Federal Institute for
Research on Building,
Urban Affairs and
Spatial Development

within the Federal Office for
Building and Regional Planning

India, Germany and Europe
A Spatial Perspective at SDG 3 on Good Health and Well-Being

Responding to crucial challenges in urban and rural development the United Nations decided on the New Urban Agenda and on the 2030 Agenda and the Sustainable Development Goals (SDGs). This publication checks the progress made in implementing the New Urban Agenda against the SDGs and vice versa. In order to understand the spatial patterns, a national and supranational spatial perspective is taken on some of the SDGs. Given the significance of good health and well-being – particularly with regard to pandemics – SDG 3 thus covers:

- Life expectancy at birth and teenage parenthood
- Medical practitioners and hospital beds
- Infant and toddler mortality

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Joint foreword

Dear Reader,

the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) and the National Institute of Urban Affairs (NIUA) signed in 2018 a Joint Declaration of Intent to cooperate on different aspects of evidence-based research and expert positioning as well as policy advice. Several expert workshops and a series of joint presentations at the United Nations World Urban Forums 2018 and 2020 have led to a better understanding of our common challenges and to better knowledge of possible solutions.

A first joint publication of BBSR and NIUA (BBSR-Analysen KOMPAKT 06/2019) was dedicated to spatial structures and trends in India, Germany and Europe. The analysis focused on population development and migration, urbanization and suburbanization as well as land-use for new settlements. The positive resonance by readers encouraged us to continue our joint analytical work.

The United Nations remind us with their revised World Urbanization Prospects of 2018 of the urbanization changes affecting all countries worldwide. In that respect, our joint work and expert exchange are a part of the bilateral urbanization partnership between the responsible ministries in India and Germany.

In the framework of our cooperation, we develop and deepen a comparable picture of the spatial structures and trends in our countries and continents. In doing so, we try to find and further strengthen a common data-oriented language that is based on national and supranational data sources and may contribute to making global data sets compatible.

Our joint efforts are guided by the thematic priorities defined in the New Urban Agenda of the United Nations and its references to the Sustainable Development Goals (SDGs) – this publication focuses on SDG 3 on Good Health and Well-Being.

We wish you a stimulating reading.

Dr. Markus Eltges
Director of the Federal Institute for Research on Building,
Urban Affairs and Spatial Development

Hitesh Vaidya
Director of the National Institute of Urban Affairs

Introduction

BBSR and NIUA continue with this publication on the Sustainable Development Goal 3 in India, Germany and Europe as well as the accompanying publications on SDG 4 and SDG 11 their efforts in identifying and applying a comparable approach to reporting on urban and rural development. In doing so, a look at SDG 3 is of particular interest for umbrella organisations of cities and communities with regard to health services close to the places where people live (Elsaeßer et al. 2020). This also goes for ongoing or upcoming EU Trio Presidencies, e.g. the one of Germany, Portugal and Slovenia in 2020-2021. The publication describes the findings in texts and maps in the same way as it discusses similarities and dissimilarities from national and supranational perspectives – all within the limits of available and comparable data sources.

The United Nations set a new policy framework for urban and rural development with the 2030 Agenda and the Sustainable Development Goals (SDGs) in 2015 and the New Urban Agenda in 2016. Their revised World Urbanization Prospects (UN DESA 2018) provide updated estimates and projections of the urban and rural population for all countries of the world as well as their major urban agglomerations.

Reporting on the implementation of the New Urban Agenda will start in 2022. UN-Habitat, the housing and settlement programme of the United Nations, is expected to provide evidence-based and data-oriented reports – so called Quadrennial Reports – every four years from that year on. Member States of the United Nations are invited to report on the national and sub-national implementation by 2021. This publication contributes to these reporting mechanisms.

As cross-references between the New Urban Agenda and the 2030 Agenda are evident, the SDGs and their underlying indicators constitute the analytical pattern of the publication. Considering the availability of data sources at national and supranational level, it covers with regard to SDG 3 (Good Health and Well-Being) the following selected sub-goals (the figures in brackets refer to the numbering of the Global Indicator Framework adopted by the General Assembly of the United Nations):

- Life expectancy at birth (SDG 3.4.2)
- Teenage parenthood (SDG 3.7.1)
- Medical practitioners (SDG 3.8.2)
- Hospital beds (SDG 3.8.2)
- Infant mortality (SDG 3.8.2)
- Toddler mortality (SDG 3.8.2)

Life expectancy at birth is a summary indicator of overall health and well-being in a country. It not only indicates the improving health status but it also determines the socio-economic and demographic progress that a country has achieved. Poor health care, excess child mortality, maternal mortality (as of teenage motherhood), accidental and premature deaths retard life expectancy. These indicators vary across geographies. Life expectancy at birth is assessed by its geographical variations. On smaller geographical scales, motilities and choices of the residential location of population groups by age, gender and status affect the life expectancy at birth of the respective local and regional population.

Progress in health positively influences several aspects of development in a country. Ongoing improvements in the life expectancy at birth ascertain significant progress towards health care in any country. The development in the respective health system is validated by improving health-related indicators, such as institutional deliveries, infant and child mortality rates, full immunisation and nutrition. In India, eradicating smallpox, polio and guinea worm are other significant achievements of the health system. SDG 3 also focuses on improving the density and distribution of health workers.

Assessing the distribution of registered medical practitioners is thus required for underscoring. The number of beds in health care facilities is also an integral part of the service infrastructure. The availability of beds in a health care unit represents the level of health care preparedness of the respective facility.

The infant mortality rate is an important demographic and health indicator. It is recognised as an essential tool for identifying inequality in health as well as various development parameters in a country at different levels of disaggregation. Crucial policy documents like the National Population Policy of India (2000), the Millennium Development Goals (2008) and the National Health Policy of India (2017) include targets set on this indicator due to its programmatic relevance. SDG 3 also envisages ending preventable deaths of newborns and children under the age of 5 years by 2030. Statistics in many countries refer to infants rather than newborns. It is important to note that reducing the mortality under the age of 5 years might become unattainable without making significant progress in reducing the infant mortality rate. Thus, in Germany and Europe as in other high-income countries, toddlers face a high expectancy to survive once they have passed the critical first year.

