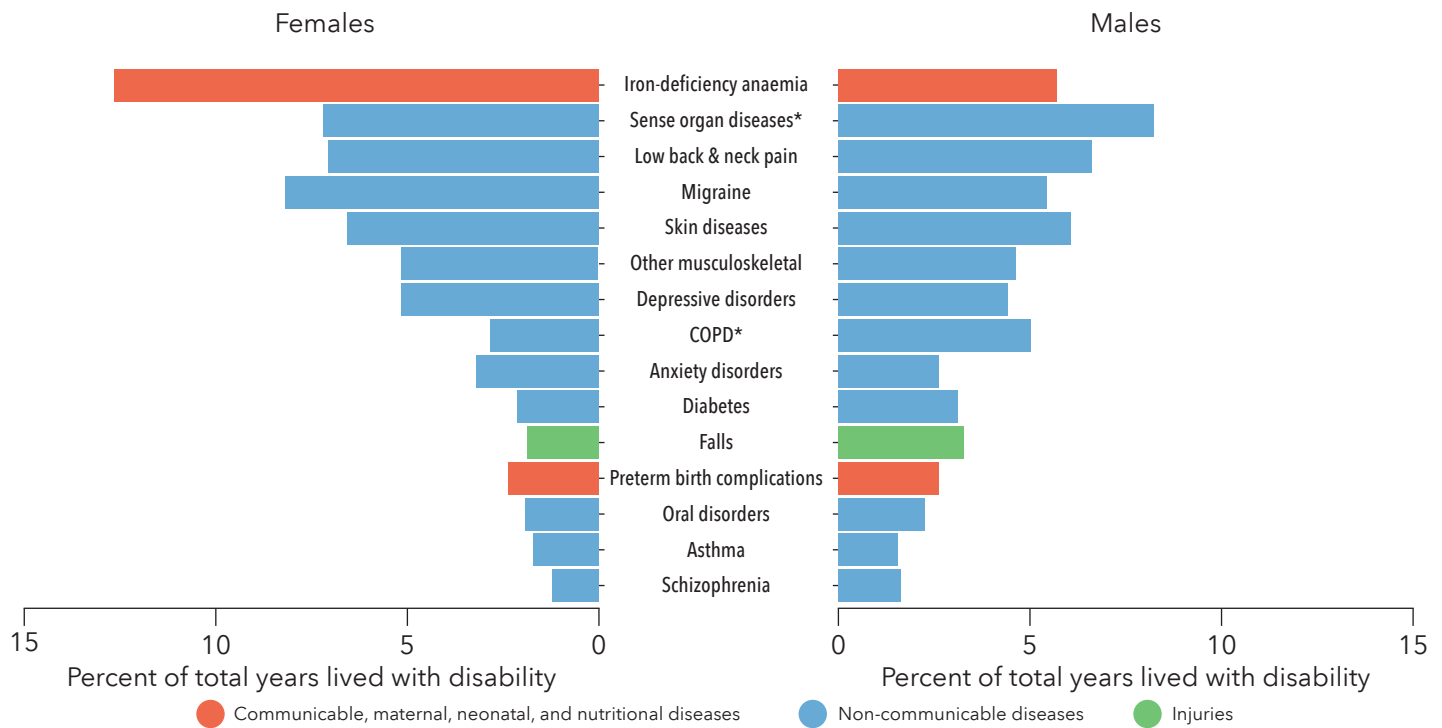
**What caused the most years of life lost, by sex, in 2016?**

Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**

Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

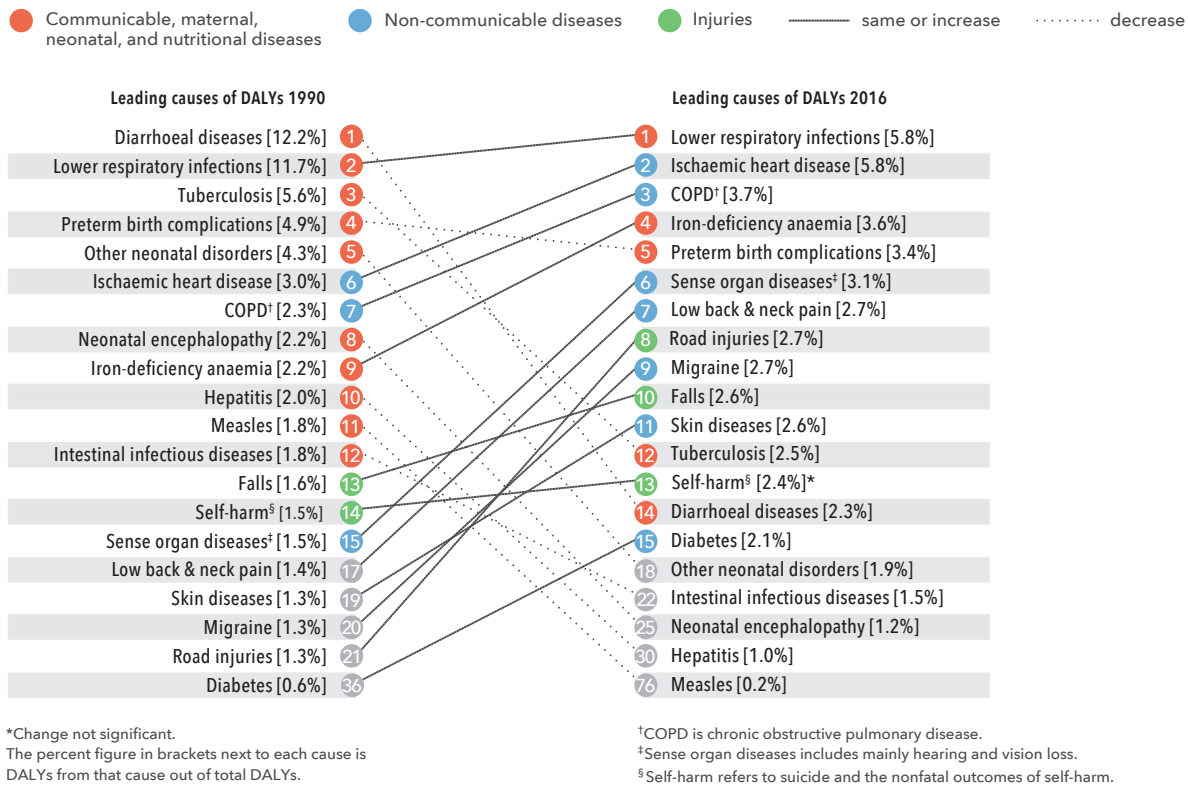


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

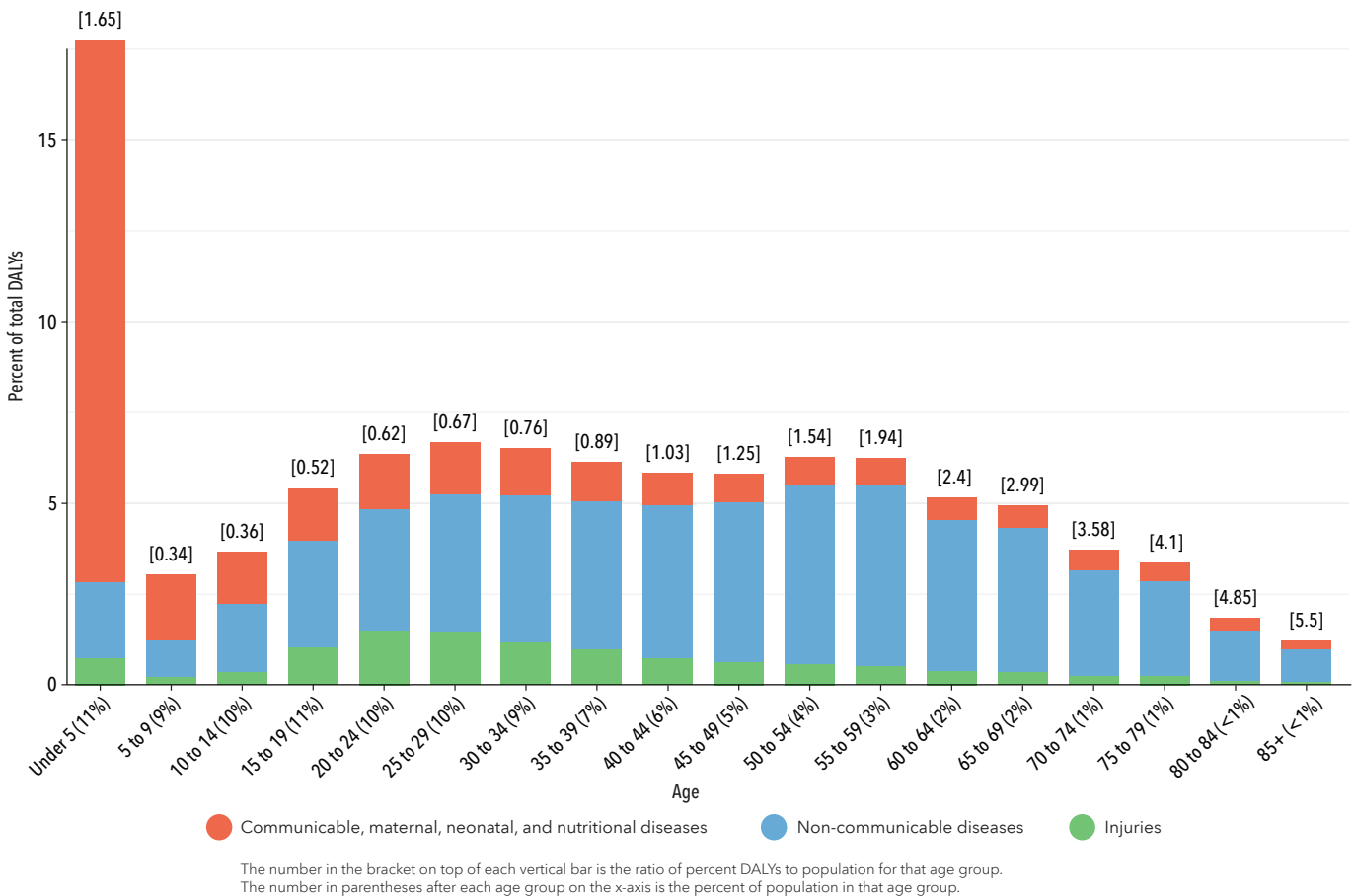


## Proportion of total disease burden from: CMNNDs: 30.9% | NCDs: 57.5% | Injuries: 11.6%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990–2016

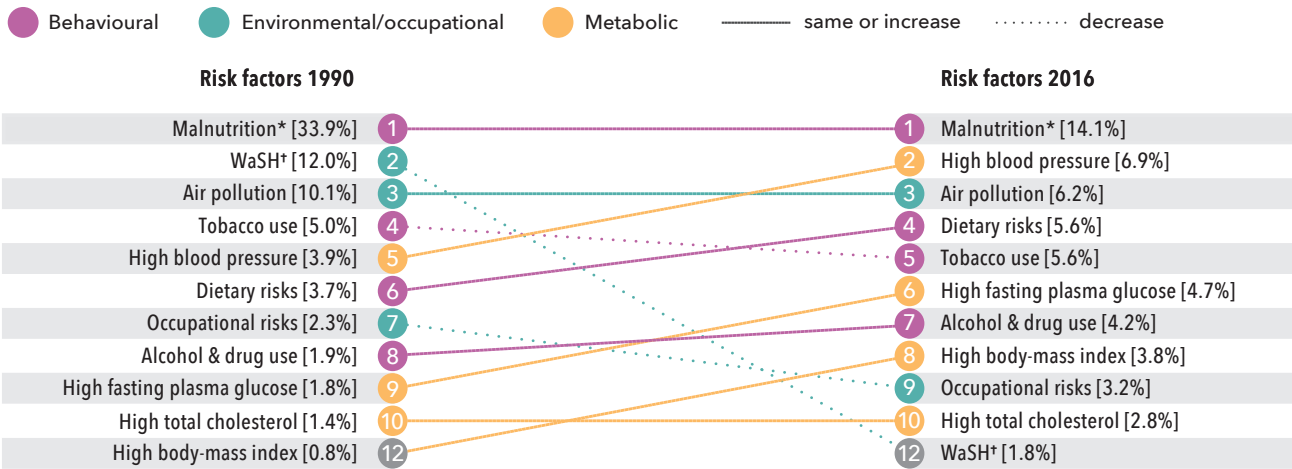


## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

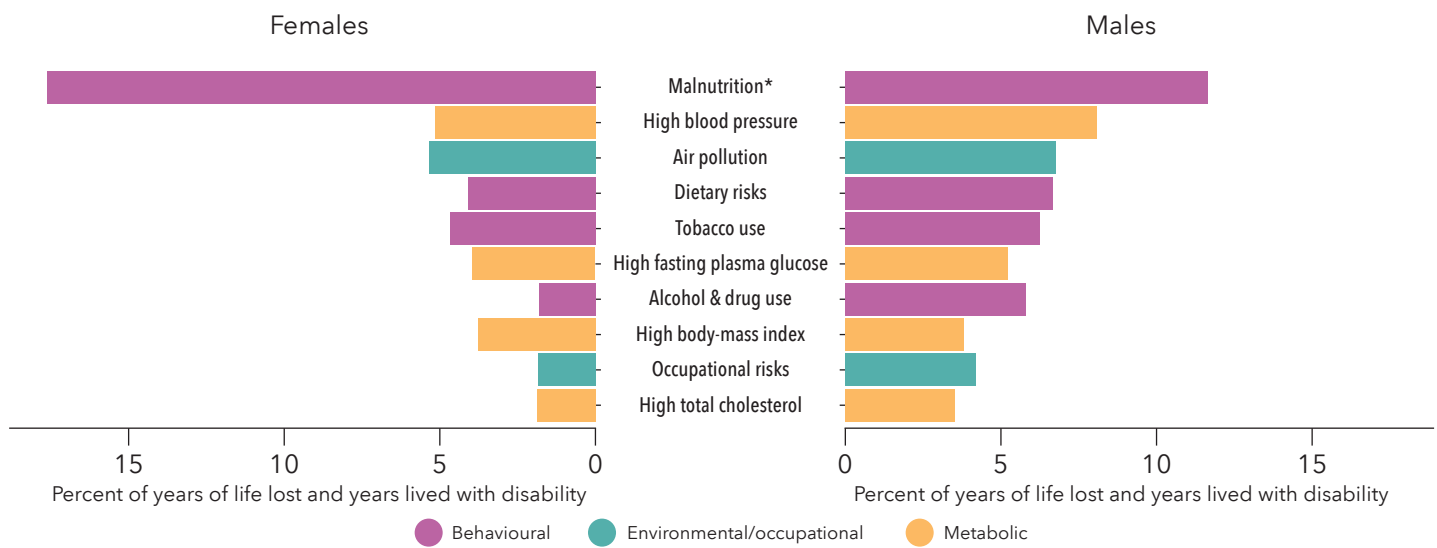


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Tamil Nadu

## 1990 life expectancy

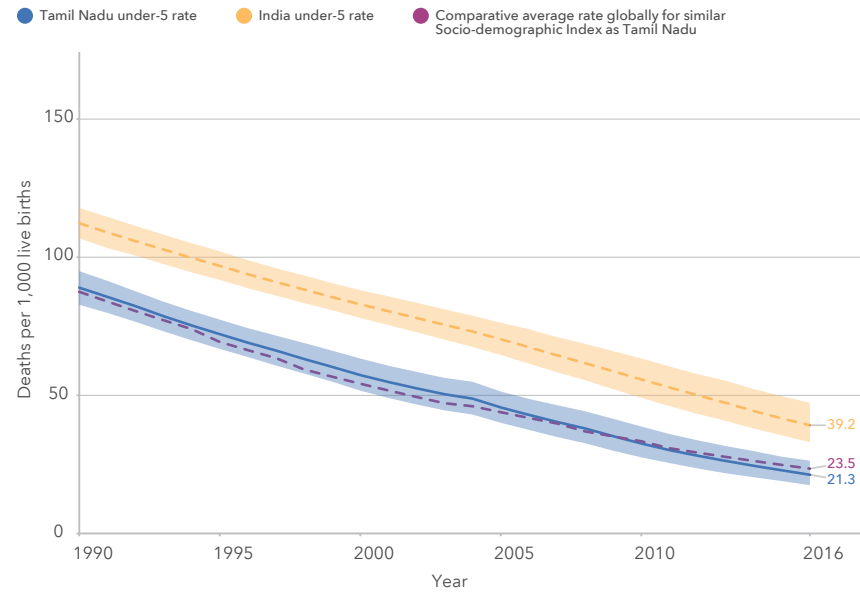
Females: 61.9 years Males: 59.4 years

## 2016 life expectancy

Females: 73.5 years Males: 68.9 years

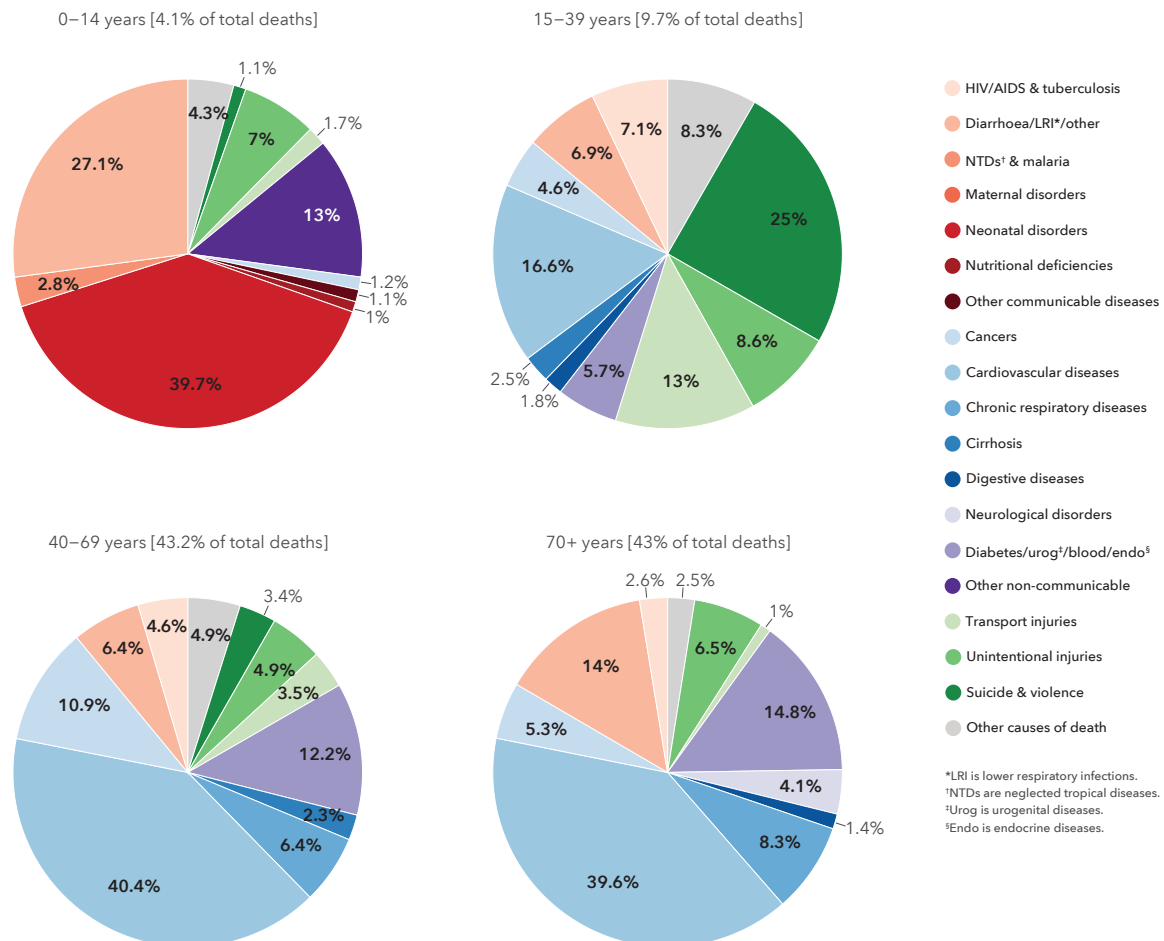
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

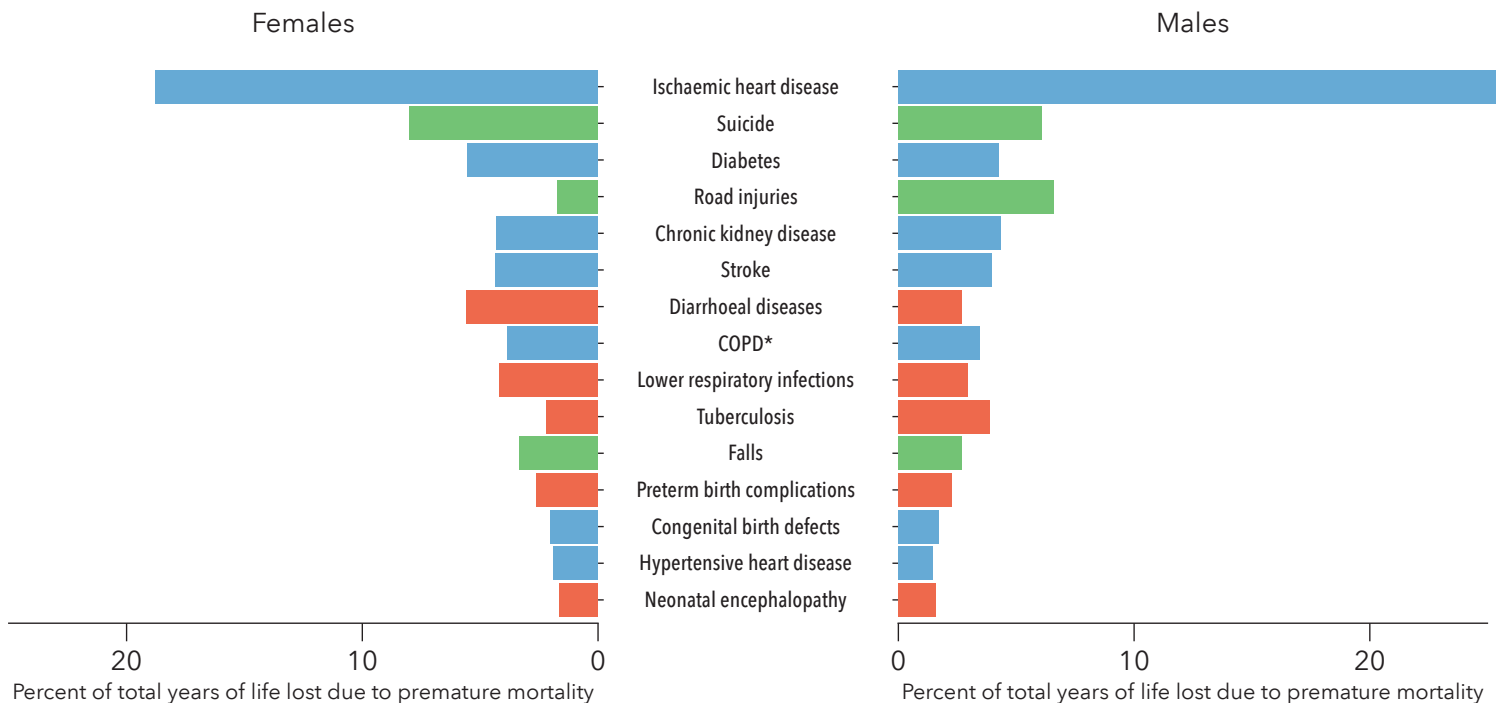
Percent contribution of top 10 causes of death by age group, both sexes, 2016