Life expectancy at birth

In India, life expectancy at birth is assessed at district level (Shukla 2019). The estimates are based on 2011 Census data of the country applying an indirect approach as taken by Wilmoth et al. (2011). Life expectancy at birth increased in India from 49.7 years between 1970 and 1975 to 69 years between 2013 and 2017. In the rural areas of India, life expectancy at birth rose from 48.0 years (1970–1975) to 67.8 years (2013–2017) while it grew in urban areas from 58.9 years between 1970 and 1975 to 72.4 years between 2013 and 2017. Between 1970 and 1975, the life expectancy at birth of females was slightly lower (49.0 years) than for males (50.5 years). This trend reversed in four decades. Between 2013 and 2017, the life expectancy at birth of females was reported with 70.4 years and the one of males with 67.8 years respectively. Mortality decline and health gain are not uniform at the various levels of disaggregation leading to a significant heterogeneity in the survival pattern across different regions in India. The range of the life expectancy at birth varies at state level between 65.5 years in Uttar Pradesh and 75.2 years in Kerala.

In Kerala, the urban-rural gap in the life expectancy at birth is almost negligible while is ranges in other states between 1.2 and 7.9 years (2013–2017). The analysis at district level also presents an enormous disparity in the life expectancy at birth over the entire country with areas of a low life expectancy at birth in the central and northern regions of India. In contrast, a higher life expectancy at birth shows up in areas in southern regions of the country, particularly in Kerala, Karnataka and Tamil Nadu. At district level, the life expectancy at birth ranges from the lowest value of 54.4 years in the District of East Kameng in Arunachal Pradesh to the highest value of 75.5 years in the District of Kannur in Kerala. Almost 61 districts of the developed states of India in socio-economic terms achieved in 2011 the goal of 70 years set by the National Health Policy (NHP 2017). This group includes 8 districts in Delhi, 14 in Kerala, 11 in Tamil Nadu, 16 in Karnataka and 6 in Haryana. Around 103 districts in India reached in 2011 a life expectancy at birth within a range from 68 to 70 years arguing for a potential possibility to attaining the NHP goal before 2025.

A possible explanation of the increase in life expectancy at birth in the southern part of India may be attributed to a significant decline in childhood mortality, an increase in health care service provision and higher levels of awareness of reproductive medicine and the rights of children.

Nonetheless, geographical disparities exist and might require comprehensive planning.

Life expectancy at birth in India

500 km
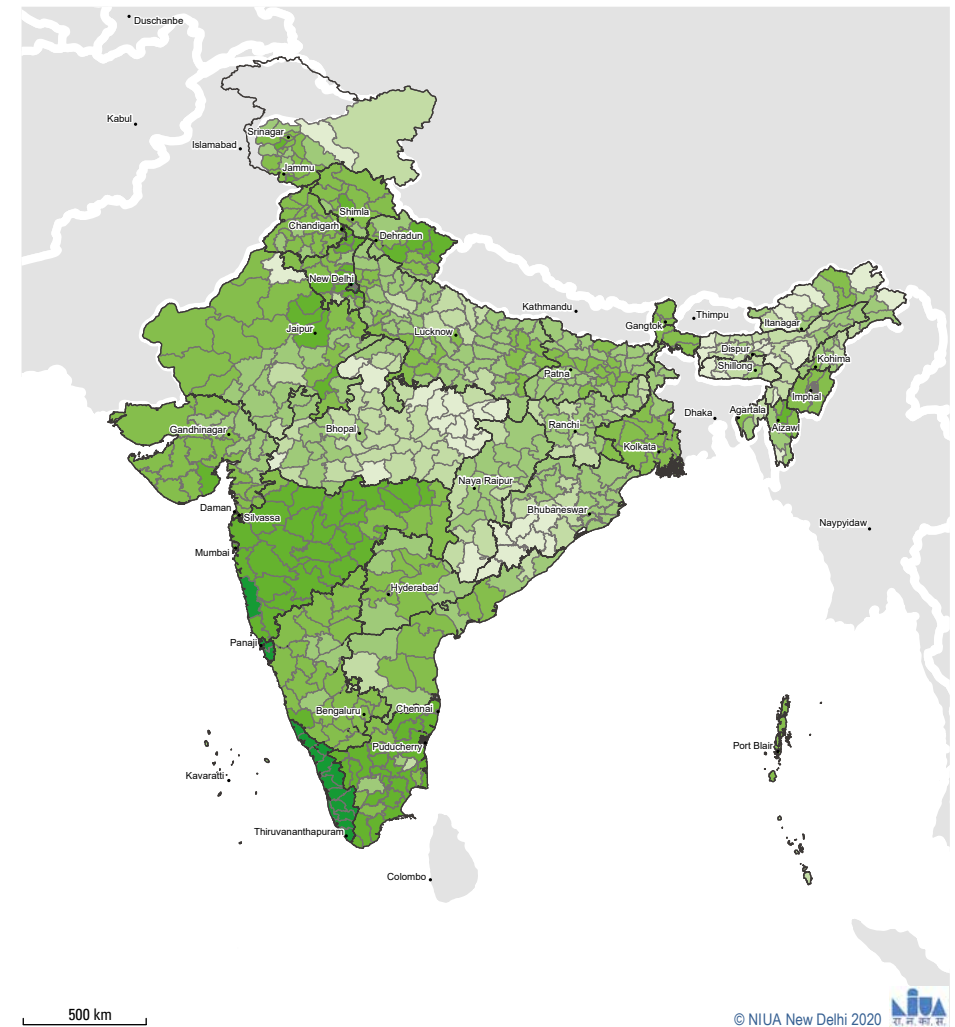
Average life expectancy at birth in years, 2011

- up to below 60
- 60 up to below 63
- 63 up to below 66
- 66 up to below 69
- 69 up to below 72
- 72 and more
- no data

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Data source: Office of the Registrar General & Census Commissioner
Data origin: Population Census of India, 2011
Geometric basis: ESRI data & maps, districts, states, union territories
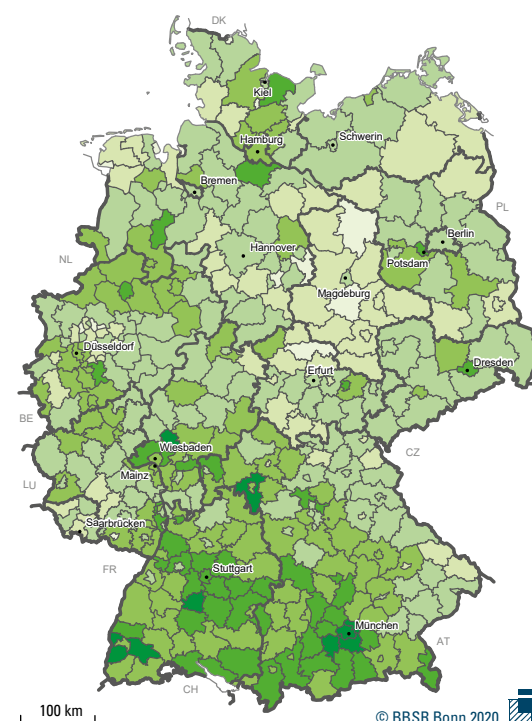Author: NIUA Team

Disclaimer: The information on this map has been created with the highest degree of accuracy possible. However, NIUA cannot be held responsible for errors, omissions or positional accuracy. The depiction of boundaries is not authoritative.

Taking a first glance at the situation in Europe, the difference between East and West is striking. While the average European (EU27-2020) might expect a lifespan of 80.9 years, it is in Spain 83.4 years and in Romania 75.3 years. The European country with the highest life expectancy at birth at 83.7 years is Switzerland. At the regional level, the expectancy of life at birth ranges from 74.3 years in the southeastern part of Bulgaria to 85.1 years in Madrid. Considering Europe as a whole, most of its countries show relatively homogenous regional pictures, a few countries like Spain, Italy, France and Belgium face larger regional differences, the latter in between the parts of the country divided by language.
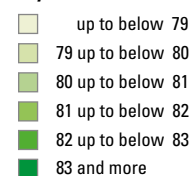
Mortality tables applying the method of Farr (Destatis 2019) as well as annual death and population statistics of the age group of 19 years calculate life expectancy at birth in districts in Germany and provide averages of 3 years. On average, a newborn may expect to turn 80.8 years old. Since 1990, the life expectancy at birth increased annually by 2.5 months; this increase however has slowed down in recent years. Regional differences decrease and count for 5.5 years with the lowest figure (78 years) in some structurally weak regions of Germany and the highest one (83.5 years) in the prosperous southern part of the country. In addition, the gap between female and male life expectancy at birth is almost

disappearing. The effect of the regional level of income, education and the unemployment rate on the regionalised life expectancy at birth is significantly higher than the regional differences in health service supply.

Life expectancy at birth in Germany

Average life expectancy at birth in years, 2017

- up to below 79
- 79 up to below 80
- 80 up to below 81
- 81 up to below 82
- 82 up to below 83
- 83 and more

Data source: Spatial Monitoring System of the BBSR
Data origin: Federal Statistical Offices
Geometric basis: counties (generalised borders), 31.12.2017 © GeoBasis-DE/BKG
Author: A. Milbert

Life expectancy at birth in Europe
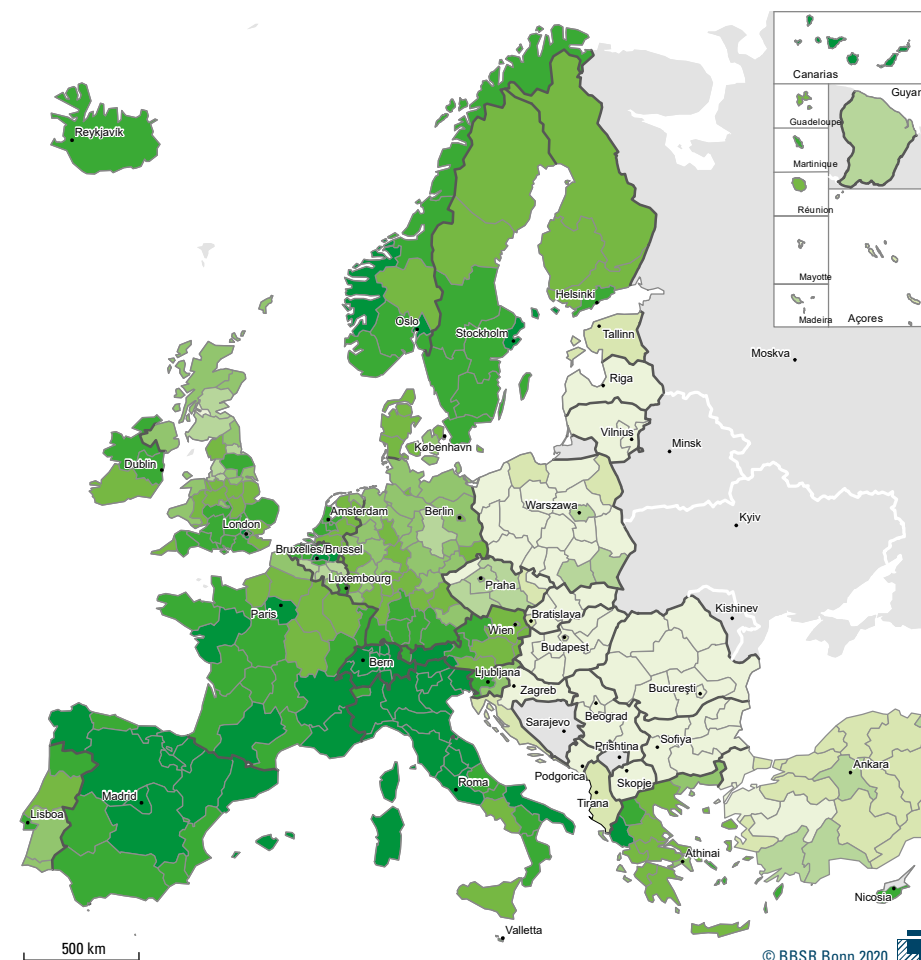
Average life expectancy (up to 1 year) in years, 2017

- up to below 78
- 78 up to below 79
- 79 up to below 80
- 80 up to below 81
- 81 up to below 82
- 82 up to below 83
- 83 and more
- no data

Data source: Spatial Monitoring for Europe
Data origin: Eurostat
Geometric basis: GfK GeoMarketing, NUTS 2 regions
Author: R. Binot

Teenage parenthood

With regard to teenage parenthood, Europe shows a quite varied national and regional picture. The regional mosaic envisages in general a distinct East-West divide with a larger number of girls between the age of 15 to 19 years giving birth in Eastern European countries. The span stretches from 19 out of 1,000 girls in Bulgaria to 1 out of 1,000 girls in the Netherlands. A high number of teenage parenthood may be observed in regions lagging behind in economic terms – independently from a European or national comparative approach. Teenage parenthood is more prominent in the eastern parts of Germany, the northern part of England and in the eastern part of France.