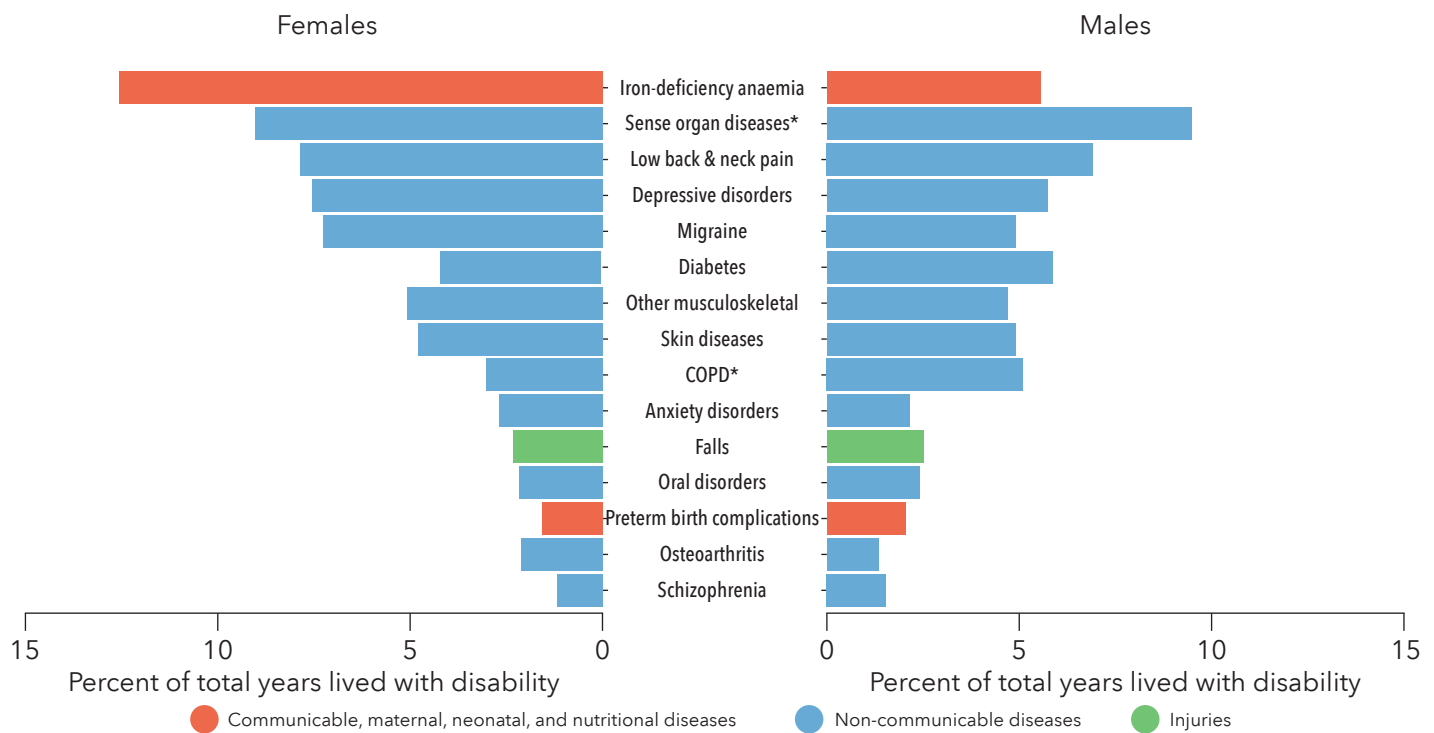
\*LRI is lower respiratory infections.  
<sup>†</sup>NTDs are neglected tropical diseases.  
<sup>‡</sup>Urog is urogenital diseases.  
<sup>§</sup>Endo is endocrine diseases.

**Proportion of total disease burden from:**  
 Premature death: 62.0% | Disability or morbidity: 38.0%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



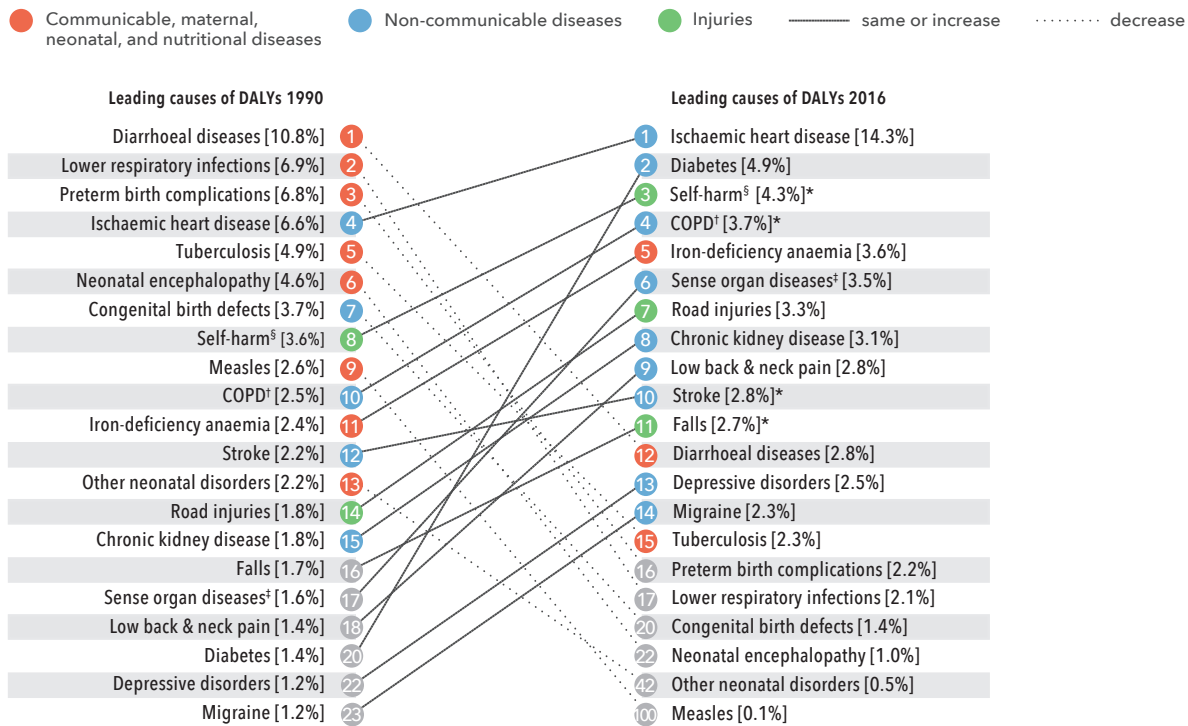
**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 20.4% | NCDs: 65.3% | Injuries: 14.3%

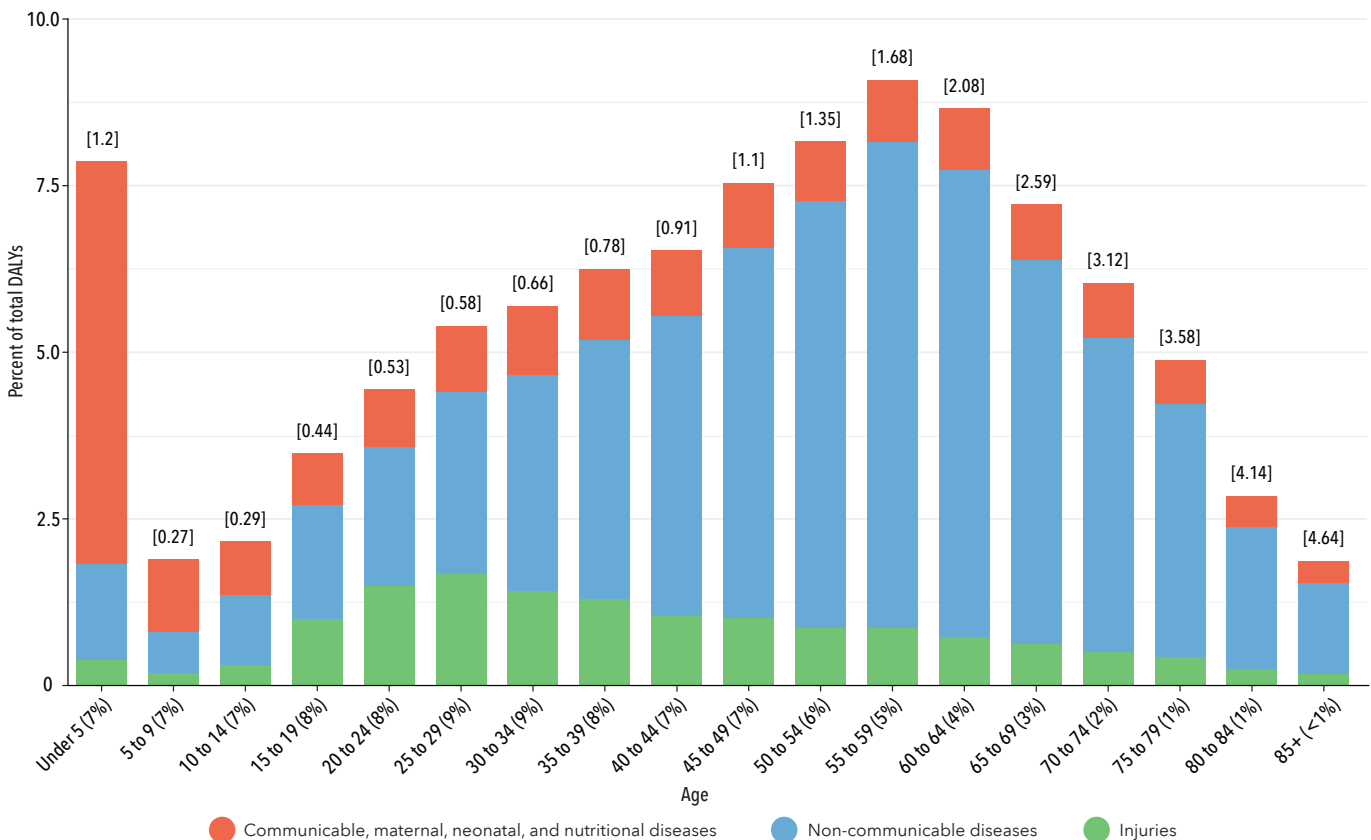
How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990–2016



\*Change not significant.  
The percent figure in brackets next to each cause is DALYs from that cause out of total DALYs.

<sup>†</sup>COPD is chronic obstructive pulmonary disease.  
<sup>‡</sup>Sense organ diseases includes mainly hearing and vision loss.  
<sup>§</sup>Self-harm refers to suicide and the nonfatal outcomes of self-harm.

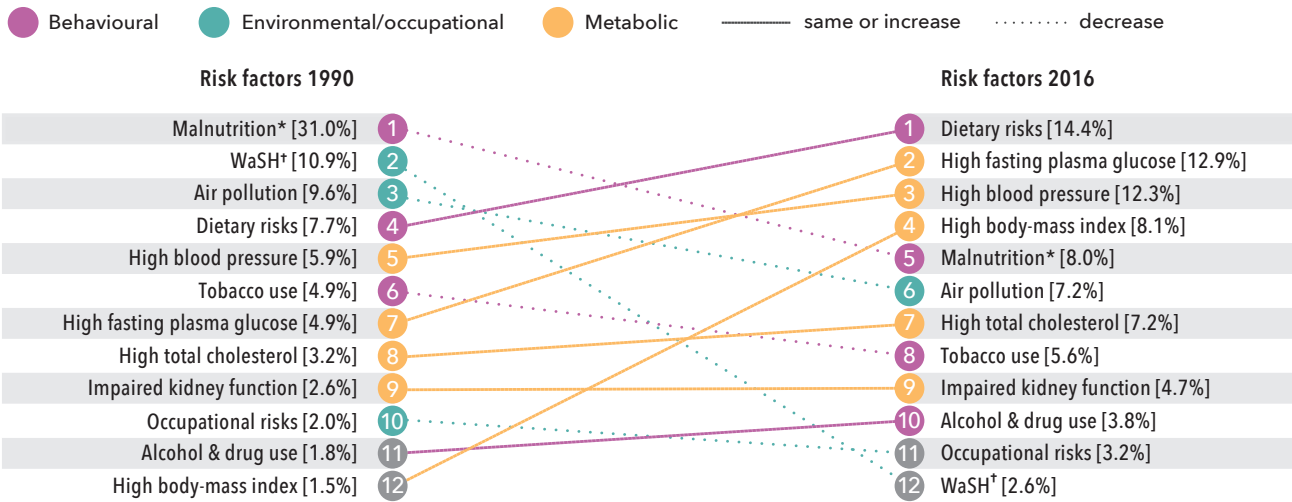
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

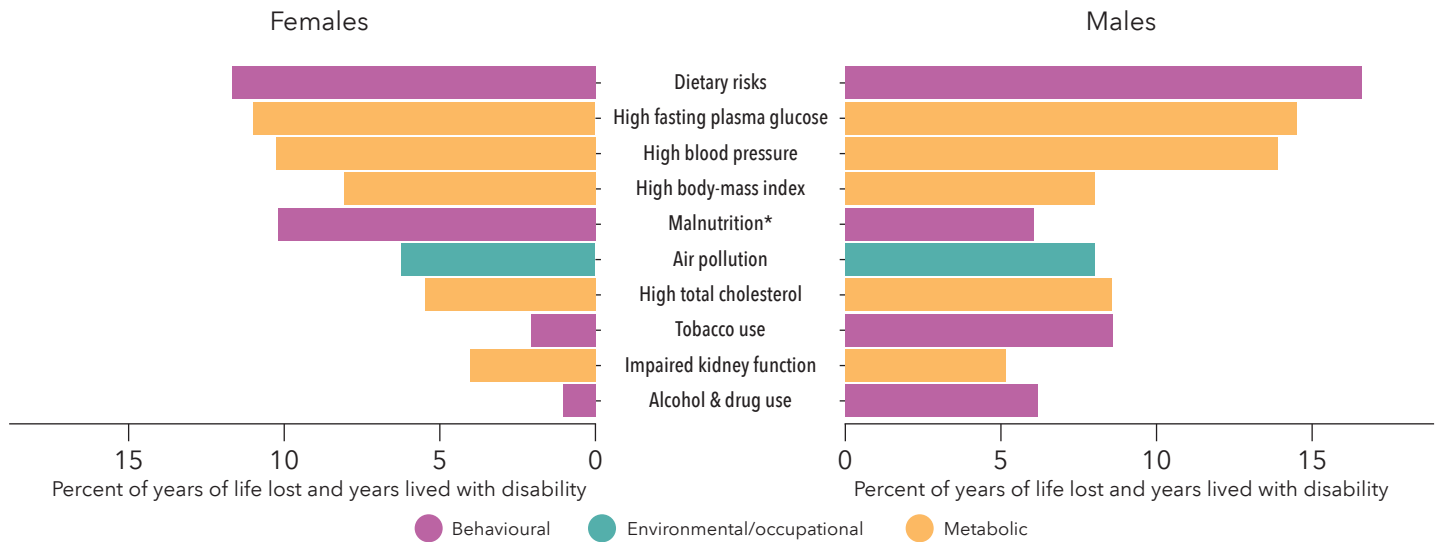


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# Telangana

## 1990 life expectancy

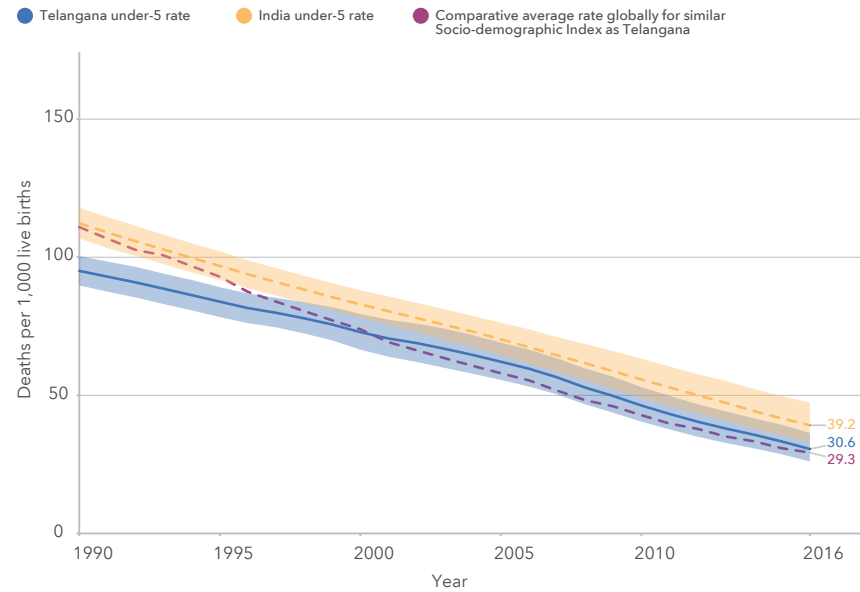
Females: 61.8 years Males: 60.2 years

## 2016 life expectancy

Females: 73.2 years Males: 69.4 years

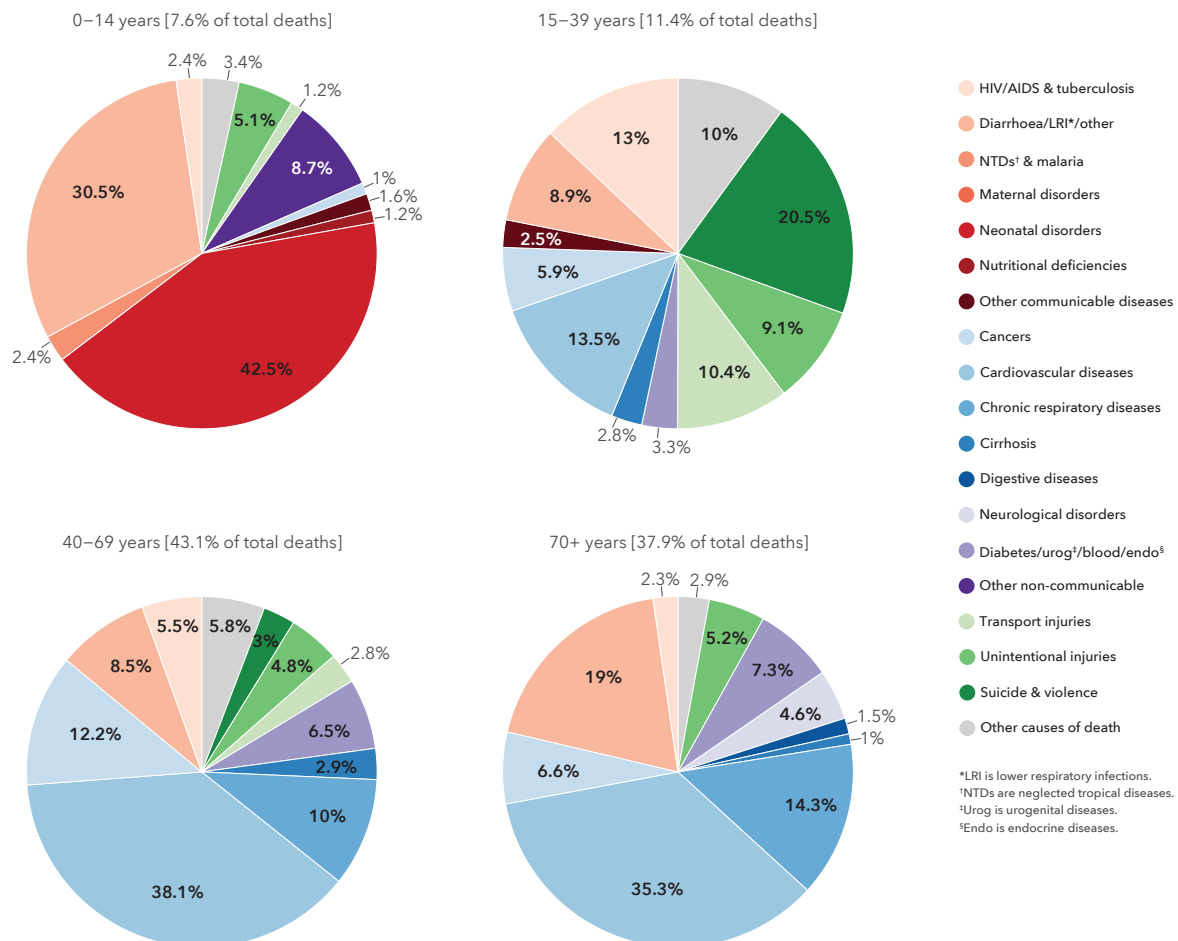
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