4 out of 1,000 girls aged between 15 and 19 years on average give birth to a child. This number is slowly decreasing despite some irregular development in East Germany. Teenage parenthood used to be less significant in the former German Democratic Republic (GDR) than in the former Federal Republic of Germany (FRG) due to a more liberal legislation on abortion. After reunification, teenage parenthood increased more rapidly in East Germany and reached a level of 8 out of 1,000. This development path reflects the increase in unemployment there. In times of less alternatives on the labour market, young women of lower education tend to substitute a future alternative in education

and employment with motherhood. The gap has been disappearing, as economic upswings are enlarging opportunities in education and employment for young women.

Teenage parenthood in Germany

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Number of births of mothers aged below 20 per 1,000 inhabitants aged 15 to below 20, 2017

- up to below 2
- 2 up to below 3
- 3 up to below 4
- 4 up to below 6
- 6 up to below 8
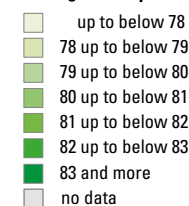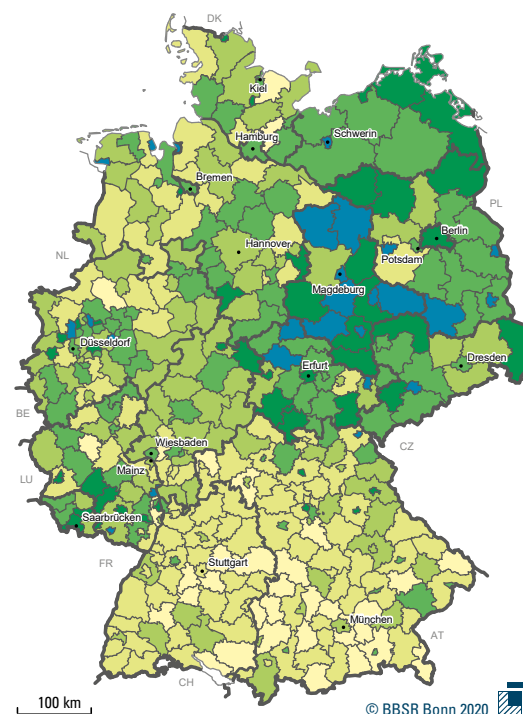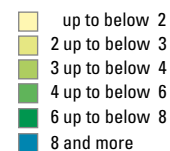- 8 and more

Data source: Spatial Monitoring System of the BBSR
Data origin: Federal Statistical Offices
Geometric basis: counties (generalised borders), 31.12.2017 © GeoBasis-DE/BKG
Author: A. Milbert

Teenage parenthood in Europe
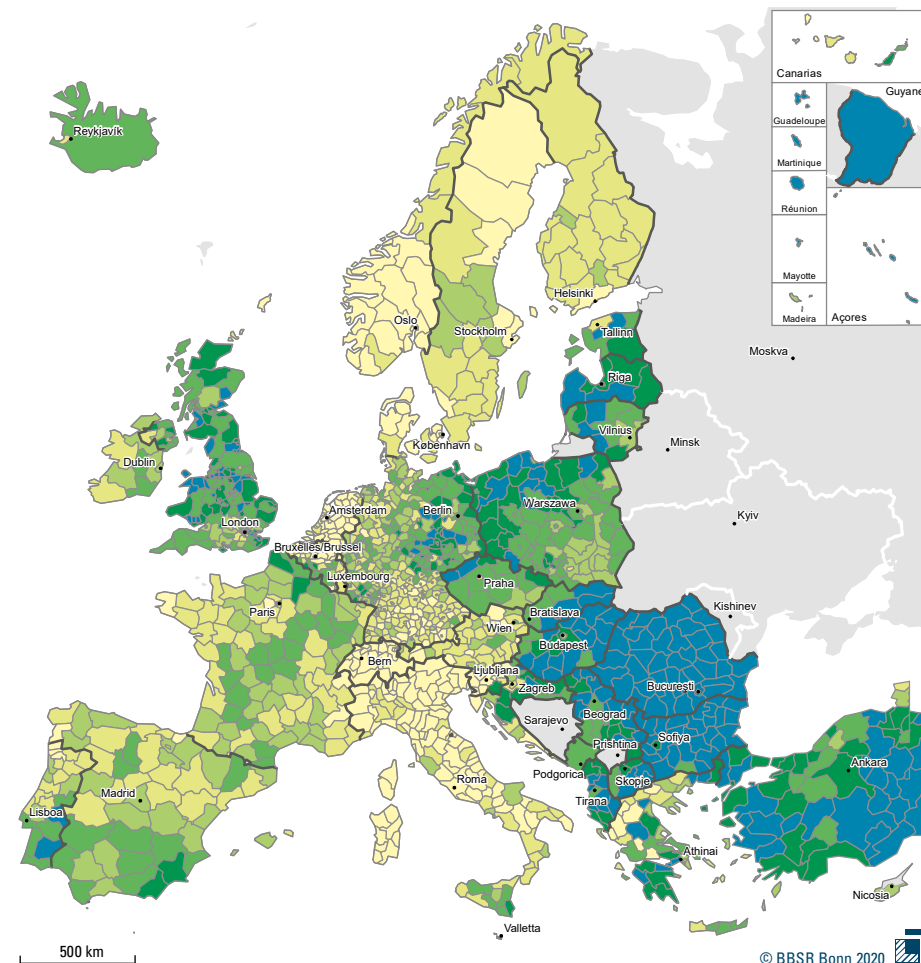
© BBSR Bonn 2020

Number of births of mothers aged below 20 per 1,000 inhabitants aged 15 to below 20, 2017

- up to below 2
- 2 up to below 3
- 3 up to below 4
- 4 up to below 6
- 5 up to below 8
- 8 and more
- no data
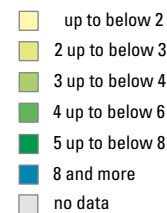
Data source: Spatial Monitoring for Europe
Data origin: Eurostat
Geometric basis: GfK GeoMarketing, NUTS 3 regions
Author: R. Binot

The teenage fertility rate varies distinctively across the states and union territories of India, showing an average rate at national level of 51 births per 1,000 female adolescents aged between 15 and 19 years.

Among all states and union territories, West Bengal registers the highest fertility rate of 99 births per 1,000 female adolescents, followed by Andhra Pradesh (83 births), Tripura (82 births), Jammu & Kashmir (77 births) and Bihar (77 births). These are states where child marriage prevails. States like Kerala show the lowest teenage fertility rate.
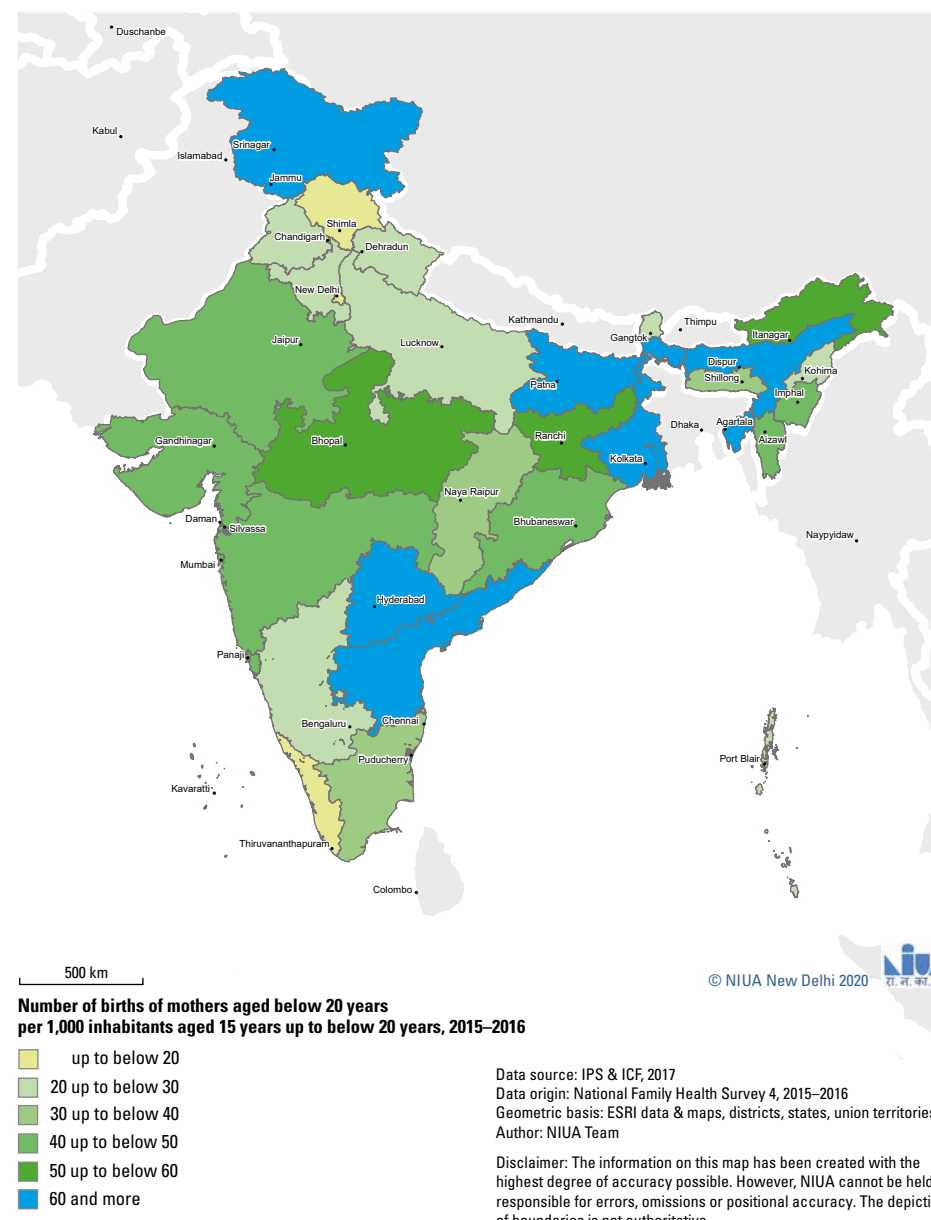
Besides, 24 states and union territories can be identified where teenage fertility rates are lower than the national average. This category includes states of the so-called Empowered Action Group (EAG), such as Uttar Pradesh, Rajasthan and Chhattisgarh, which are generally known for higher total fertility rates. The phenomenon may be attributed to a significant decline in child marriage there.

West Bengal and Andhra Pradesh with a total fertility rate below the replacement level show high adolescent fertility rates. Early age marriage and lower awareness constitute the factors that contribute to a higher number of births during adolescence.

Raising awareness among girls, their parents and communities about the possibly severe impacts of early childbearing may contribute to a change of attitude, accompanied by respective outreach activities towards planning methods. Moreover, the mandatory registration of pregnancies and the strict monitoring of adolescent mothers by applying the Mother and Child Tracking System (MCTS) could be beneficial in India for securing good health and well-being in the sense of SDG 3 for both, mother and child.

BBSR-Analysen KOMPAKT 11/2020

Teenage parenthood in India

500 km

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**Number of births of mothers aged below 20 years
per 1,000 inhabitants aged 15 years up to below 20 years, 2015–2016**

- up to below 20
- 20 up to below 30
- 30 up to below 40
- 40 up to below 50
- 50 up to below 60
- 60 and more

Data source: IPS & ICF, 2017
Data origin: National Family Health Survey 4, 2015–2016
Geometric basis: ESRI data & maps, districts, states, union territories
Author: NIUA Team