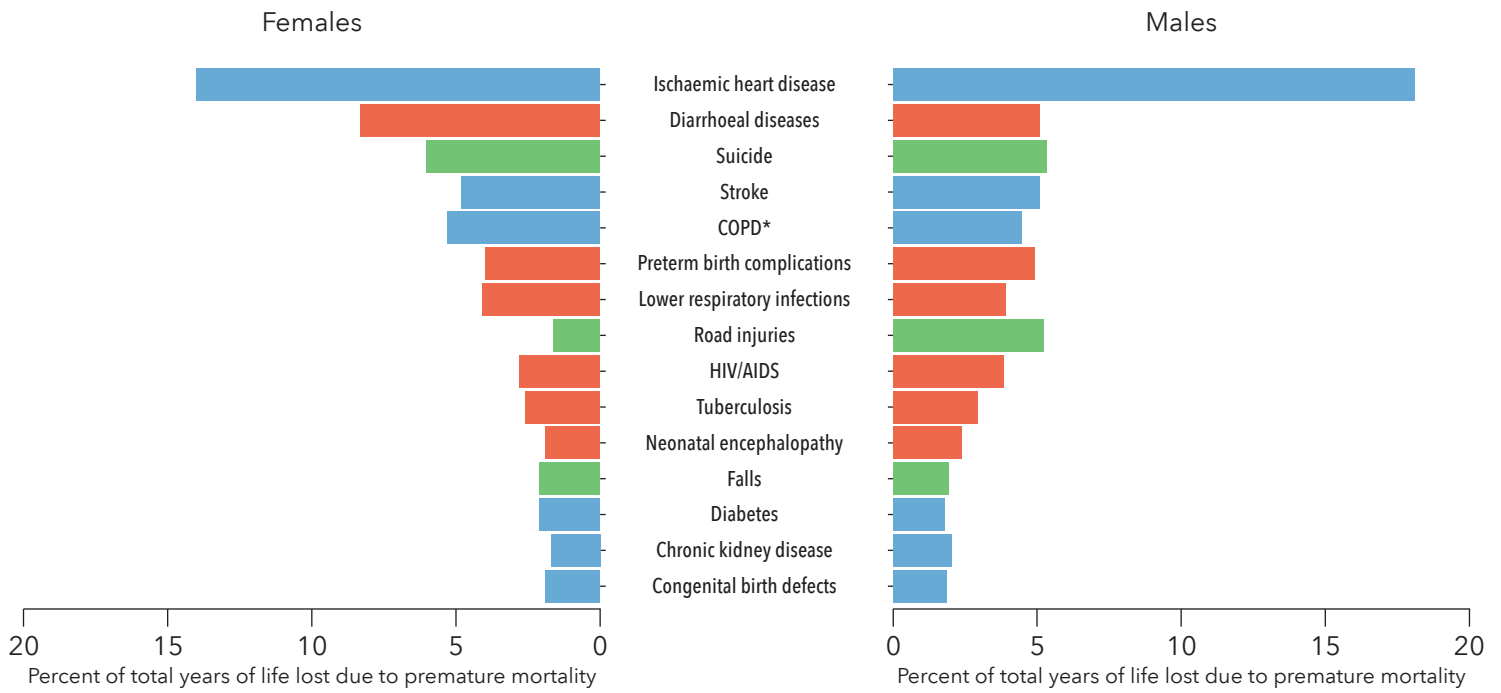


## Proportion of total disease burden from:

Premature death: 61.6% | Disability or morbidity: 38.4%

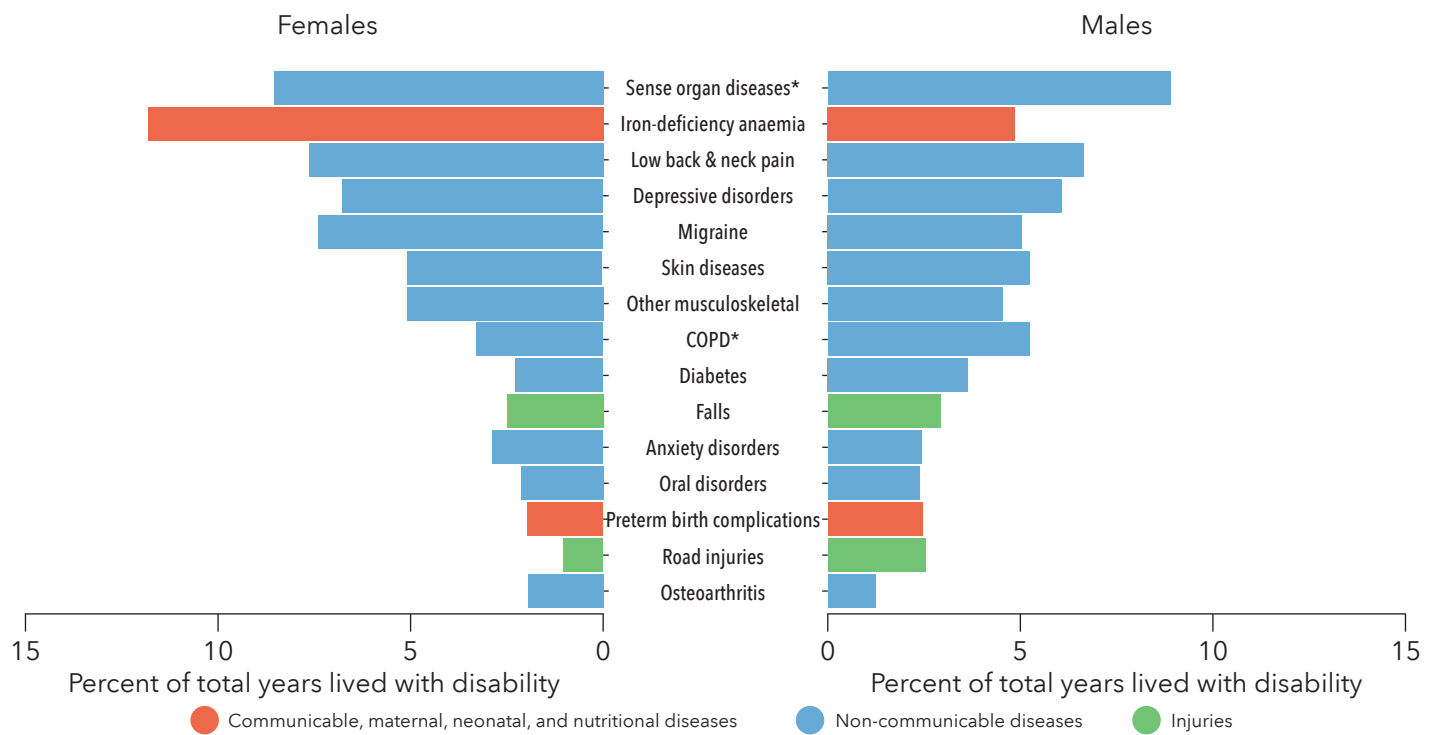
### What caused the most years of life lost, by sex, in 2016?

Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



### What caused the most years lived with disability, by sex, in 2016?

Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



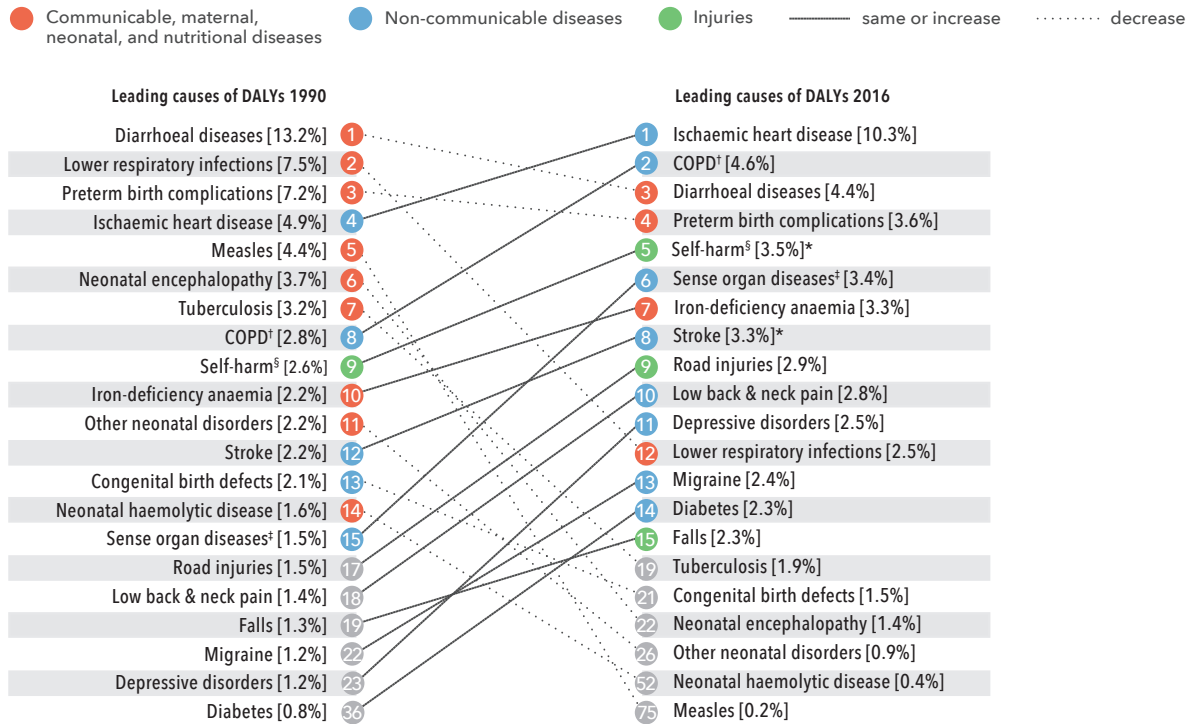
\*COPD is chronic obstructive pulmonary disease.

\*Sense organ diseases includes mainly hearing and vision loss.



## Proportion of total disease burden from: CMNNDs: 27.6% | NCDs: 59.2% | Injuries: 13.2%

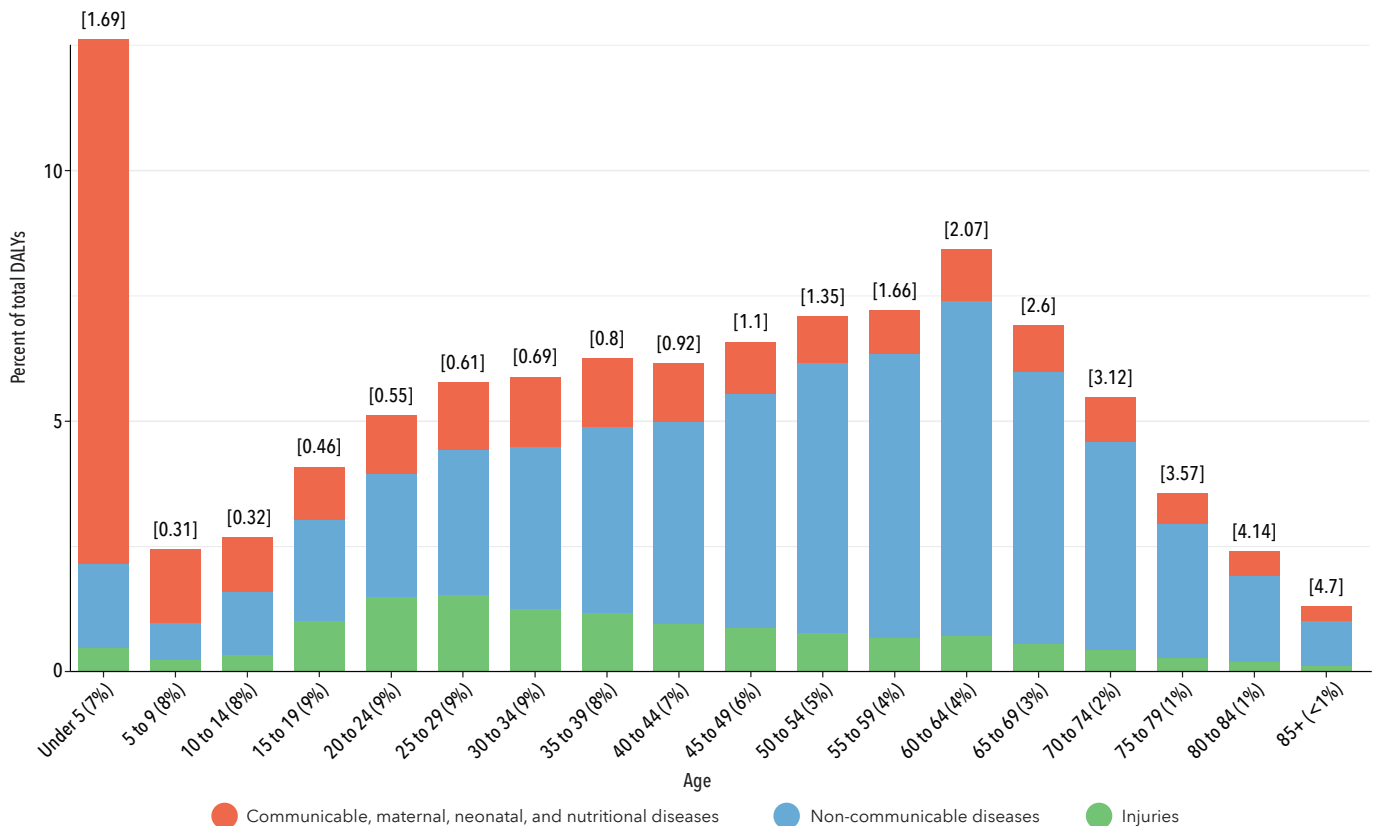
How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016



\*Change not significant.  
The percent figure in brackets next to each cause is DALYs from that cause out of total DALYs.

<sup>†</sup>COPD is chronic obstructive pulmonary disease.  
<sup>‡</sup>Sense organ diseases includes mainly hearing and vision loss.  
<sup>§</sup>Self-harm refers to suicide and the nonfatal outcomes of self-harm.

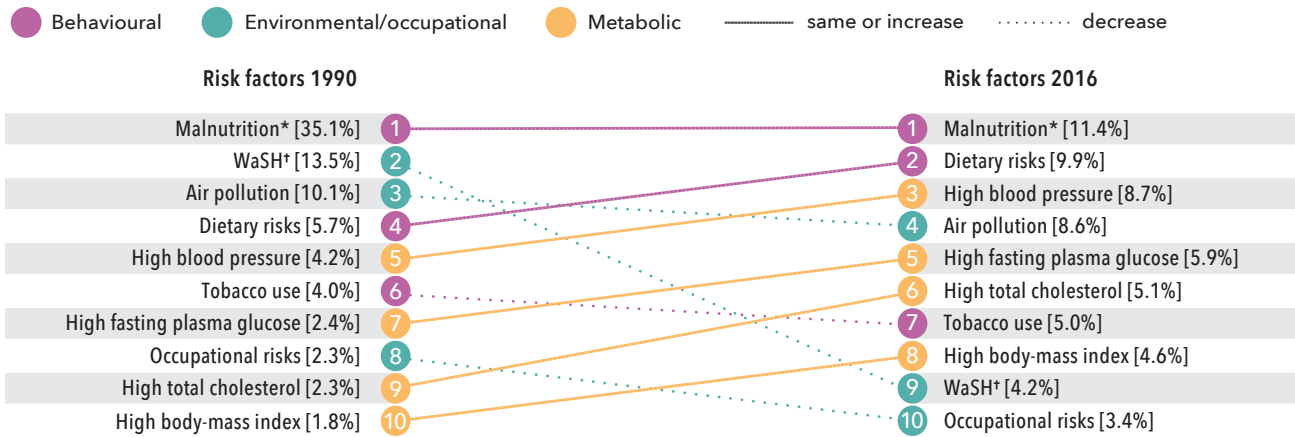
## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group.  
The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

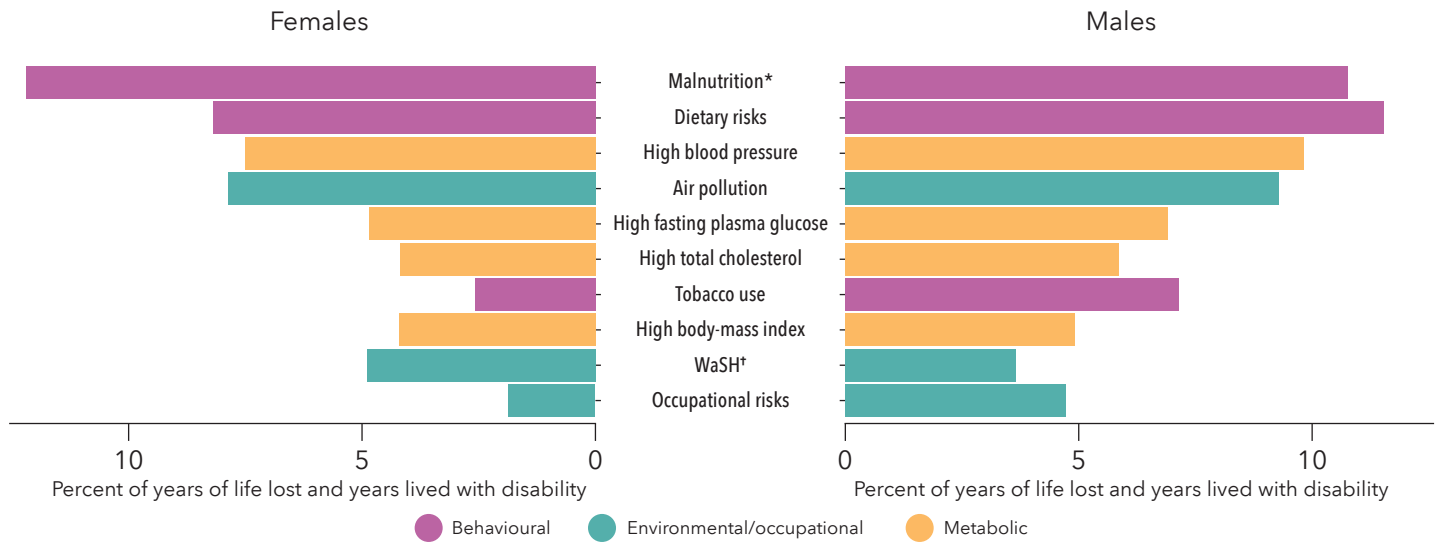


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Tripura

## 1990 life expectancy

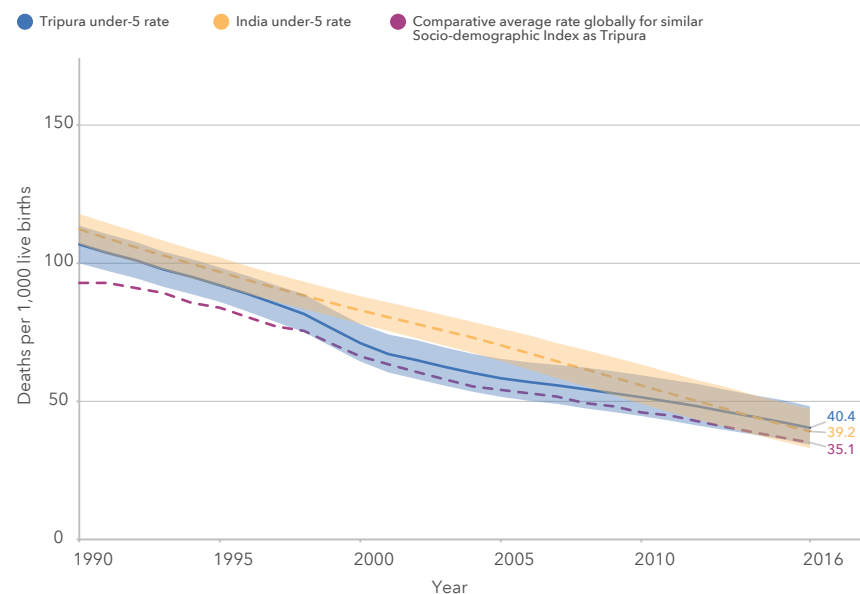
Females: 61.6 years Males: 58.9 years

## 2016 life expectancy

Females: 71.5 years Males: 66.3 years

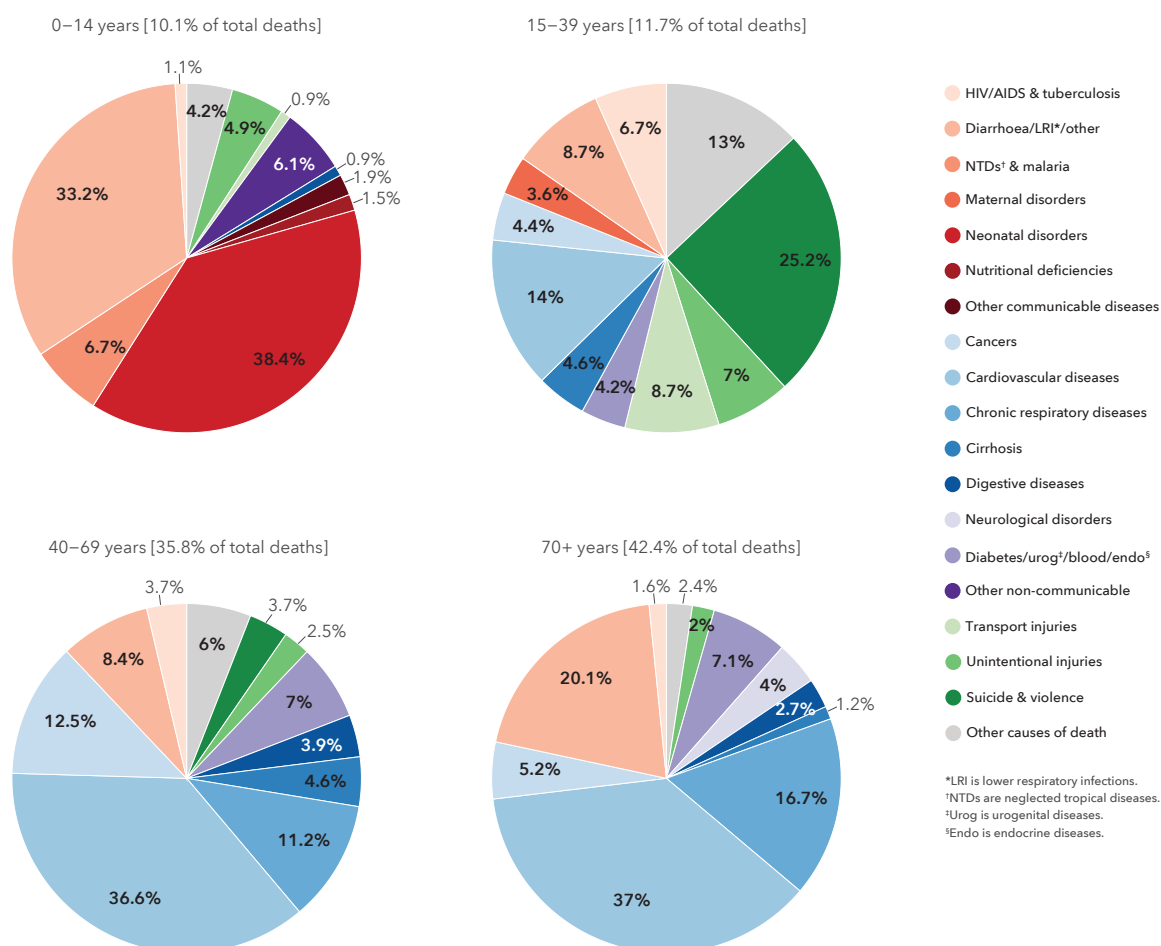
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