Disclaimer: The information on this map has been created with the highest degree of accuracy possible. However, NIUA cannot be held responsible for errors, omissions or positional accuracy. The depiction of boundaries is not authoritative.
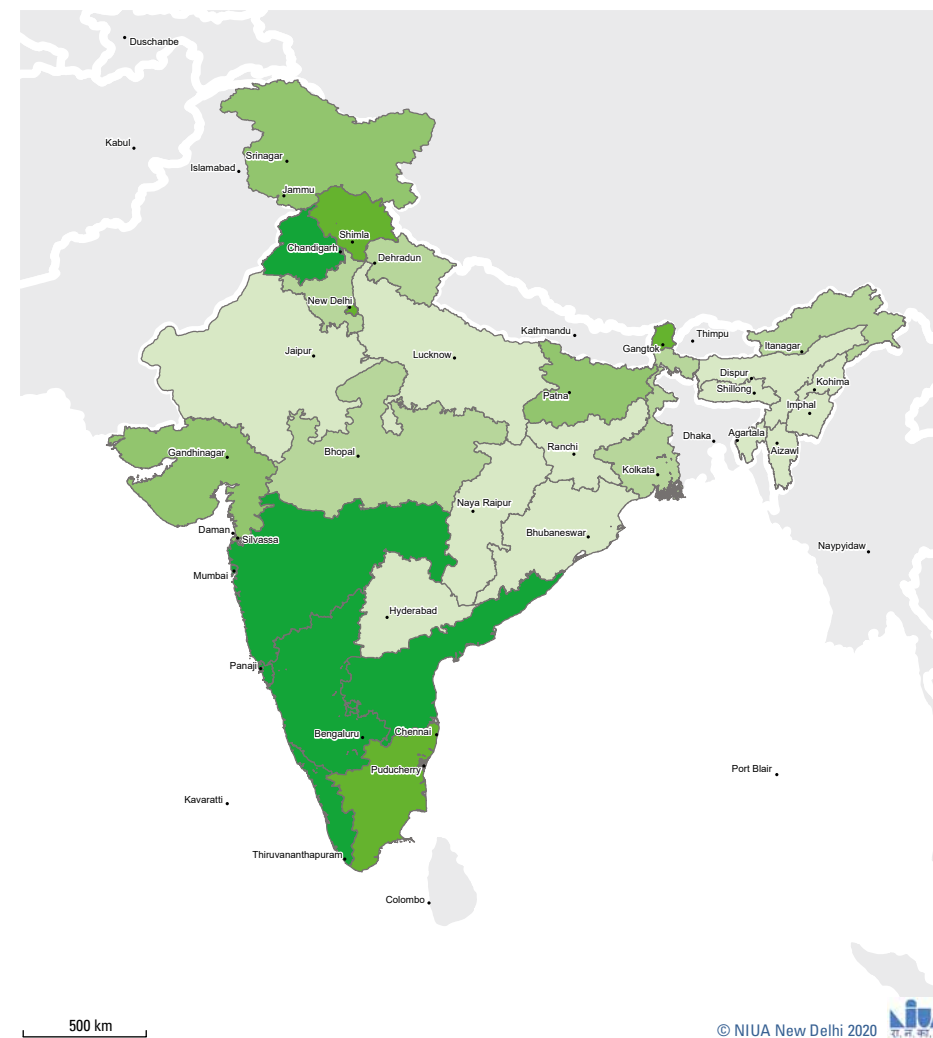
Medical practitioners

According to the Central Bureau of Health Intelligence (CBHI), there were 1,154,686 allopathic medical practitioners in India in 2018, registered under the Medical Council Act of 1956 and including medical doctors practising in public and private health facilities. Between 2010 and 2018, altogether 327,680 medical doctors enrolled in the country. In addition, 254,283 dental surgeons and 799,879 doctors specialised in AYUSH (Ayurveda, Yoga/ Naturopathy, Unani, Siddha, Homoeopathy) were registered in 2018. All health care professionals working in the open private sector and unregistered rural medical practitioners are not considered. The share of medical practitioners was calculated on the basis of projections of the Registrar General India (RGI) published in 2019.

Nevertheless, disparities in the geographical distribution of medical practitioners and its heterogeneity becomes visible across the different states of India. In absolute terms, Maharashtra (173,384), Karnataka (133,918) and Tamil Nadu (120,261) show in 2018 the highest number of registered allopathic medical practitioners. At the same time, the highest number of registered dental surgeons can be identified in Karnataka and Maharashtra while most AYUSH doctors were practising in Maharashtra and Bihar. The share of registered medical
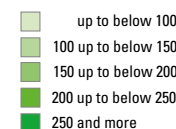
practitioners is with 402 per 100,000 people the highest in Goa. Similarly, the share in Kerala (343), Karnataka (321) and Maharashtra (300) is nearly twice the national average of 162 registered medical practitioners per 100,000 people. In the group of larger states, there are Jharkhand (19) and Chhattisgarh (52) with the lowest share in 2018. Allopathic doctors constitute 52.3 % of the total number of registered medical practitioners, dental surgeons 11.5 % and AYUSH doctors 36.2 %. At state level, except for Haryana, Telangana, Himachal Pradesh, Uttar Pradesh and Bihar, the share of registered allopathic medical practitioners is higher than in the aforementioned two groups.

Substantial shortfalls of registered allopathic medical practitioners still exist and constitute a significant challenge in public health facilities in India, particularly in rural areas as reported by the Rural Health Statistics (RHS) in 2019. The shortfall decreased in primary health centres in rural areas from 14 % to 6 % between 2018 and 2019, whereas primary health centres in urban areas reported a shortage of medical doctors of 16.7 %. At the same time, a deficit of 81.8 % and 45.8 % of specialised medical doctors was identified in rural and urban community health centres as per Indian Public Health Standards (IPHS).

Medical practitioners in India

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Number of general medical practitioners per 100,000 inhabitants, 2018

- up to below 100
- 100 up to below 150
- 150 up to below 200
- 200 up to below 250
- 250 and more

500 km

Data source: Directorate General of State Health Services
Data origin: National Health Profile, 2019
Geometric basis: ESRI data & maps, districts, states, union territories
Author: NIUA Team

Note: General medical practitioners include registered allopathic doctors, dental surgeons and AYUSH doctors.
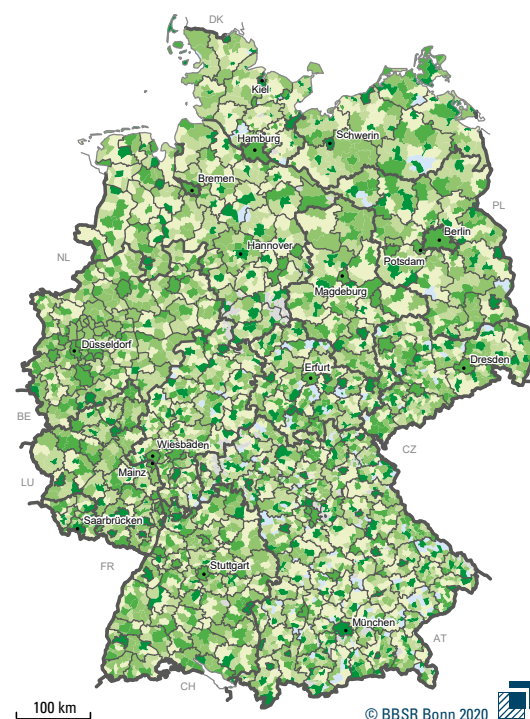
Disclaimer: The information on this map has been created with the highest degree of accuracy possible.However, NIUA cannot be held responsible for errors, omissions or positional accuracy. The depiction of boundaries is not authoritative.