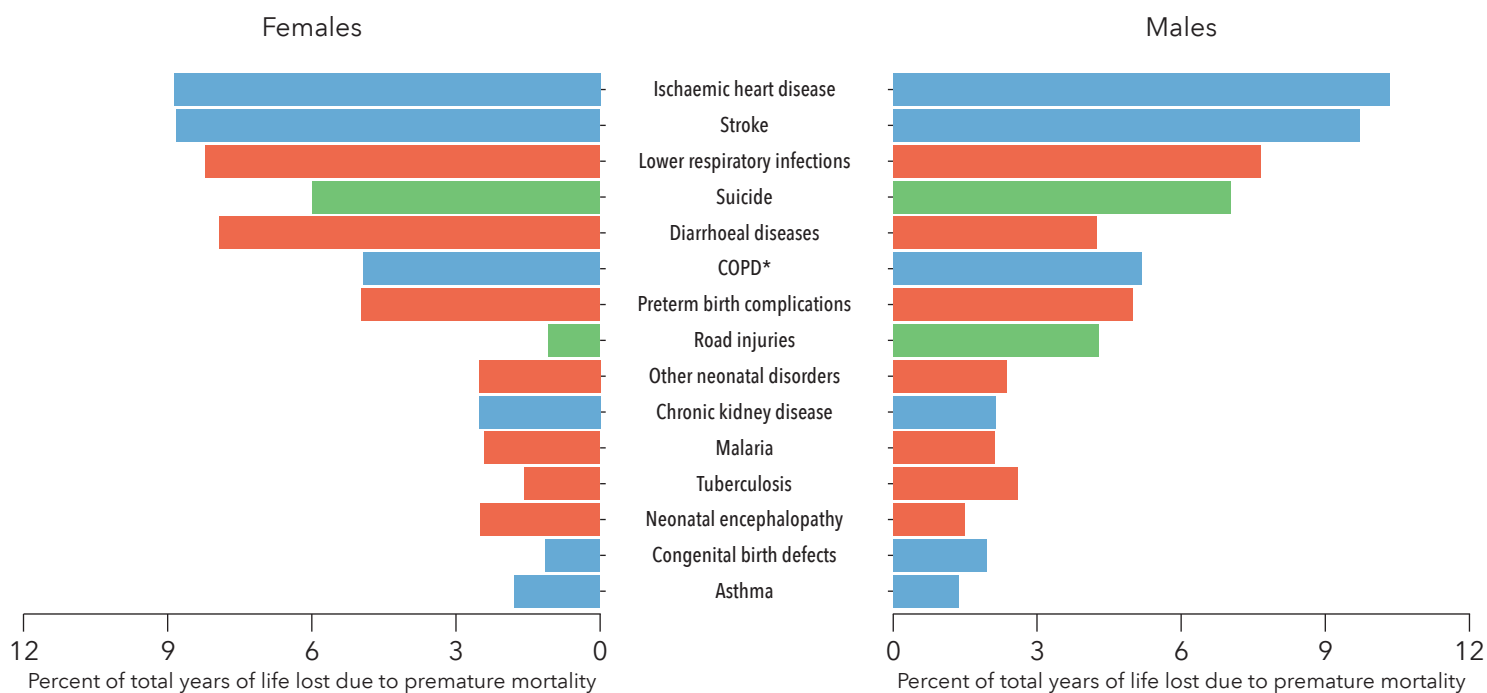
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

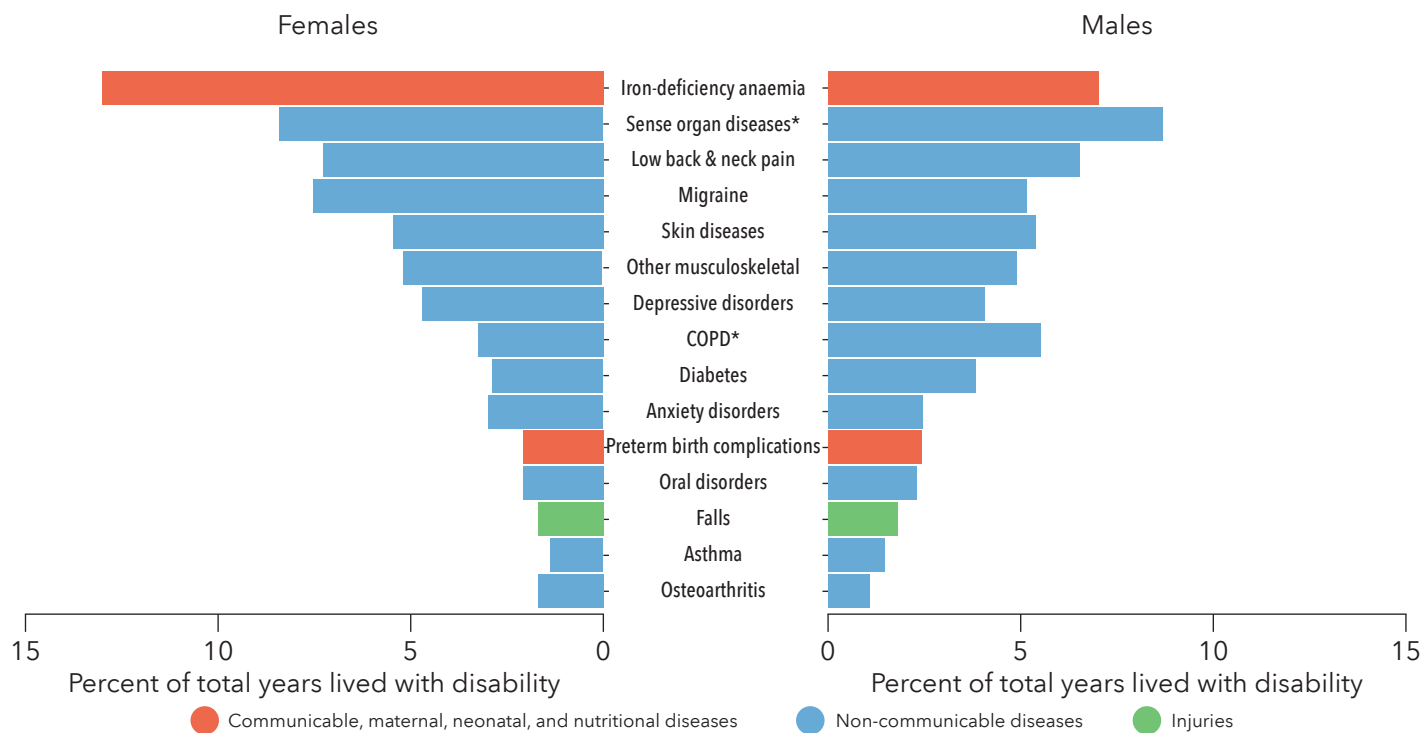


**Proportion of total disease burden from:**  
 Premature death: 66.7% | Disability or morbidity: 33.3%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



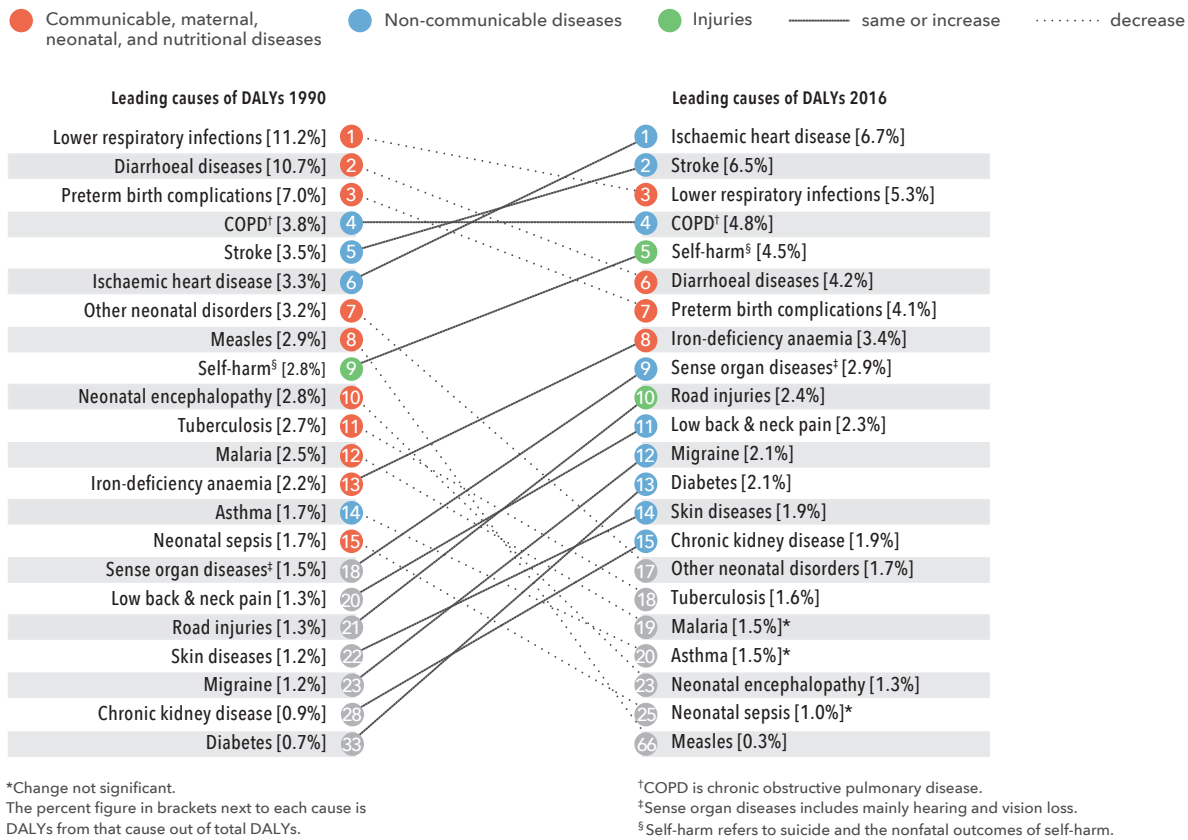
**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016



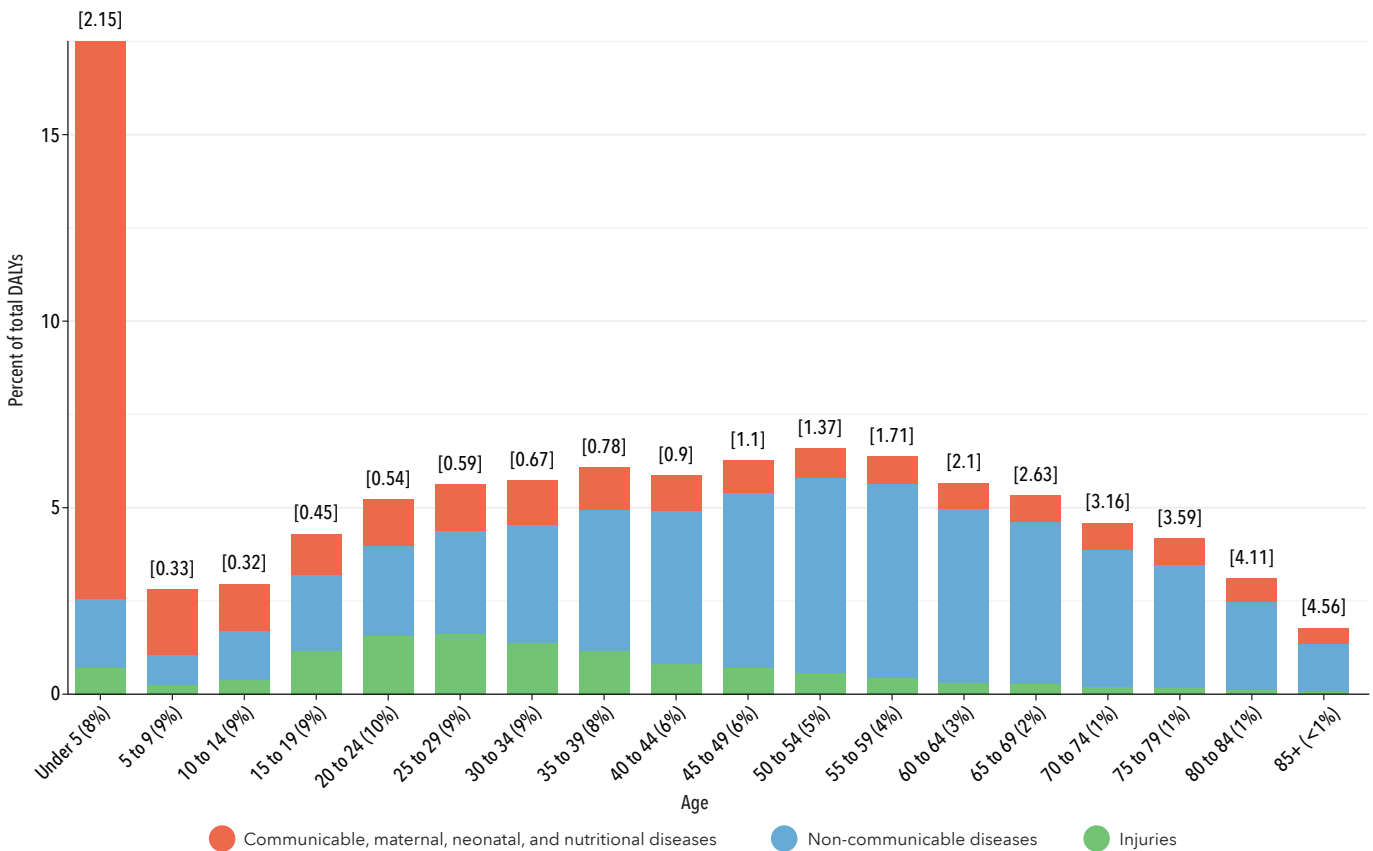
\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 31.1% | NCDs: 57.0% | Injuries: 12.0%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990–2016

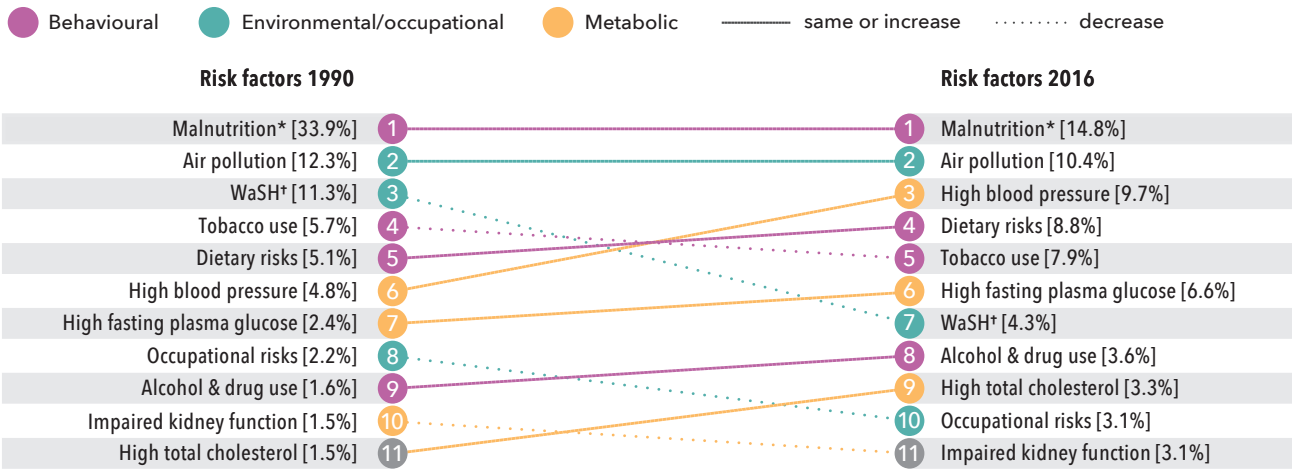


## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

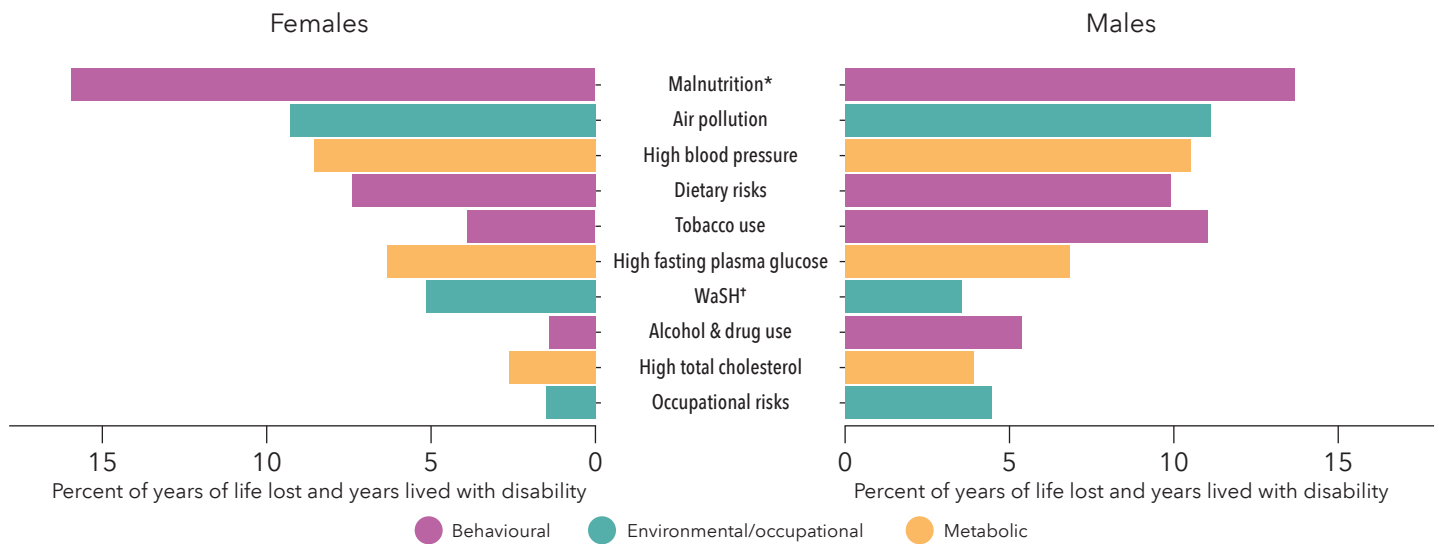


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Uttar Pradesh

## 1990 life expectancy

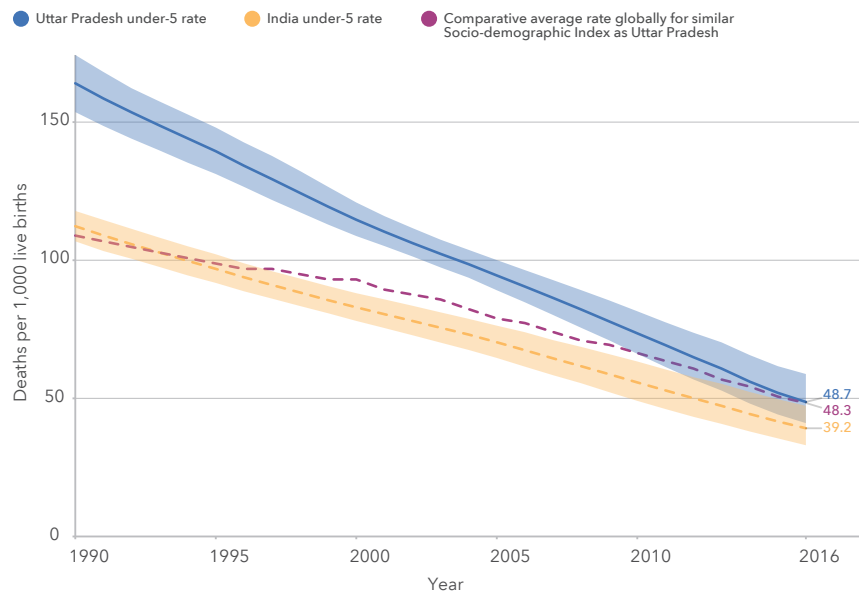
Females: 53.5 years Males: 54.9 years

## 2016 life expectancy

Females: 66.8 years Males: 64.6 years

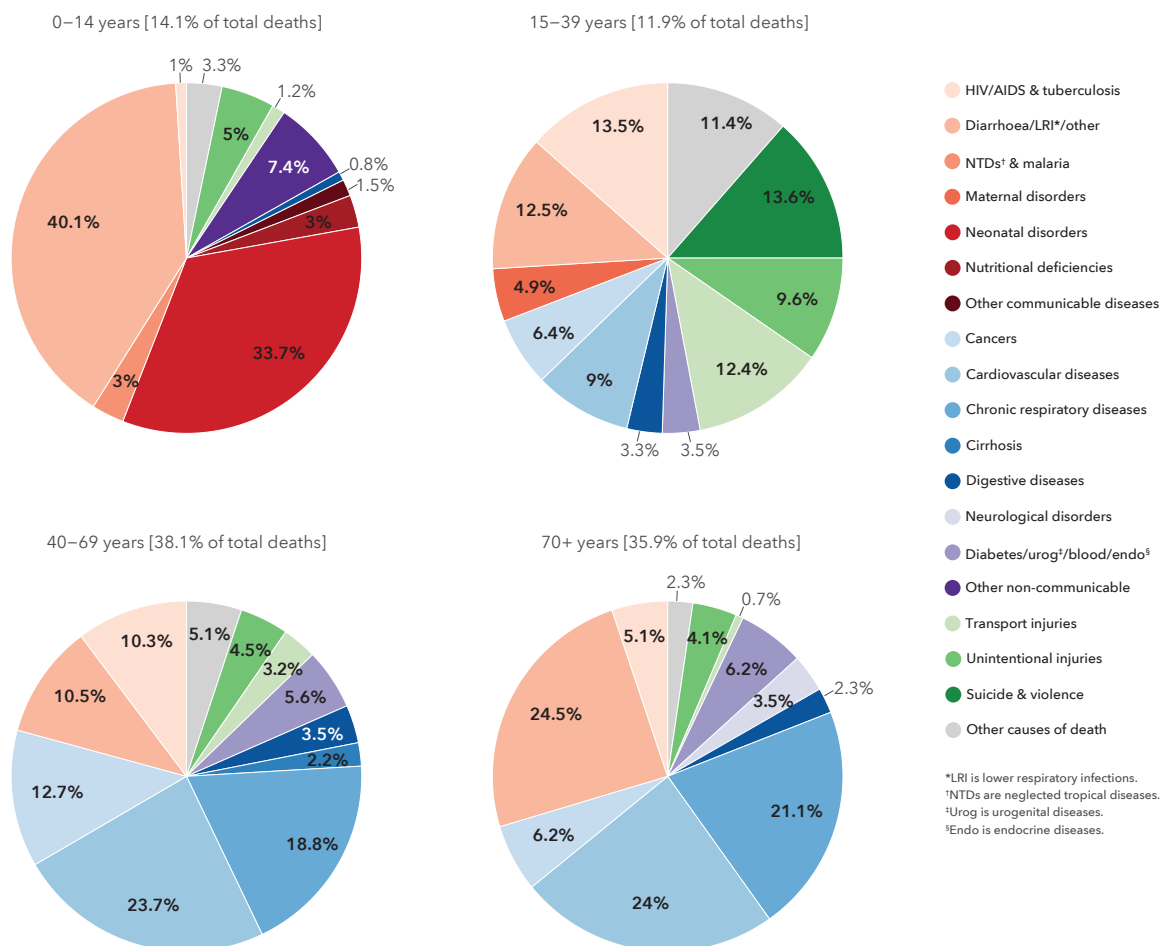
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



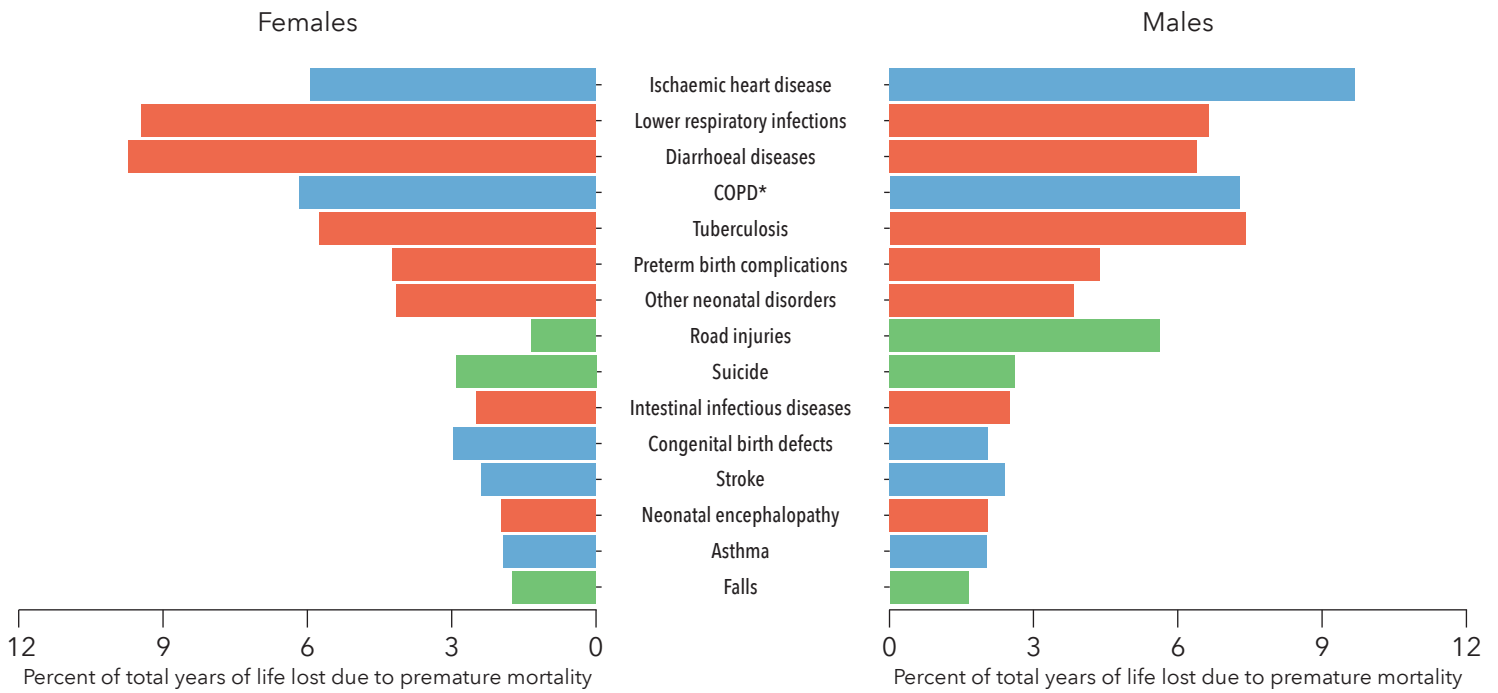
### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

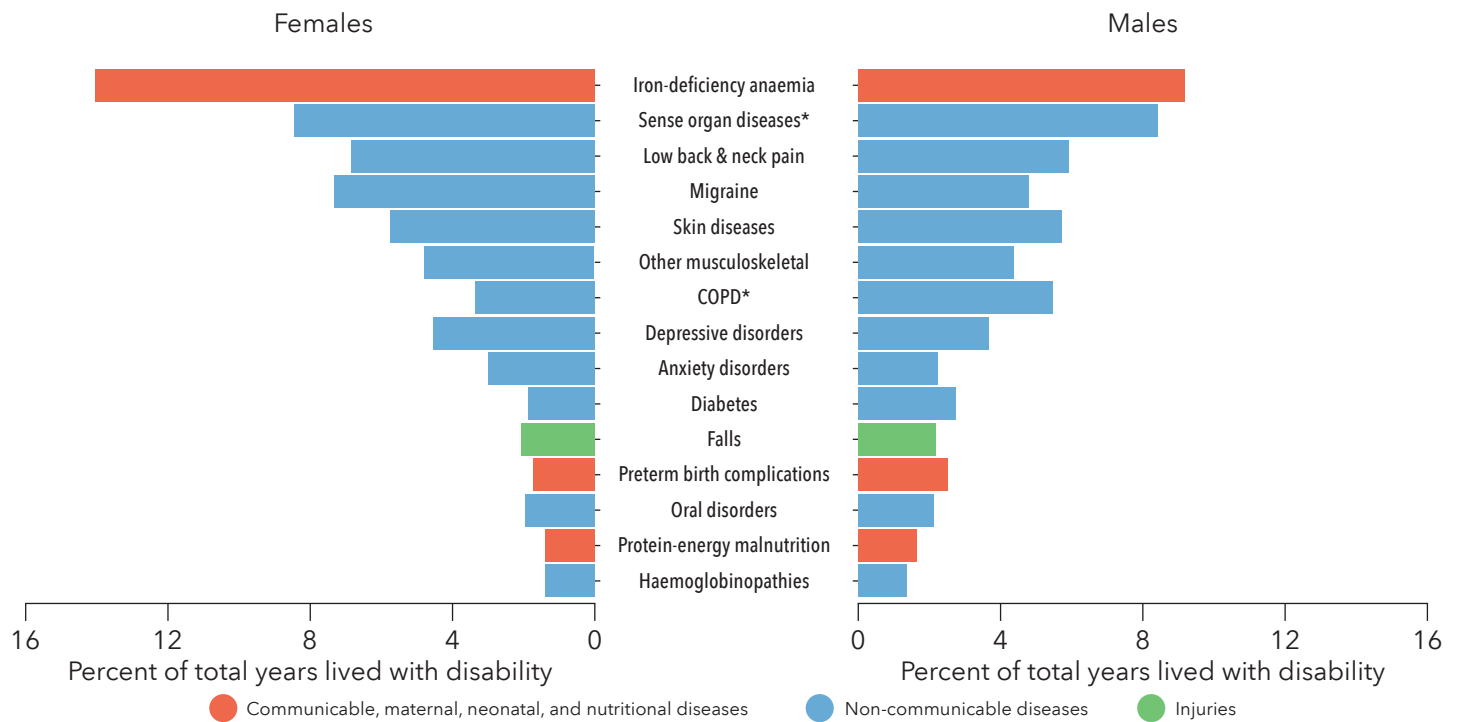


**Proportion of total disease burden from:**  
 Premature death: 71.6% | Disability or morbidity: 28.4%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

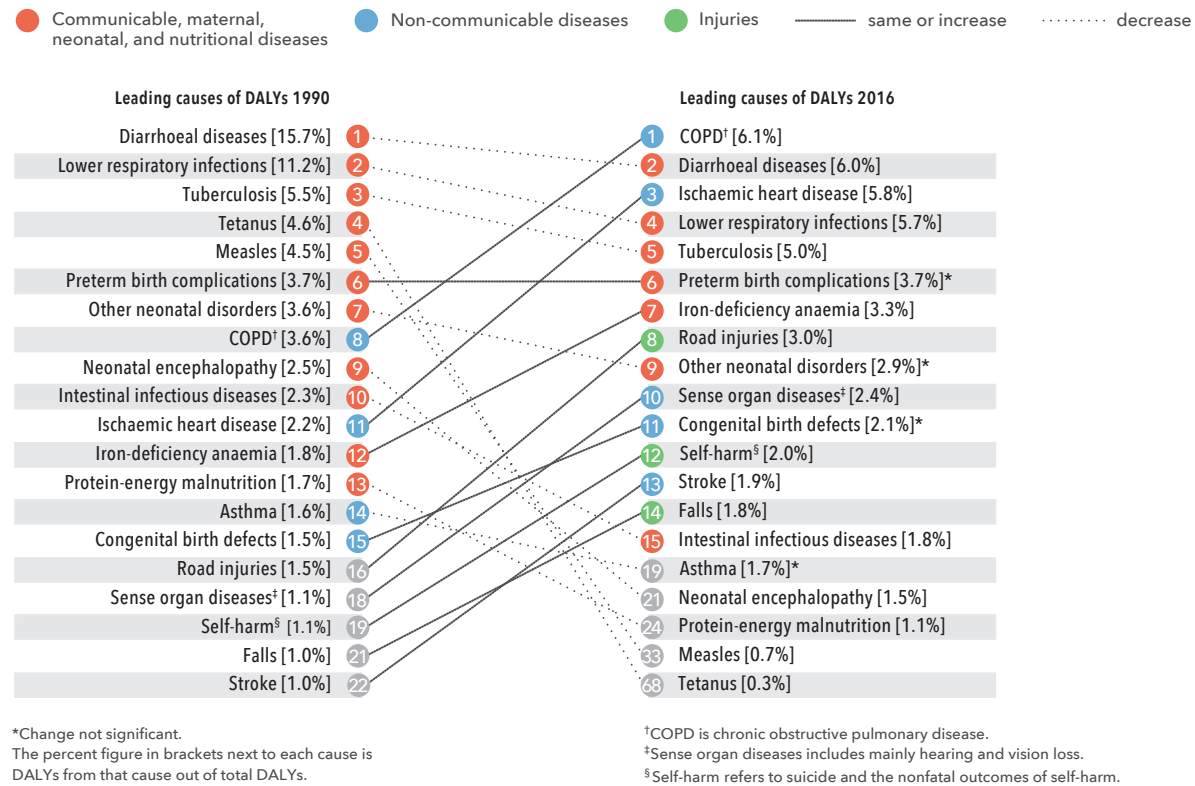


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.



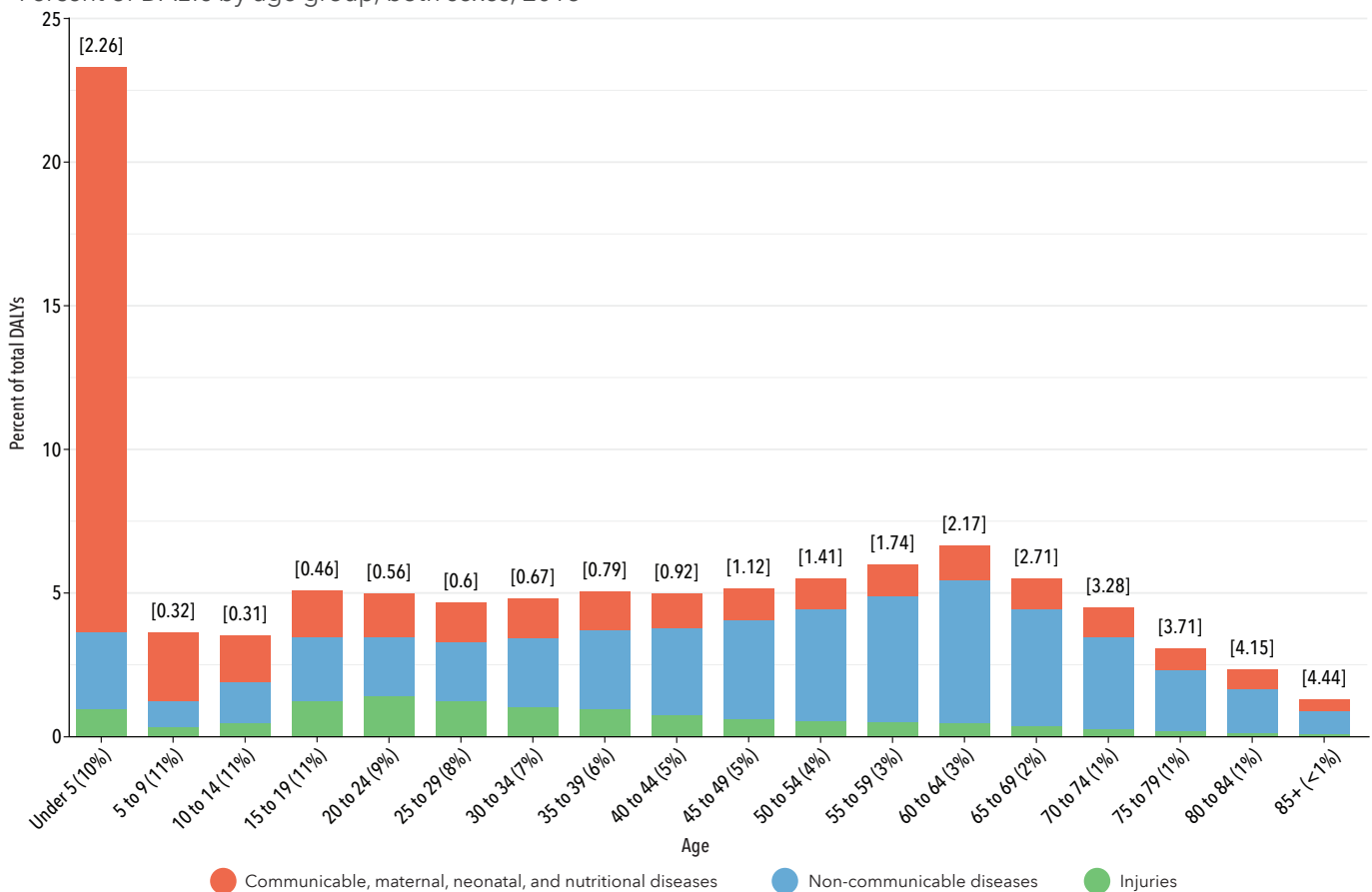
## Proportion of total disease burden from: CMNNDs: 40.5% | NCDs: 47.9% | Injuries: 11.6%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016



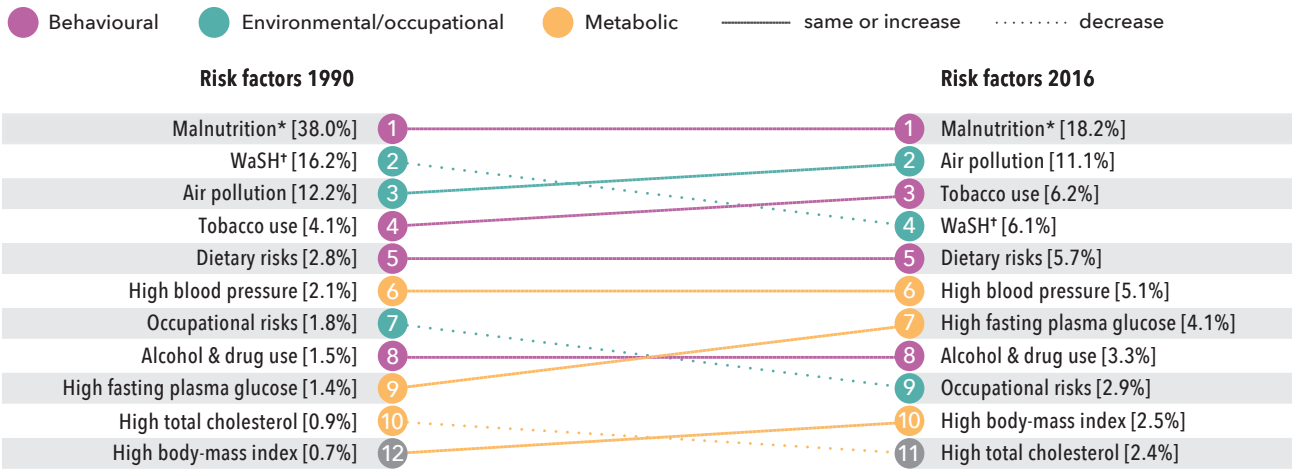
## What caused the most death and disability combined across age groups in 2016?

Percent of DALYs by age group, both sexes, 2016



### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

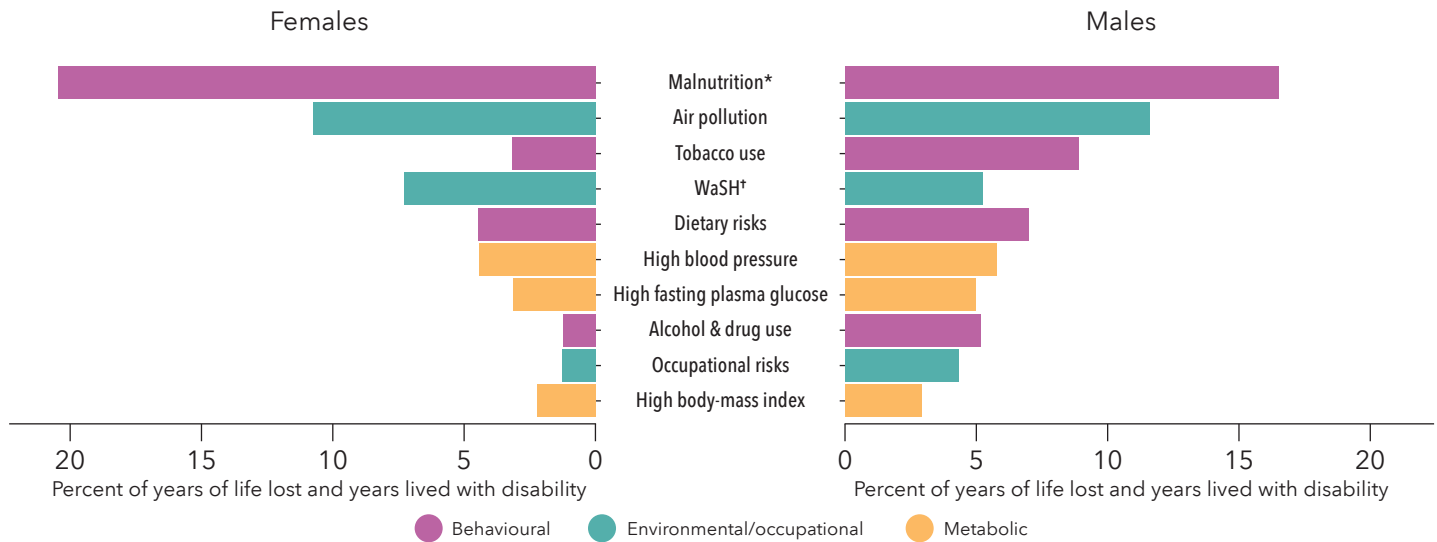


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

# Uttarakhand

## 1990 life expectancy

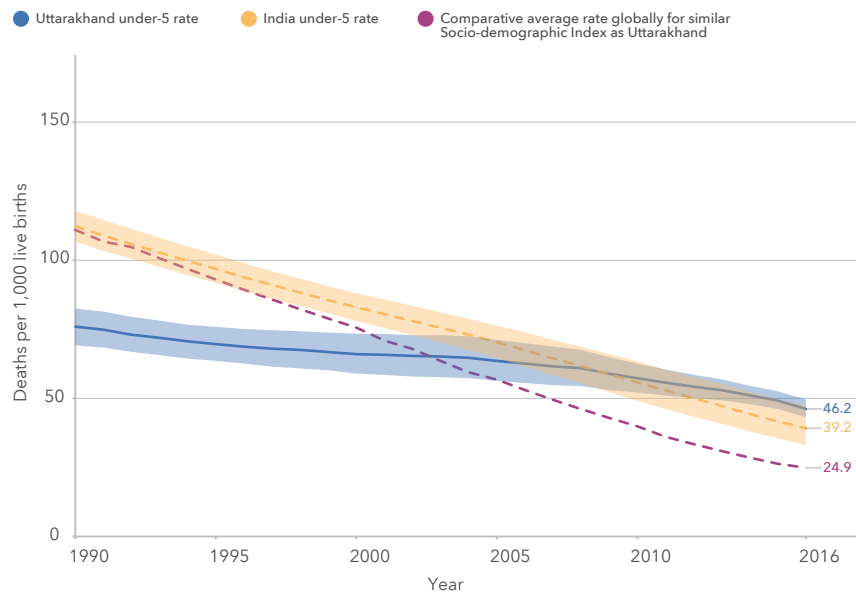
Females: 60.5 years Males: 57.8 years

## 2016 life expectancy

Females: 71.1 years Males: 65.3 years

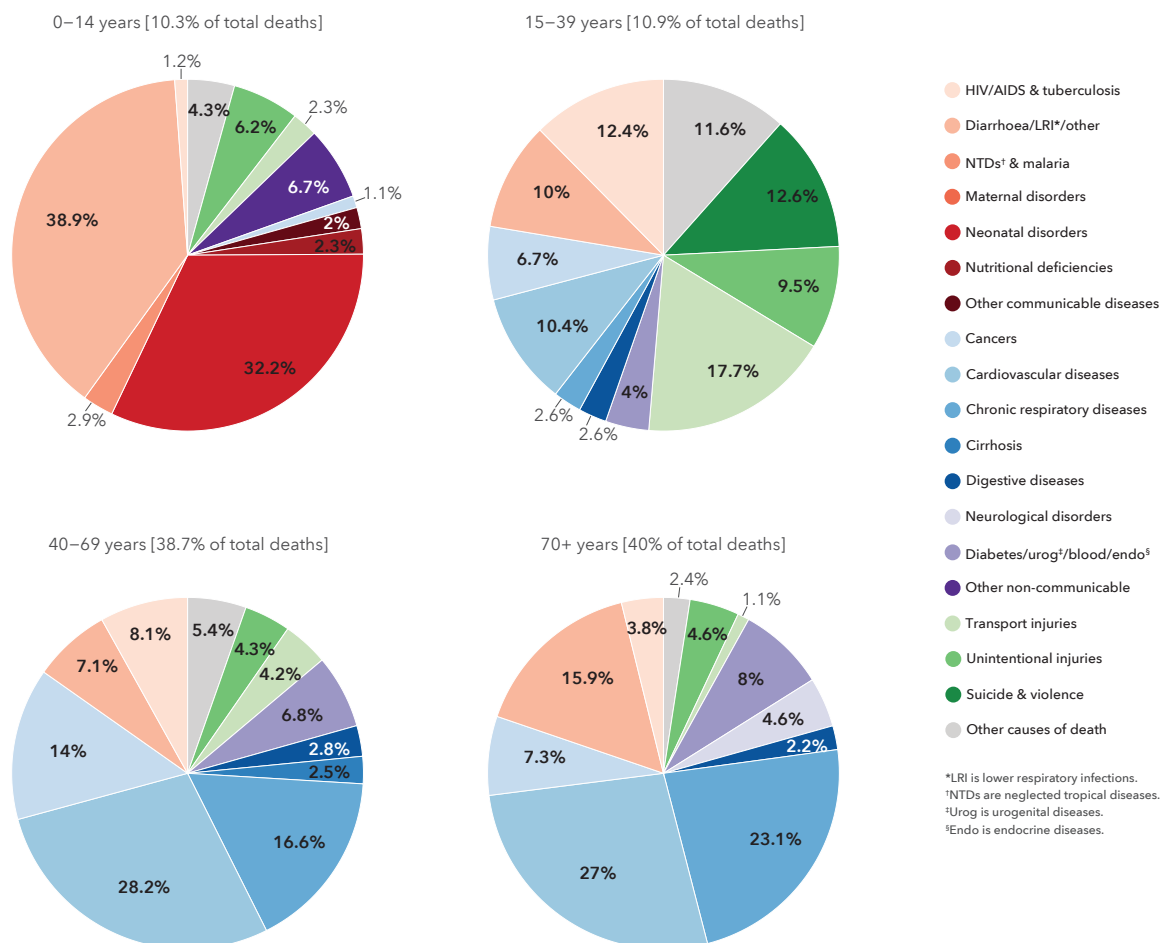
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