The number of medical practitioners varies on national levels in Europe between 240 per 100,000 people and 600 per 100,000 people. Distinct differences in the national health systems definitely influence these varieties. Comparing the situation regionally means that Attici in Greece hosts with 790 medical practitioners per 100,000 people most medical practitioners whereas the southern part of Romania is home to 152 medical practitioners per 100,000 people. Being aware of the regional level of NUTS 2 combining urban, suburban and regional areas, regions may not be characterised preferentially as urban in that respect.
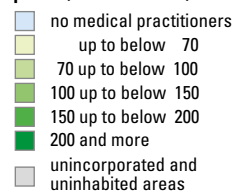
The National Association of Statutory Health Insurance Physicians (KBV – Kassenärztzliche Bundesvereinigung) provides statistics on medical practitioners in Germany. This association is responsible for planning and securing a regionally equal and sufficient supply with physicians. Despite the authority-like status of the association, its members include medical practitioners of the public and private health insurance sector. In contrast to the situation in India, figures in Germany do not include psychiatrists, homeopaths and dentists. The respective figures had been transformed into full-time equivalents per 100,000 people. Although the map reflects the local situation, those addressing medical practitioners usually utilise different medical facilities in a broader regional context. This is particularly the case of specialised medical practitioners.

Therefore, people in cities and towns without a medical practitioner may not be described as medically undersupplied but would need to address a neighbouring facility.

Medical practitioners in Germany

100 km

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Number of medical practitioners per 100,000 inhabitants, 2017

- no medical practitioners
- up to below 70
- 70 up to below 100
- 100 up to below 150
- 150 up to below 200
- 200 and more
- unincorporated and uninhabited areas

Data source: Spatial Monitoring System of the BBSR
Data origin: Federal Association for Statutory Health Insurance Physicians (KBV)
Geometric basis: Associations of Municipalities (generalised borders), 31.12.2017
© GeoBasis-DE/BKG
Author: A. Milbert

Medical practitioners in Europe
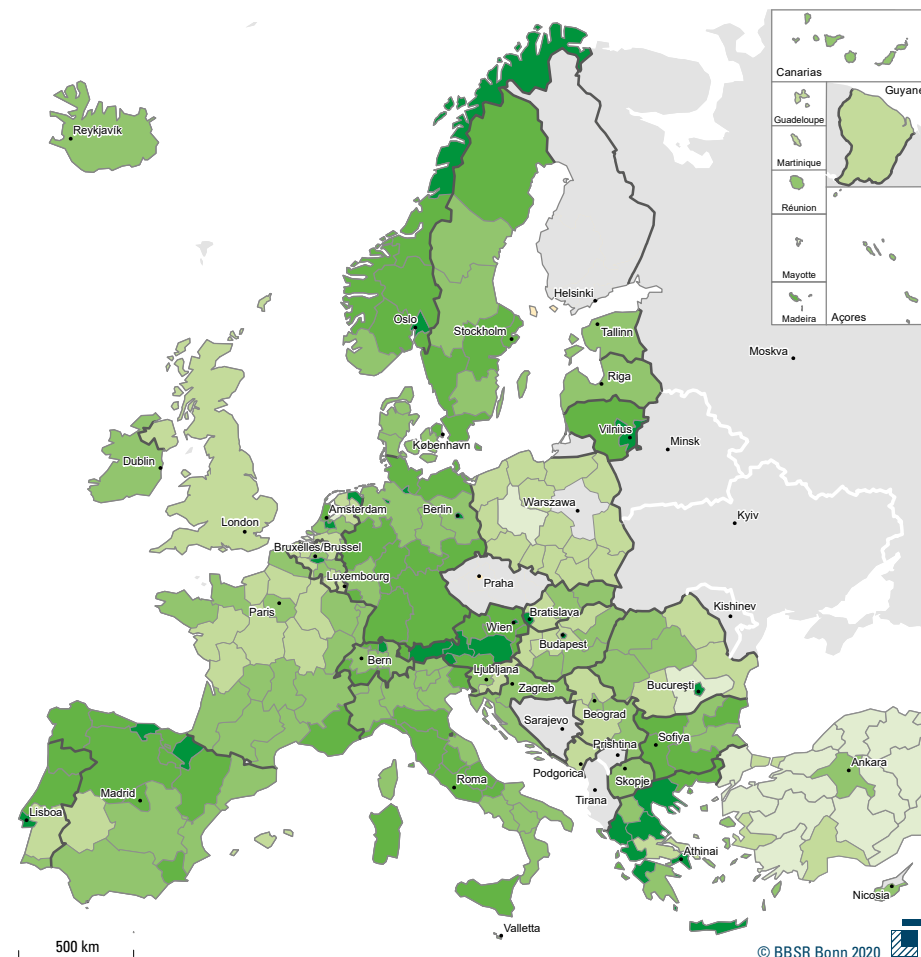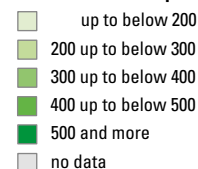
500 km

© BBSR Bonn 2020

Number of medical practitioners per 100,000 inhabitants, 2017*

- up to below 200
- 200 up to below 300
- 300 up to below 400
- 400 up to below 500
- 500 and more
- no data

Data source: Spatial Monitoring for Europe
Data origin: Eurostat
Geometric basis: GfK GeoMarketing, NUTS 3 regions, NUTS 1 regions
Author: R. Binot

*DK, SE: 2016
DE: NUTS 1
IE, UK: national value

Hospital beds

541 hospital beds are provided per 100,000 people on average in Europe. Based on data provided by Eurostat, Germany heads the line of countries with 800 beds per 100,000 people, Sweden stays at the end of this line with 222 beds. The differences between the countries are a clear indication that organising hospitals and stationary treatment is handled quite differently in Europe. Comparing the situation nationally, Germany appears fairly homogenous whereas other countries, just to mention France and Poland, show regional differences with a higher number of beds per capita in non-metropolitan regions. The number of hospital beds in Germany refers to those in short-term treatment units. Patients in need for long-term treatment are transferred to special care facilities. Between 1991 and 2017, the number of hospital beds decreased by 160,000 in total and proportionally from 832 beds per 100,000 people to 602 (the European picture here looks slightly different due to varying data sourcing). Due to a shortening of the average hospital stay of a patient, the utilisation rate of the hospital bed capacity shrank in the same period from 84.1 % to 77.8 %. The administrative boundaries of the counties in Germany as well as its system of central places affect regional disparities: Cities and larger towns also support districts in their direct neighbourhood, yet these districts might show a low level of hospital bed supply although they are not necessarily to be called undersupplied. On average, numbers of 800 or more hospital beds per 100,000 people show up because of specialised hospitals important for a larger area.