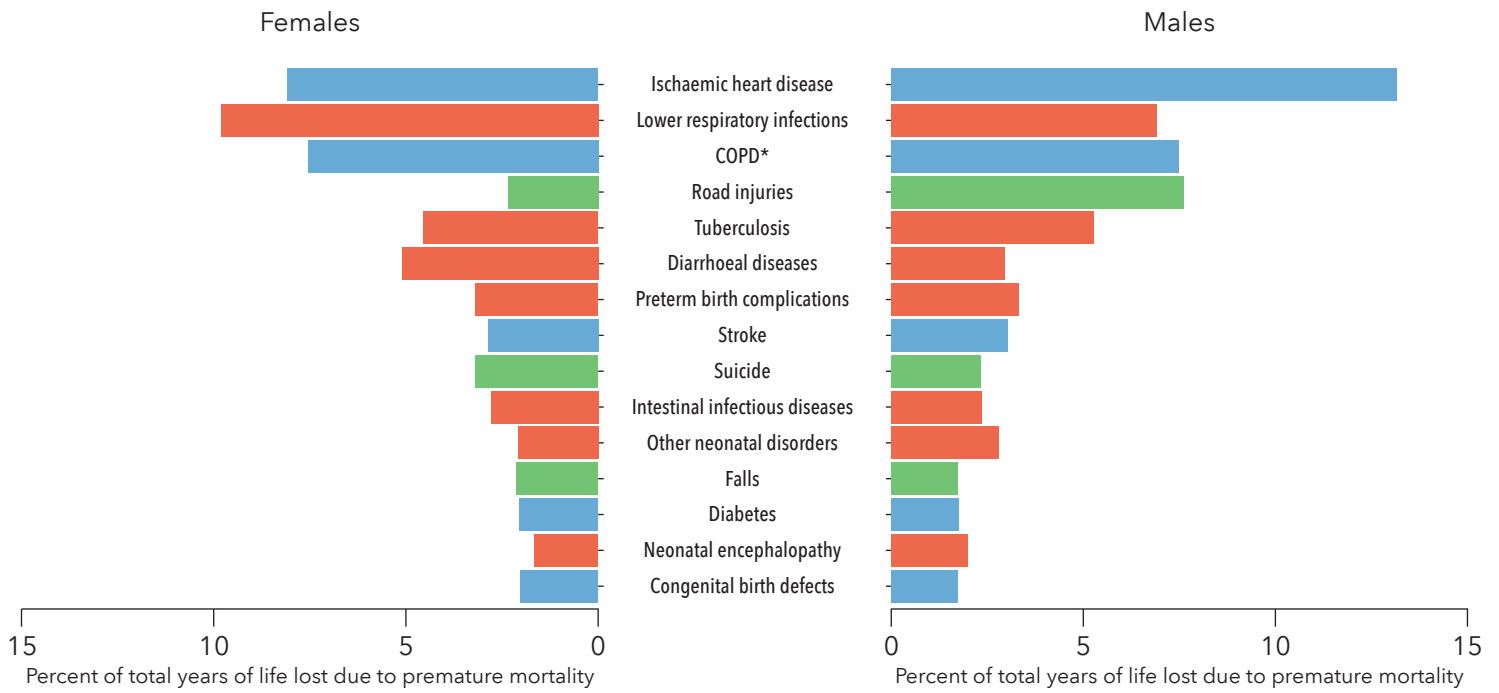
Percent contribution of top 10 causes of death by age group, both sexes, 2016



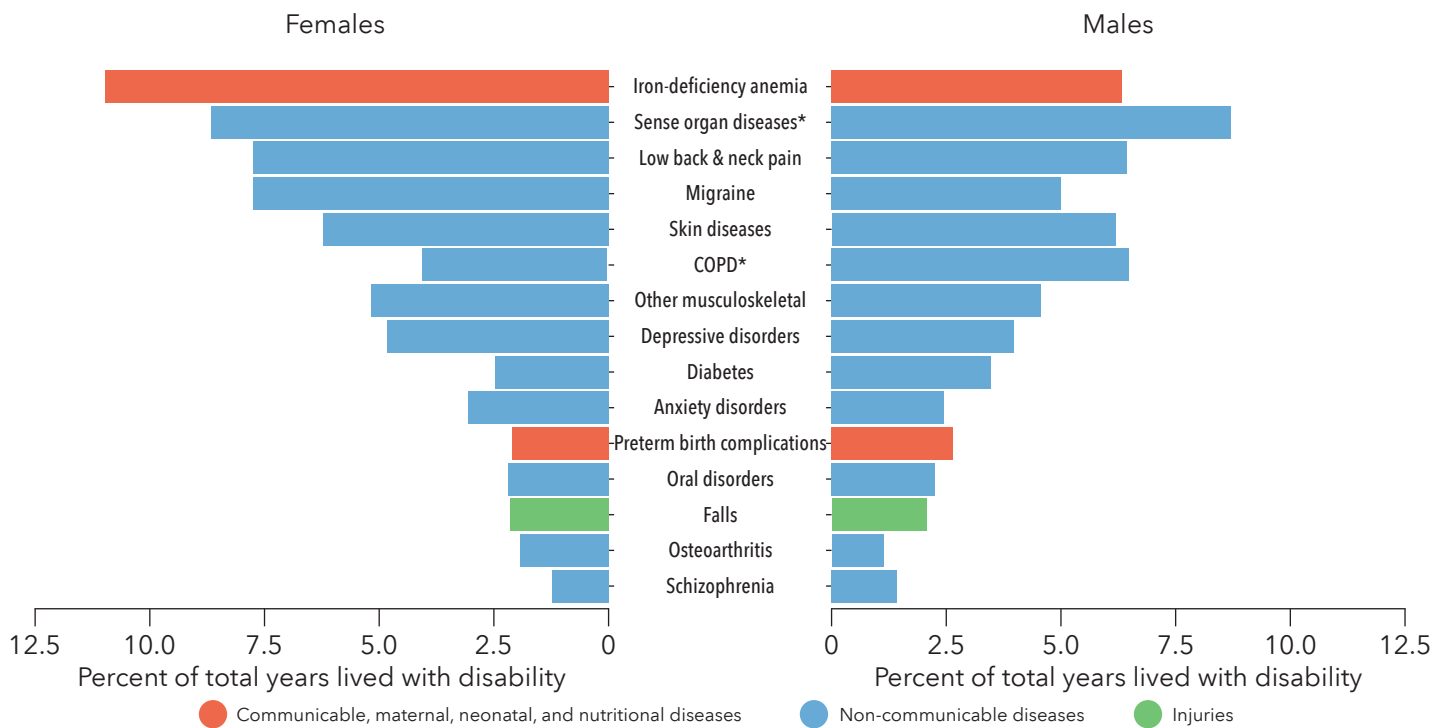
\*LRI is lower respiratory infections.  
<sup>†</sup>NTDs are neglected tropical diseases.  
<sup>‡</sup>Urog is urogenital diseases.  
<sup>§</sup>Endo is endocrine diseases.

**Proportion of total disease burden from:**  
 Premature death: 68.0% | Disability or morbidity: 32.0%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

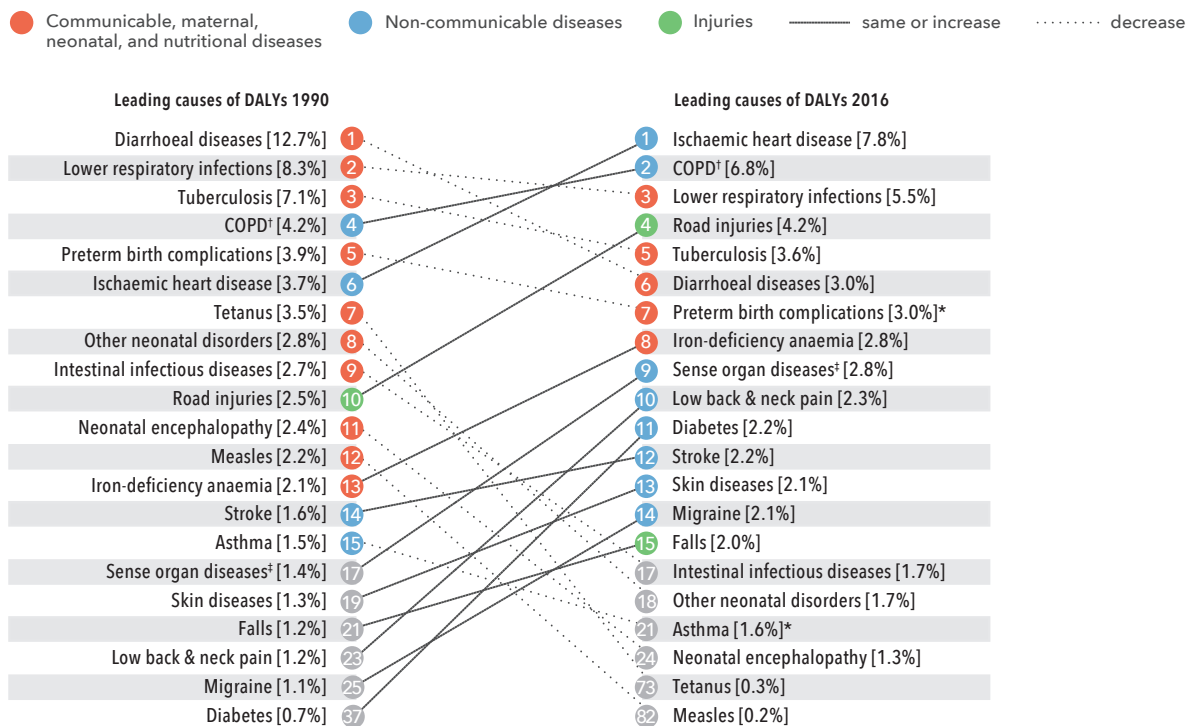


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

## Proportion of total disease burden from: CMNNDs: 31.7% | NCDs: 55.5% | Injuries: 12.9%

### How have the leading causes of death and disability combined changed from 1990 to 2016?

Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016

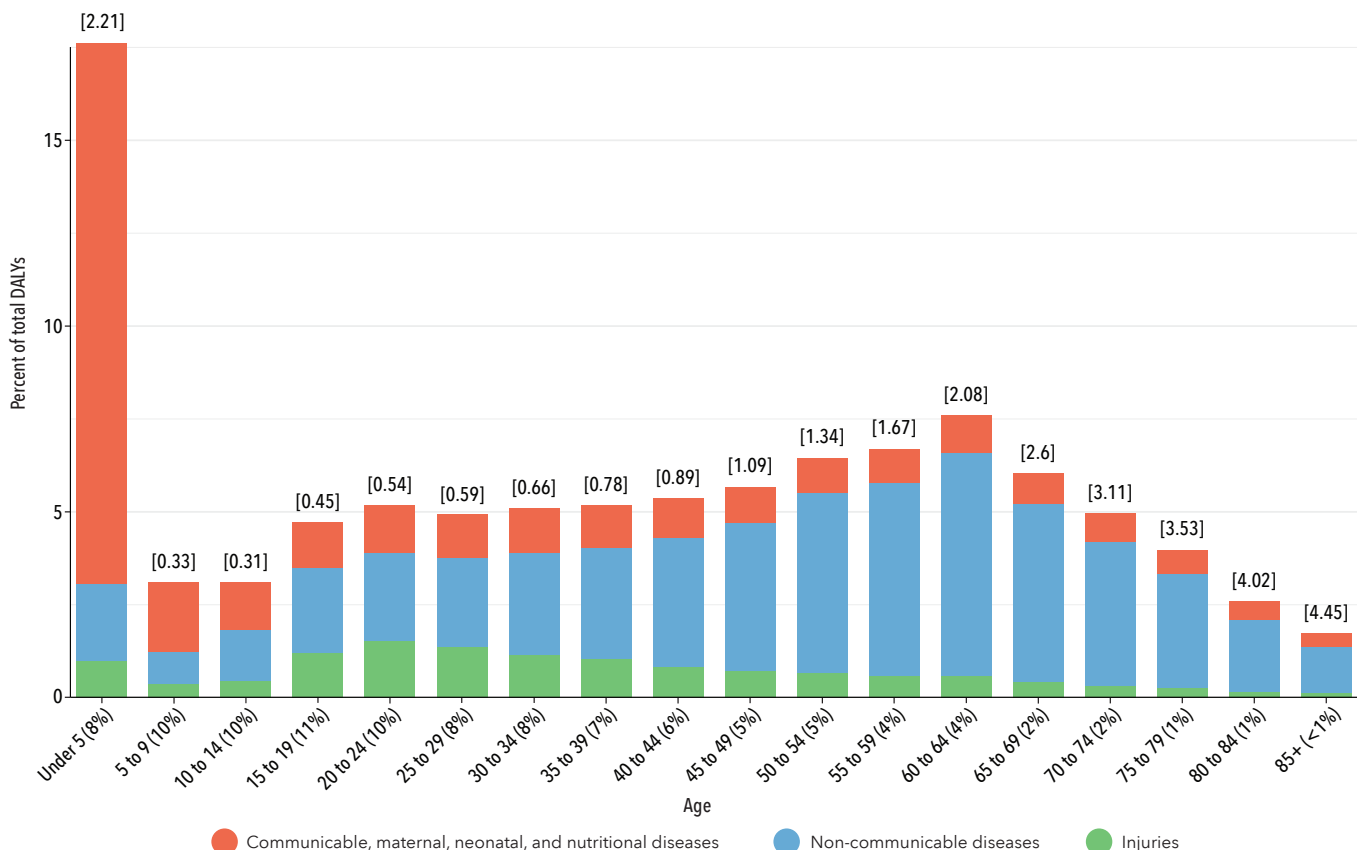


\*Change not significant.  
The percent figure in brackets next to each cause is DALYs from that cause out of total DALYs.

<sup>†</sup>COPD is chronic obstructive pulmonary disease.  
<sup>‡</sup>Sense organ diseases includes mainly hearing and vision loss.  
<sup>§</sup>Self-harm refers to suicide and the nonfatal outcomes of self-harm.

### What caused the most death and disability combined across age groups in 2016?

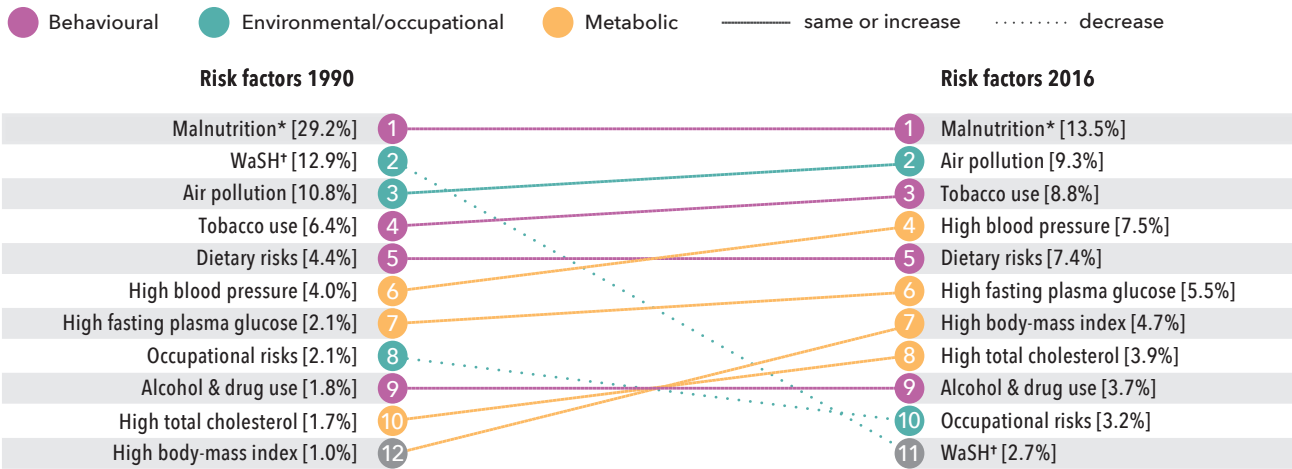
Percent of DALYs by age group, both sexes, 2016



The number in the bracket on top of each vertical bar is the ratio of percent DALYs to population for that age group. The number in parentheses after each age group on the x-axis is the percent of population in that age group.

### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

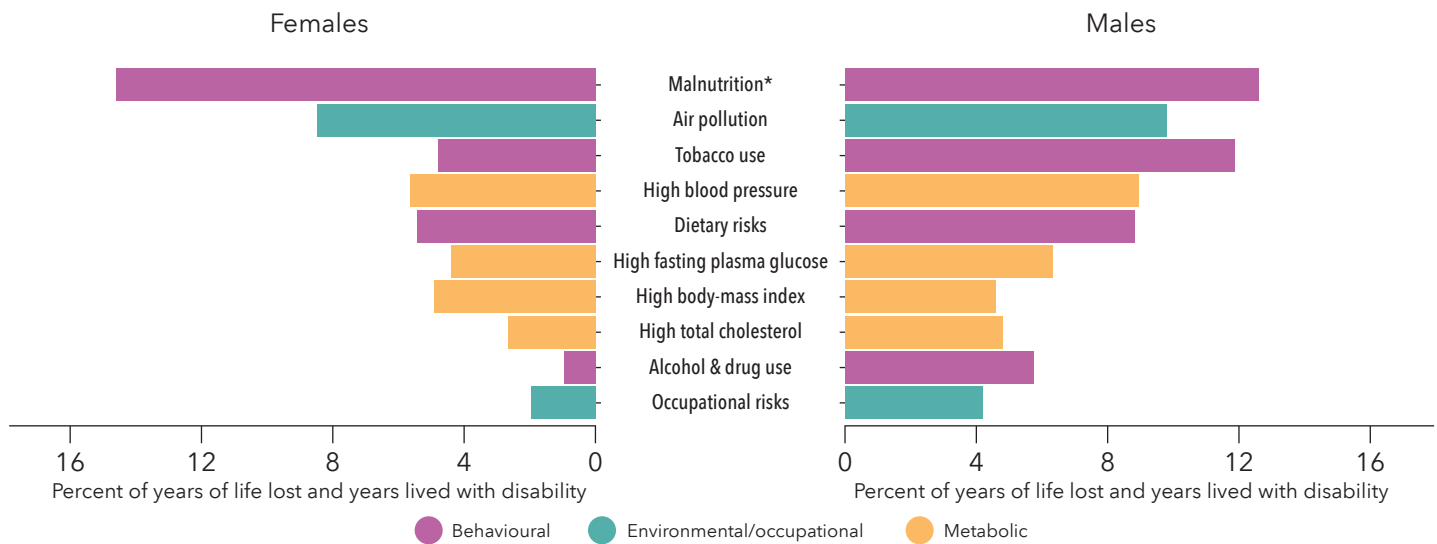


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

# West Bengal

## 1990 life expectancy

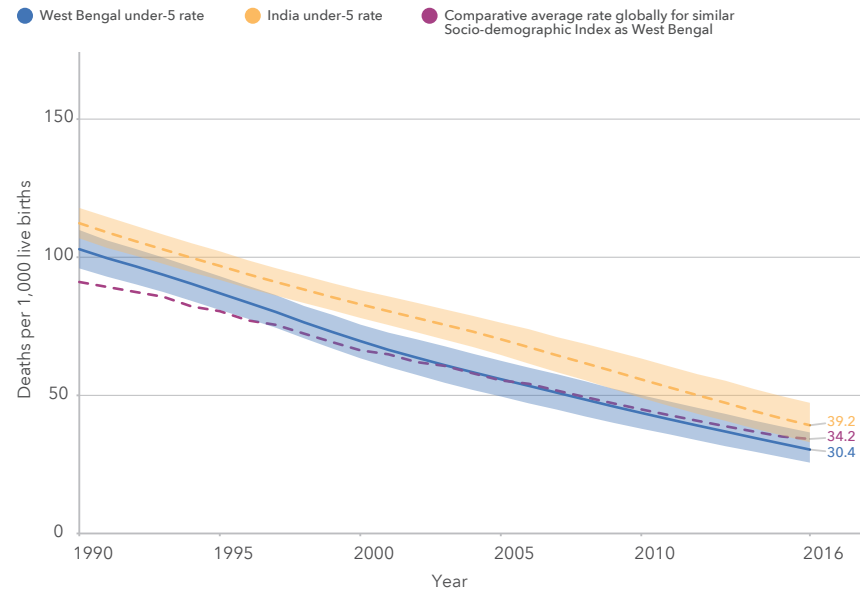
Females: 59.6 years Males: 58.4 years

## 2016 life expectancy

Females: 71.3 years Males: 68.1 years

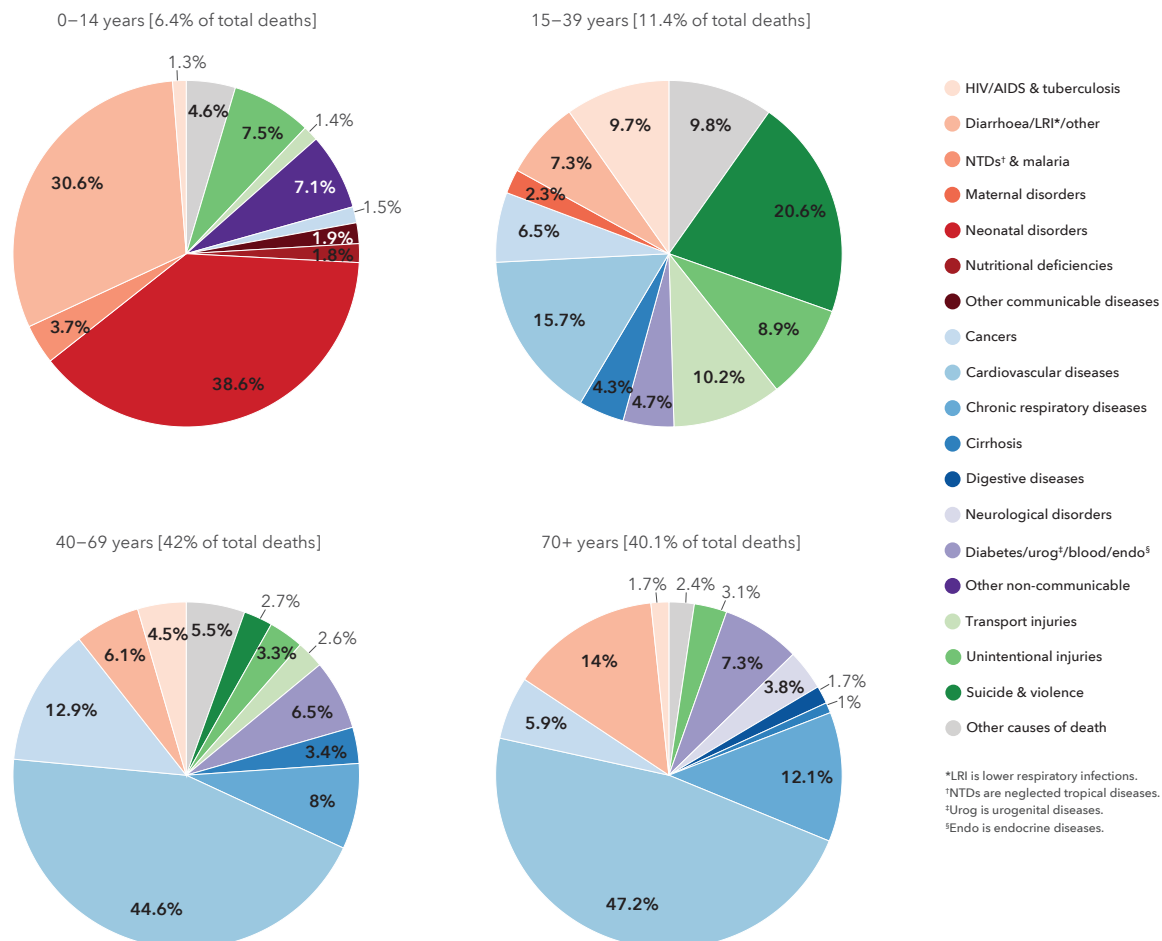
### How much did the under-5 mortality rate change from 1990 to 2016?

Under-5 mortality rate, both sexes combined, 1990-2016



### What caused the most deaths in different age groups in 2016?

Percent contribution of top 10 causes of death by age group, both sexes, 2016

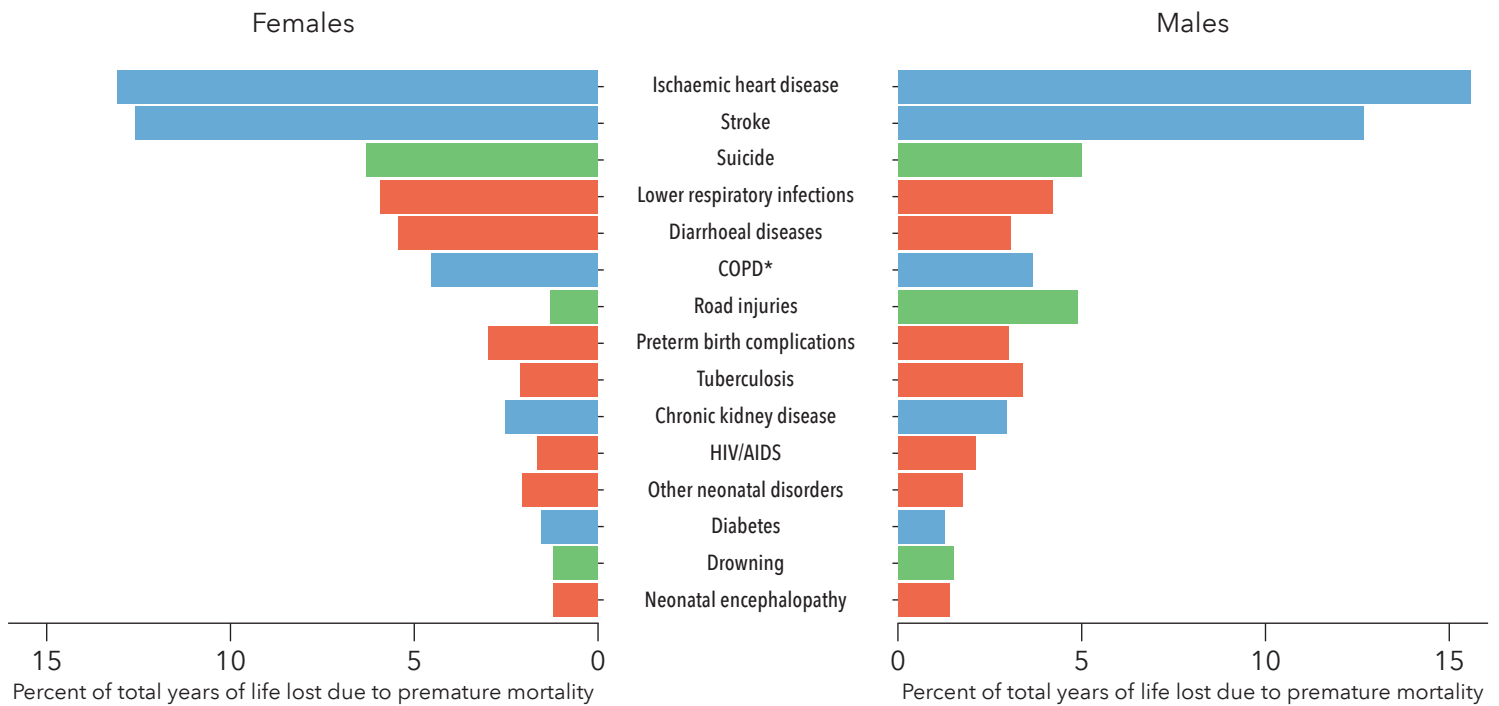


- HIV/AIDS & tuberculosis
- Diarrhoea/LRI\* / other
- NTDs† & malaria
- Maternal disorders
- Neonatal disorders
- Nutritional deficiencies
- Other communicable diseases
- Cancers
- Cardiovascular diseases
- Chronic respiratory diseases
- Cirrhosis
- Digestive diseases
- Neurological disorders
- Diabetes/urog†/blood/endo‡
- Other non-communicable
- Transport injuries
- Unintentional injuries
- Suicide & violence
- Other causes of death

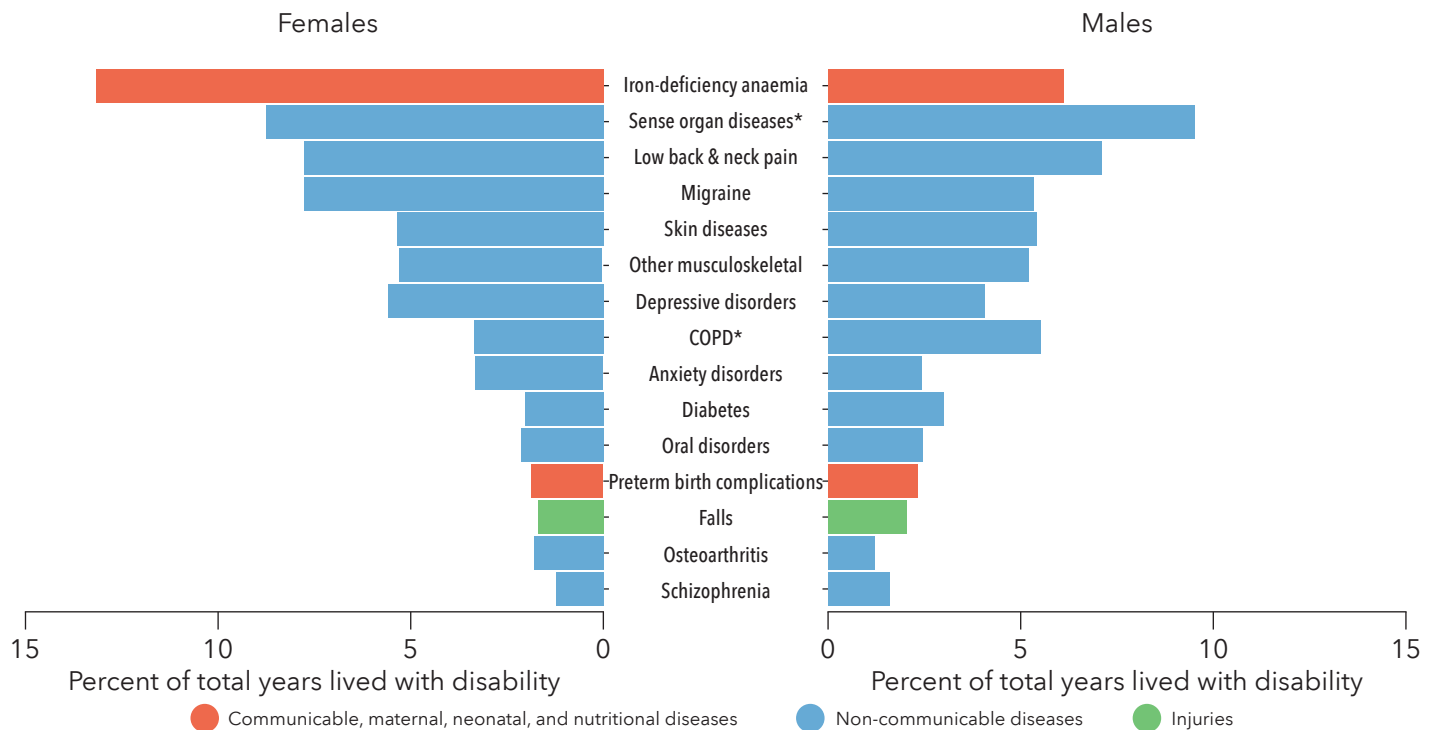
\*LRI is lower respiratory infections.  
 †NTDs are neglected tropical diseases.  
 ‡Urog is urogenital diseases.  
 †Endo is endocrine diseases.

**Proportion of total disease burden from:**  
 Premature death: 64.7% | Disability or morbidity: 35.3%

**What caused the most years of life lost, by sex, in 2016?**  
 Top 15 causes of YLLs, ranked by percent for both sexes combined, 2016



**What caused the most years lived with disability, by sex, in 2016?**  
 Top 15 causes of YLDs, ranked by percent for both sexes combined, 2016

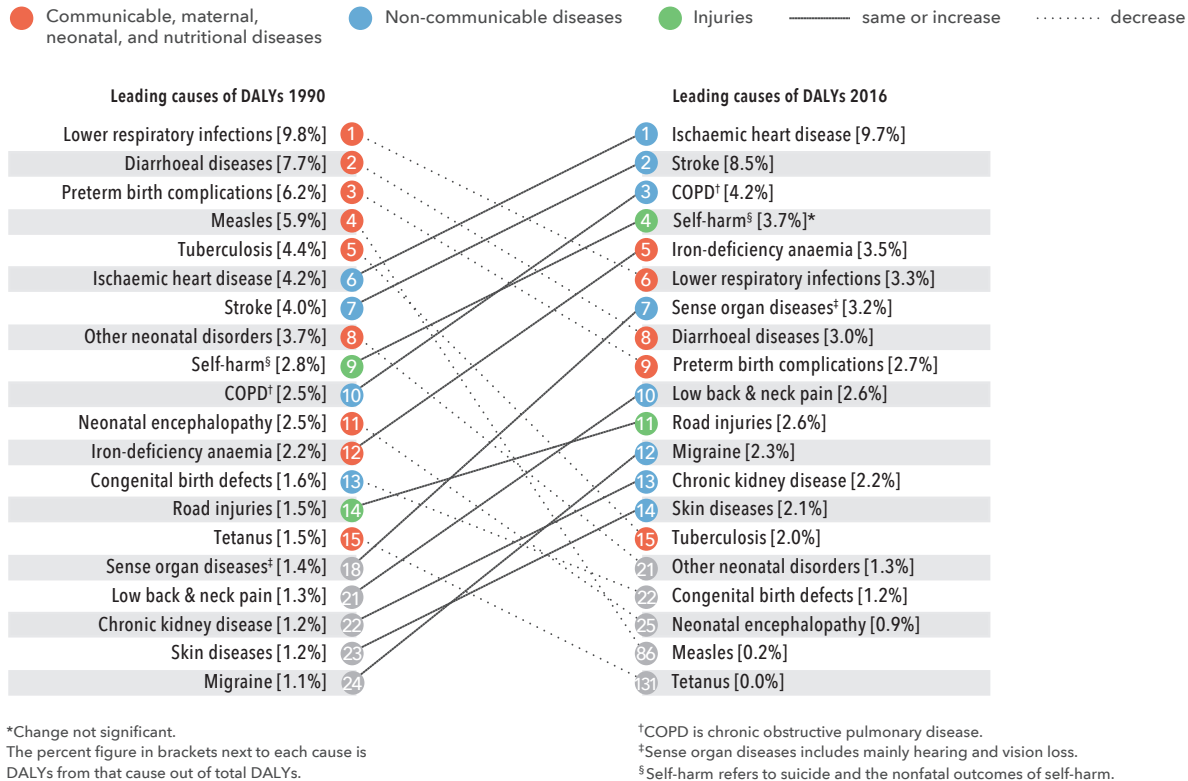


\*COPD is chronic obstructive pulmonary disease.  
 \*Sense organ diseases includes mainly hearing and vision loss.

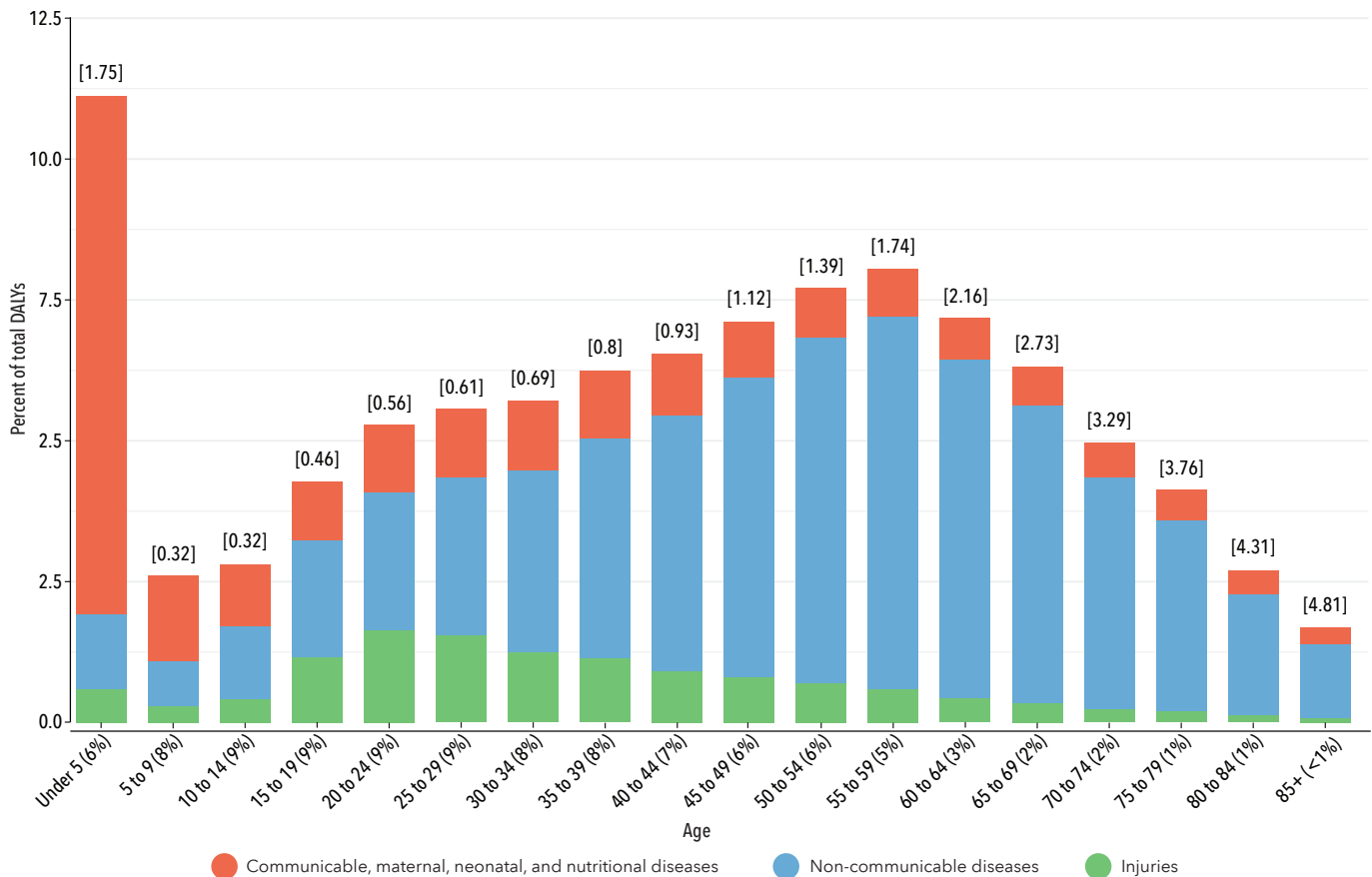


## Proportion of total disease burden from: CMNNDs: 24.8% | NCDs: 62.7% | Injuries: 12.6%

How have the leading causes of death and disability combined changed from 1990 to 2016?  
Change in top 15 causes of DALYs, both sexes, ranked by number of DALYs, 1990-2016

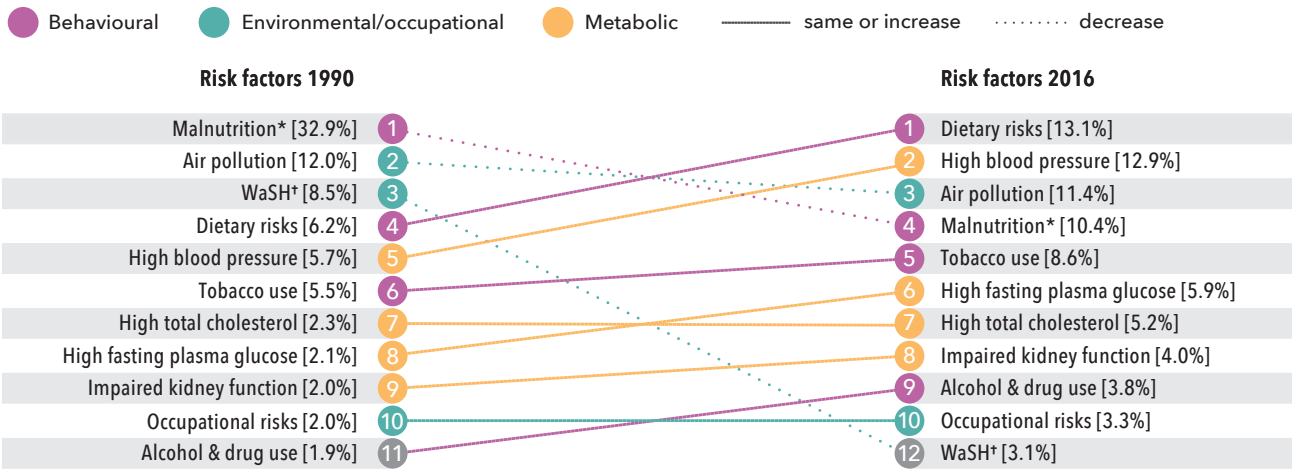


## What caused the most death and disability combined across age groups in 2016? Percent of DALYs by age group, both sexes, 2016



### What risk factors are driving the most death and disability combined?

Contribution of top 10 risks to DALYs number, both sexes, ranked by number of DALYs, 1990-2016

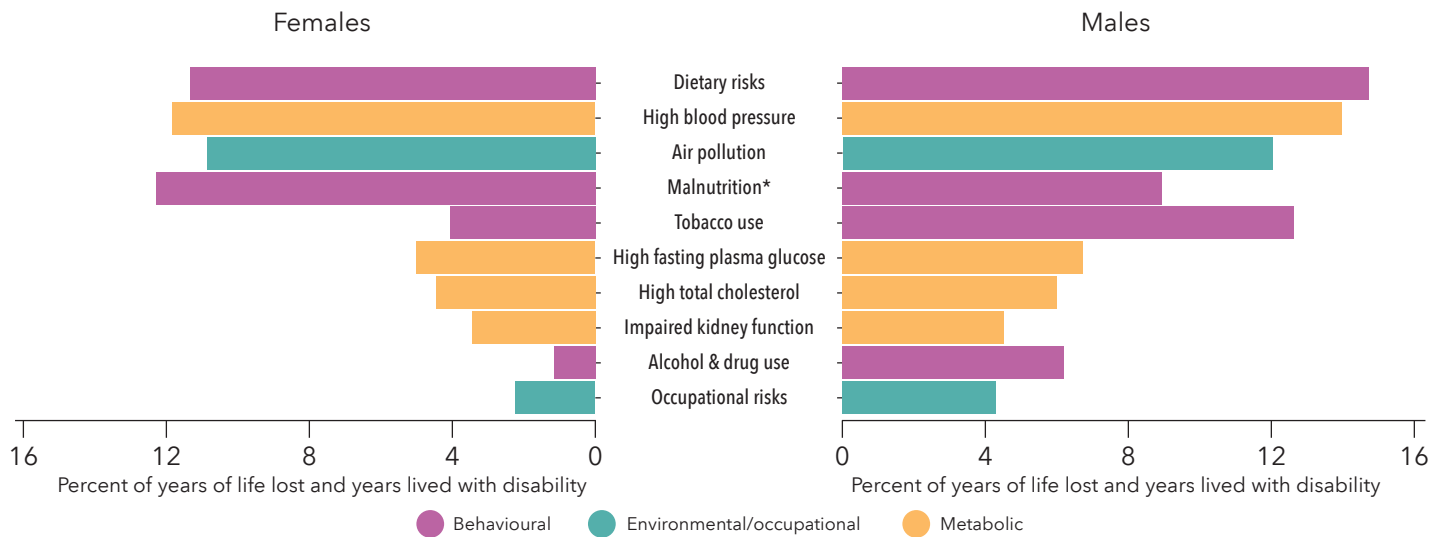


The percent figure in bracket next to each risk is DALYs from that risk out of total DALYs.

\*Malnutrition is child and maternal malnutrition.  
†WaSH is unsafe water, sanitation, and handwashing.

### How did the risk factors differ by sex in 2016?

Percent of total DALYs attributable to top 10 risks, ranked by percent for both sexes combined, 2016



\*Malnutrition is child and maternal malnutrition.

## Policy implications of the findings

India has been able to achieve a 36% reduction in per capita disease burden from 1990 to 2016, measured as DALY rate per person after adjusting for the changes in age structure during this period. However, there was an almost two-fold range of per capita disease burden across the states of India in 2016, adjusting for differences in age structure between the states, with Kerala and Goa having the lowest rates and Assam, Uttar Pradesh, and Chhattisgarh having the highest rates. India's age-standardised DALY rate was 72% higher and Kerala's was 12% higher than in either Sri Lanka or China in GBD 2016. These findings highlight major inequalities in disease burden across the states of India, and that neighbouring Sri Lanka, with population 21 million, as well as China, with population 1.4 billion, have been able to achieve a much lower disease burden level than India.

In 2016, 55% of the total disease burden in India was caused by NCDs, 33% by CMNNDs, and 12% by injuries. The burden of CMNNDs has decreased and that of NCDs increased across all states in India from 1990 to 2016. However, there are wide variations between the states, with the contribution of NCDs to the total disease burden ranging from 48% to 75%, CMNNDs ranging from 14% to 43%, and injuries ranging from 9% to 14% across the states in 2016. Even with a decreasing burden of CMNNDs, it is important to note that for diarrhoeal diseases, iron-deficiency anaemia, and tuberculosis, the DALY rates are higher than would be expected in most states for their development level (Socio-demographic Index). The per capita health loss from the individual diseases varies widely between states, with a range of over five-fold for five of the 10 leading individual causes, i.e., ischaemic heart disease, diarrhoeal diseases, lower respiratory infections, stroke, and tuberculosis.

The striking health status and disease inequalities between the states of India documented in this report are driven by variations in the exposure to major risk factors as well as broader development factors. The key to reducing these inequalities, and thereby the overall disease burden in India, is to successfully address these risks and determinants in each state of the country in accordance with their magnitude and trajectory. The findings presented in this report provide a useful reference for the distribution of diseases and risk factors in each state of the country, which can be an important aid in the data-driven and decentralised health planning recommended by two important recent policy documents in India, the NITI Aayog Action Agenda 2017–2020 and the National Health Policy 2017.

The following major policy-relevant issues arise from the findings presented in this report. These include issues related to specific risks and disease conditions, as well as broader cross-cutting policy action required to reduce health inequalities between the states. The following sections highlight key issues but are not comprehensive descriptions of each issue. The latter would be more suitable for detailed topic-specific reports and publications that will be produced subsequently.

### Addressing the major risk factors

#### Child and maternal malnutrition

The very high burden of child and maternal malnutrition in many states of India should be considered an emergency situation, as this is not com-

mensurate with India's aspirations for further rapid social and economic progress. Besides causing considerable disease burden, malnutrition blunts intellectual growth in children, thereby robbing the country of its future brain power. Several major nutritional enhancement programmes have been in place in India for a long time. These include the Integrated Child Development Services since 1975 and the Mid Day Meal Scheme for schoolchildren since 1995. The National Food Security Act was enacted in 2013 for nutritional security of the population. The fact that child and maternal malnutrition continues to be the single largest risk factor for health loss in India in 2016 points to the need for drastic and rapid action on this front. Several EAG states and Assam face the highest burden due to child and maternal malnutrition. There is a seven-fold range in the per capita DALYs due to child and maternal malnutrition among the states of India, highlighting the huge variations across the country. For India as a whole, the per capita disease burden due to child and maternal malnutrition is a striking 12 times higher than in China. Interestingly, even the lowest per capita burden in the Indian state of Kerala is 2.7 times higher than in China and 1.7 times higher than in Sri Lanka.

### **Unsafe water and sanitation**

The disease burden from unsafe water and sanitation dropped from 13% of the total burden in 1990 to 5% of the total in 2016, but this too is unacceptably high. The EAG states and Assam again have the highest disease burden from this risk factor. The Swachh Bharat Abhiyan, launched in India in 2014 with very large investments, could improve this situation. Combining infrastructure development to address this risk with behaviour change would increase the likelihood of benefits, and close monitoring of the impact of the Swachh Bharat Abhiyan versus the disease burden trends in each state over the next few years would enable increasing efforts where they are most needed. Again, for reference the per capita disease burden due to unsafe water and sanitation in India is a massive 40 times higher than in China and 12 times higher than in Sri Lanka. Within India there is a wide variation as well, with the per capita burden ranging 12-fold across the states. The lowest burden is in Goa, although it is seven times higher than in China as a whole, suggesting that huge improvements should be possible across the states of India.

### **Air pollution**

People living in India have one of the highest levels of exposure to air pollution globally. Progress has been made in India in reducing household air pollution from solid fuels, yet this remains a significant problem, particularly in the EAG states and Assam. Continuing efforts to reduce the use of solid fuels, as is being done through the Pradhan Mantri Ujjwala Yojna to enhance access to cooking gas for the poor, will be needed for some time to come. Outdoor air pollution, on the other hand, has increased across all of India. Concerted efforts are needed to curb the sources of this pollution, including power production, industry, vehicles, construction, and open burning. These efforts are needed across all states through strategic long-term planning involving the relevant sectors. Several EAG states have quite high levels of both household and outdoor air pollution, and a corresponding high burden of chronic obstructive pulmonary disease as well. Controlling air pollution has to be one of the highest priorities for improving the health of India's population that would impact generations to come. Improved and more detailed monitoring of the ambient air pollution levels would be important in monitoring progress.

## Risk factors for cardiovascular disease and diabetes

Unhealthy diet, high blood pressure, high blood sugar, high cholesterol, and overweight together contribute about a quarter of the total disease burden in India presently, as compared with a little over a tenth of the total disease burden in 1990. This phenomenal increase is responsible for the increasing dominance of NCDs in every state of the country, particularly ischaemic heart disease, stroke, and diabetes, though to a variable extent. All of these risks are already very high in Punjab and Tamil Nadu, and most of these risks are high in Kerala, Andhra Pradesh, and Karnataka. The per capita burden of ischaemic heart disease and diabetes is relatively lower in the EAG and North-East states than in the Other states group at present, but the per capita burden of stroke is a mixed situation, with some of these states having a high burden. In any case, the increasing trajectory of these risks across all states of India is ominous. If effective interventions to blunt this trajectory are not taken quickly, the EAG states in particular will be faced with relatively high burden from communicable and childhood disease on the one hand due to a continuing momentum, and from these non-communicable diseases on the other hand due to increasing risk exposure. Tobacco use is also a major risk factor for cardiovascular disease, causing 6% of the total disease burden in India in 2016. Policy action commensurate with a potential explosion of ischaemic heart disease, diabetes, and stroke is needed without delay across all states of the country.

## Addressing persistent and increasing disease conditions

### Under-5 disease burden

The under-5-year age group in India presently suffers 18% of the total disease burden across all ages, measured as DALYs. This proportion is even higher in the EAG states group (23%), which is over two times the contribution of this age group to the total population, indicating the unreasonably high disease burden in this age group. Deaths and ill-health in neonates in the first month of life make up about half of the total under-5 disease burden in India. In comparison, both the neonatal death rate and the under-5 death rate in India are about five times higher than in Sri Lanka. There is wide variation among the Indian states as well, with the under-5 mortality rate ranging four-fold between the highest in Assam and Uttar Pradesh versus the lowest in Kerala. Reduction in the under-5 disease burden in India has to be unambiguously one of the highest health priorities through focused action in each state, especially those where this continues to be high.

### Tuberculosis

India has an exceptionally high burden of tuberculosis, contributing the largest number of new cases annually of any country in the world. For almost all states of India, the burden of tuberculosis is much higher than the average burden for the similar socio-demographic level globally. The range of per capita disease burden due to tuberculosis among the states of India is nine-fold. The state with the lowest burden, Kerala, has twice the per capita burden as Sri Lanka and China, and India as a whole has about 10 times the per capita burden from tuberculosis as either of these two countries. A National Strategic Plan for Tuberculosis Elimination has been announced recently by the Revised National Control Programme of India. Effective implementation and assessing progress against evolving tuberculosis burden trends are needed to curtail the continuing very high suffering from this disease across India.

## Other communicable diseases

Several other communicable diseases have reduction targets mentioned in the National Health Policy 2017 and the NITI Aayog Action Agenda 2017–2020, which include HIV/AIDS, malaria, kala azar (visceral leishmaniasis), leprosy, and lymphatic filariasis. Estimates for each of these are produced by the India State-level Disease Burden Initiative for 1990 to 2016. These are available in an online open-access visualisation tool at [vizhub.healthdata.org/gbd-compare/india](http://vizhub.healthdata.org/gbd-compare/india). Estimates of these diseases over the next few years in each state would help monitor the progress in reducing their burden.

## Other non-communicable diseases

Besides cardiovascular disease and diabetes, referred to above, the other major NCDs that need particular attention are chronic respiratory disorders, mental health disorders, and cancers. The relative contribution of all of these conditions to the disease burden in India has increased substantially since 1990. This increase has occurred across all three state groups but varies considerably between the states. Each of these groups of conditions requires systematic and large-scale interventions to be put in place, which are currently far from adequate in most states of India. Specific estimates for these diseases and their risk factors, which are provided for each state in this report and the open-access online visualisation tool, can be useful in planning for their control.

## Injuries

The control of injuries has not been a high priority in India. The incidence of road injuries has increased by about half since 1990 in India, leading to its higher ranking in the contribution to disease burden. The relative contribution of road injuries to the disease burden has increased across all three groups of states. The contribution of suicide to the disease burden in India has also gone up in the ranking during this period. There is a six-fold variation between the states in the DALY rate from self-harm, and for India as a whole this rate is about two times higher than the global level for a similar level of sociodemographic development. Reduction in the burden due to both road injuries and suicide requires effective multi-sectoral interventions that need to be developed in each state of the country. The state-specific estimates for these and other injuries could be used for planning their control and monitoring progress over time.

## Inter-sectoral collaborations

A major issue with interventions to improve population health in India has been the relative deficiency of the necessary inter-sectoral collaborations. Most of the leading risk factors contributing to the disease burden in India can be addressed fully only through inter-sectoral collaborations. For example, child and maternal malnutrition has to be dealt with through linkages between a number of efforts being made by the Ministry of Women and Child Development, Ministry of Consumer Affairs, Food, and Public Distribution, Ministry of Agriculture and Farmers Welfare, Ministry of Health and Family Welfare, as well as a variety of non-governmental players. Similarly, air pollution can be effectively dealt with only if the efforts of the Ministry of Environment, Forest and Climate Change, Ministry of Power, Ministry of New and Renewable Energy, Ministry of Road Transport and Highways, Ministry of Housing and Urban Affairs, Ministry of Health and Family Welfare, and a variety of non-governmental partners come together. The group of risk factors that influence the increasing burden of cardiovascular disease and diabetes have to be dealt with through collaborative efforts between the Ministry of Health and Family Welfare, Ministry of Consumer

Affairs, Food, and Public Distribution, Ministry of Agriculture and Farmers Welfare, Ministry of Housing and Urban Affairs, and a range of non-governmental partners.

Besides the sectors noted above, several others impact health as well. These include education, working conditions, and social protection. Improved understanding of the influence of the variety of sectors on health would help achieve better population health levels in India. Given the social, cultural, and economic diversity between the states of India, these linkages should ideally be understood and addressed in the context of each state. These broader determinants would also have to be taken into account when the findings of the State-level Disease Burden Initiative are utilised in attempts to improve population health in each state.

### **Universal coverage and health assurance**

The National Health Policy 2017 and the NITI Aayog Action Agenda 2017–2020 have emphasised that India must achieve universal health coverage and assure health care for all. Achievement of this highly desirable goal requires a variety of actions articulated in these two policy documents. Of these, the following two major cross-cutting actions could be informed by the state-level findings presented in this report.

#### **Increasing health financing**

The National Health Policy has recommended increasing public spending on health in the states to more than 8% of the state government budget by 2020. Health is a state subject in India, and states contribute a larger proportion of the public spending on health than the centre. The aspiration of increasing state spending on health is a good investment in human capital. The magnitude of health spending and how this is utilised could benefit from the specific disease burden and risk profile of each state. For example, the annual Project Implementation Plan of each state could be informed by the findings presented in this report.

#### **Improving human resources for health**

Suitable human resources for addressing the evolving disease burden through more emphasis on public and preventive health, and through improved linkages between the primary and higher care levels, have been emphasised in the above two 2017 policy documents of the government. Within this broader goal, titration of a suitable balance between the various types and levels of health personnel can be informed by the specific disease and risk factors profile of each state.

## Strengthening the health information system

### Better cause of death data

Of the total disease burden in India in 2016, two-thirds was due to premature death and one-third due to disability. A robust cause of death reporting system is needed for disease burden estimates. Only 22% of the deaths in India in 2015 had their cause reported in the Medical Certification of Cause of Death (MCCD) system, overseen by the Office of the Registrar General of India, the majority of which were from urban public sector hospitals. This proportion varies widely between the states. The Sample Registration System (SRS) has been providing cause of death data from representative samples of the population in each state, using the verbal autopsy approach in which the cause of death is inferred from information obtained from someone close to the deceased. Verbal autopsy in general can provide reasonable cause of death distribution data at the population level. The cause of death data from the last SRS sampling cycle, 2004–2013, were provided by the Office of the Registrar General of India for utilisation in the State-level Disease Burden Initiative. This has made the disease burden estimates in this report stronger. However, it is essential to improve the scope of the MCCD system to cover the majority of deaths in India in the long run. The SRS was introduced in India some four decades ago as an interim arrangement until the Civil Registration and Vital Statistics (CRVS) system covering birth and death registration as well as medically certified causes of death got more established. While the SRS continues to provide quite useful data from a representative sample of about 0.7% of the country's population, it should not be considered a substitute for a fully functional CRVS system. India needs to effectively plan and invest to make the CRVS system much stronger in all states of the country, including good-quality cause of death data for the majority of deaths, as a very high priority.

### Improved surveillance

Disease surveillance is the cornerstone of tracking evolution of the trends of disease conditions and risk factors in populations. It is needed to monitor established diseases as well as emerging diseases and risk factors. An adequate health system response to both acute and chronic diseases is generally not possible without an adequate disease surveillance system including disease registries. Disease surveillance has typically been weak in India. Exceptions in recent times include polio and HIV, and cancer registries have provided crucial data from parts of the country. The Integrated Disease Surveillance Programme was started in India over a decade ago with much hope, but it did not reach the level of functioning needed to significantly uplift disease surveillance systematically across India. The importance of disease surveillance has been reiterated in both the National Health Policy 2017 and the NITI Action Agenda 2017–2020. What is needed as one of the highest priorities in health in India currently is development of a scientifically sound surveillance system covering all disease conditions and risk factors of interest, as well as a practically feasible implementation plan backed by financial and human resources. The success of this seems likely only if planning for this is done for every state of the country, taking into account the specific disease and risk factor profile and context of each state. The findings of the India State-level Disease Burden Initiative could be a useful guide for such planning.



## Other

Another important aspect of the health information system that needs significant improvement in India is better documentation in health facility records and utilisation of these data to understand health outcomes. This requires enhancement of information technology infrastructure across all states of India for more systematic documentation of health services provision, as well as corresponding training of health personnel, both in the public and private sectors. The data gaps related to disease sequelae and outcomes identified through the work of the India State-level Disease Burden Initiative could inform enhancement of this aspect of the health information system of India.



## Conclusion

The India State-level Disease Burden Initiative findings in this report are the most detailed mapping of the magnitude, age and sex distribution, and trends since 1990 for the whole range of diseases and risk factors in every state of the country. These findings are based on all available data obtained through extensive efforts of a large network of collaborators, and use of the standardised methods of the Global Burden of Disease study that enable comparisons across diseases, risk factors, age, sex, time, and geographies.

Although variations in diseases and risk factors have been anticipated between the states of India, this is the first time that a comprehensive compilation of all estimates in a single standardised framework has been made possible for every state in India. Besides presenting the findings in this report, the technical details are presented in a scientific paper published in the journal *The Lancet*, and visual graphics of the findings are available in an online open-access interactive visualisation tool at [vizhub.healthdata.org/gbd-compare/india](http://vizhub.healthdata.org/gbd-compare/india). All three outputs – the report, the technical paper, and the visualization tool – are being released on the same day in November 2017. Together, these outputs provide a valuable resource for policymakers, health managers, academics, health providers, agencies supporting health, other stakeholders, and the public at large to understand the heterogeneity of disease burden and risk factors across the states of India, which can be utilised in a variety of ways in the effort to improve the health of people living in each state and union territory of the country.

The major areas in which policy utilisation of the India State-level Disease Burden Initiative findings could be useful include planning of state health budgets, prioritisation of interventions relevant to each state, informing the government's Health Assurance Mission in each state, monitoring of health-related Sustainable Development Goals targets in each state, assessing impact of large-scale interventions based on time trends of disease burden, and forecasting population health under various scenarios in each state. The 1990 to 2016 state-level disease burden findings, and the subsequent annual updates in the trends by the India State-level Disease Burden Initiative, as well as availability of more disaggregated findings such as rural-urban estimates planned for next year, can be crucial contributors to the data-driven and decentralised health planning and monitoring recommended by the National Health Policy 2017 and the NITI Aayog Action Agenda 2017–2020. The availability of detailed and comprehensive estimates for disease burden and risk factors for every state of the country is a major advancement which would enable the planning of specific action needed to reduce health inequalities and inequities between the states, as well as between the sexes and age-groups within each state.



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Damodar Bachani, Gurugram, India  
Kalpana Balakrishnan, Chennai, India  
Anup Barman, Guwahati, India  
Kalpana Baruah, New Delhi, India  
Ashish Bavdekar, Pune, India  
Shahina Begum, Mumbai, India  
Gufran Beig, Pune, India  
Anil Bhansali, Chandigarh, India  
Deeksha Bhardwaj, Gurugram, India  
Anurag Bhargava, Mangalore, India  
Eesh Bhatia, Lucknow, India  
Kelly Bienhoff, Seattle, USA  
Simon Brooker, Seattle, USA  
Vineet Chadha, Bengaluru, India  
Joy Kumar Chakma, New Delhi, India  
H.K. Chaturvedi, New Delhi, India  
Pankaj Chaturvedi, Mumbai, India  
Arvind Chopra, Pune, India  
D.J. Christopher, Vellore, India  
Lalit Dandona, Gurugram, India  
Rakhi Dandona, Gurugram, India  
Shyamashree Das, New Delhi, India  
Siddharth K. Das, Lucknow, India  
A.P. Dash, Thiruvallur, India  
Puneet Dewan, New Delhi, India  
Sagnik Dey, New Delhi, India  
Subhojit Dey, Gurugram, India  
R.S. Dhaliwal, New Delhi, India  
A.C. Dhariwal, New Delhi, India  
Preet K. Dhillon, Gurugram, India  
Neeraj Dhingra, New Delhi, India  
Rajesh Dikshit, Mumbai, India  
Eliza Dutta, Gurugram, India  
Christina Fitzmaurice, Seattle, USA  
Melissa Furtado, Gurugram, India  
Emmanuela Gakidou, Seattle, USA  
P. Gangadharan, Cochin, India  
Parthasarathi Ganguly, Gandhinagar, India  
Peter Gething, Oxford, UK  
Alakendu Ghosh, Kolkata, India  
Raj S. Ghosh, New Delhi, India  
Aloke G. Ghoshal, Kolkata, India  
Scott Glenn, Seattle, USA  
Saurabh Goel, New Delhi, India  
N. Gopalakrishnan, Chennai, India  
Randeep Guleria, New Delhi, India  
Prakash C. Gupta, Mumbai, India  
Rajeev Gupta, Jaipur, India  
R.K. Das Gupta, New Delhi, India  
Subodh S. Gupta, Wardha, India  
Tarun Gupta, Kanpur, India  
M.D. Gupte, Pune, India  
G. Gururaj, Bengaluru, India  
S. Harikrishnan, Trivandrum, India  
N.K. Hase, Mumbai, India  
Simon I. Hay, Seattle, USA  
Manoranjan Hota, New Delhi, India  
Harish Iyer, New Delhi, India  
Veena Iyer, Gandhinagar, India  
Saurabh Jain, New Delhi, India  
Sudhir K. Jain, New Delhi, India  
P. Jambulingam, Puducherry, India  
K.S. James, New Delhi, India  
M.S. Jawahar, Chennai, India  
P. Jeemon, Trivandrum, India  
Jacob Jose, Vellore, India  
P.L. Joshi, New Delhi, India  
Tushar K. Joshi, New Delhi, India  
Vasna Joshua, Chennai, India  
Atul Juneja, New Delhi, India  
Ravi Kannan, Silchar, India  
Lalit Kant, New Delhi, India  
Rajni Kant, New Delhi, India  
Umesh Kapil, New Delhi, India  
Anita Kar, Pune, India  
Chittaranjan Kar, Cuttack, India  
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Amal C. Katak, Guwahati, India  
Kiran Katoch, Agra, India  
Tanvir Kaur, New Delhi, India  
Tripti Khanna, New Delhi, India  
Sunil D. Khaparde, New Delhi, India  
Pradeep Khasnobis, New Delhi, India  
Ajay Khera, New Delhi, India  
Sanjay Kinra, London, UK  
Parvaiz A. Koul, Srinagar, India  
Anand Krishnan, New Delhi, India  
Anil Kumar, New Delhi, India  
Avdhesh Kumar, New Delhi, India  
G. Anil Kumar, Gurugram, India  
Raman K. Kumar, Cochin, India  
Rashmi Kumar, Lucknow, India  
R. Vijai Kumar, Hyderabad, India  
Sanjiv Kumar, New Delhi, India  
Sathish Kumar, Bengaluru, India

Sunil Kumar, Ahmedabad, India  
 Anura V. Kurpad, Bengaluru, India  
 Hmwe H. Kyu, Seattle, USA  
 Laishram Ladusingh, Mumbai, India  
 Shiv Lal, New Delhi, India  
 Avula Laxmaiah, Hyderabad, India  
 Stephen S. Lim, Seattle, USA  
 Derek Lobo, Manipal, India  
 Rakesh Lodha, New Delhi, India  
 Thingnganing Longvah, Hyderabad, India  
 Jayaram Madala, Hyderabad, India  
 P.A. Mahesh, Mysore, India  
 Rajesh Malhotra, New Delhi, India  
 Matthews Mathai, Liverpool, UK  
 Ashish J. Mathew, Vellore, India  
 Joseph L. Mathew, Chandigarh, India  
 Manu R. Mathur, Gurugram, India  
 Prashant Mathur, Bengaluru, India  
 Dileep Mavalankar, Gandhinagar, India  
 Sanjay Mehendale, New Delhi, India  
 Ravi Mehrotra, Noida, India  
 Geetha R. Menon, New Delhi, India  
 Ahmed J. Mohamed, New Delhi, India  
 B.V. Murali Mohan, Bengaluru, India  
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 Viswanathan Mohan, Chennai, India  
 Ajit Mukherjee, New Delhi, India  
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 Nitish Naik, New Delhi, India  
 Sanjeev Nair, Trivandrum, India  
 Saritha Nair, New Delhi, India  
 Sreenivas A. Nair, New Delhi, India  
 Lipika Nanda, Bhubaneswar, India  
 A. Nandakumar, Bengaluru, India  
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 Arvind Pandey, New Delhi, India  
 Rajendra Pandey, Kolkata, India  
 Jeyaraj D. Pandian, Ludhiana, India  
 Sapan Pandya, Ahmedabad, India  
 Sreejith Parameswaran, Puducherry, India  
 Vikram Patel, Gurugram, India  
 Sanghamitra Pati, Bhubaneswar, India  
 Vinod K. Paul, New Delhi, India  
 C. Ponnuraja, Chennai, India  
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 Manorama Purwar, Nagpur, India  
 Kirankumar Rade, New Delhi, India  
 Manju Rahi, New Delhi, India  
 Asma Rahim, Kozhikode, India  
 Neena Raina, New Delhi, India  
 Sreebhusan Raju, Hyderabad, India  
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