Hospital beds in Germany

Number of beds in acute care hospitals per 100,000 inhabitants, 2017

- up to below 300
- 300 up to below 450
- 450 up to below 600
- 600 up to below 800
- 800 up to below 1200
- 1200 and more

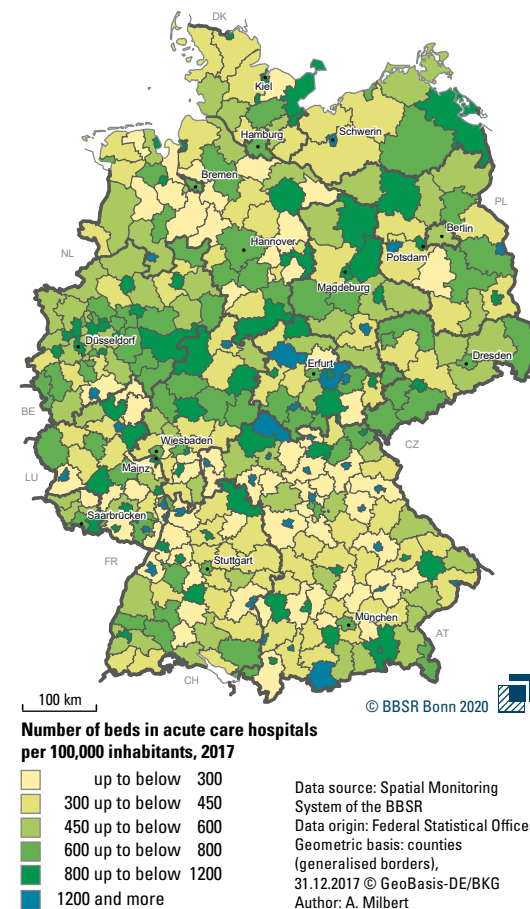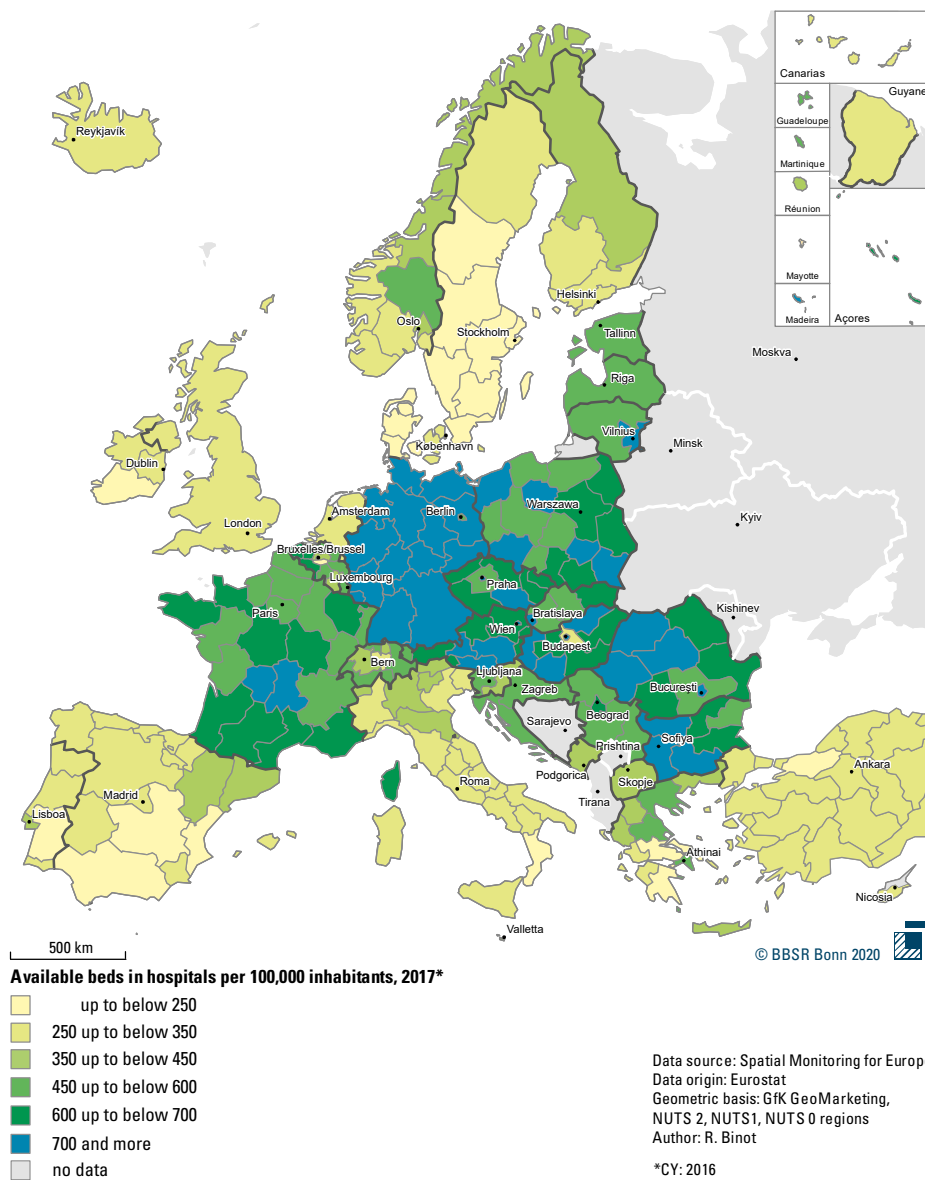Data source: Spatial Monitoring System of the BBSR
Data origin: Federal Statistical Offices
Geometric basis: counties (generalised borders), 31.12.2017 © GeoBasis-DE/BKG
Author: A. Milbert

Hospital beds in Europe

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Available beds in hospitals per 100,000 inhabitants, 2017*

- up to below 250
- 250 up to below 350
- 350 up to below 450
- 450 up to below 600
- 600 up to below 700
- 700 and more
- no data

Data source: Spatial Monitoring for Europe
Data origin: Eurostat
Geometric basis: GfK GeoMarketing, NUTS 2, NUTS1, NUTS 0 regions
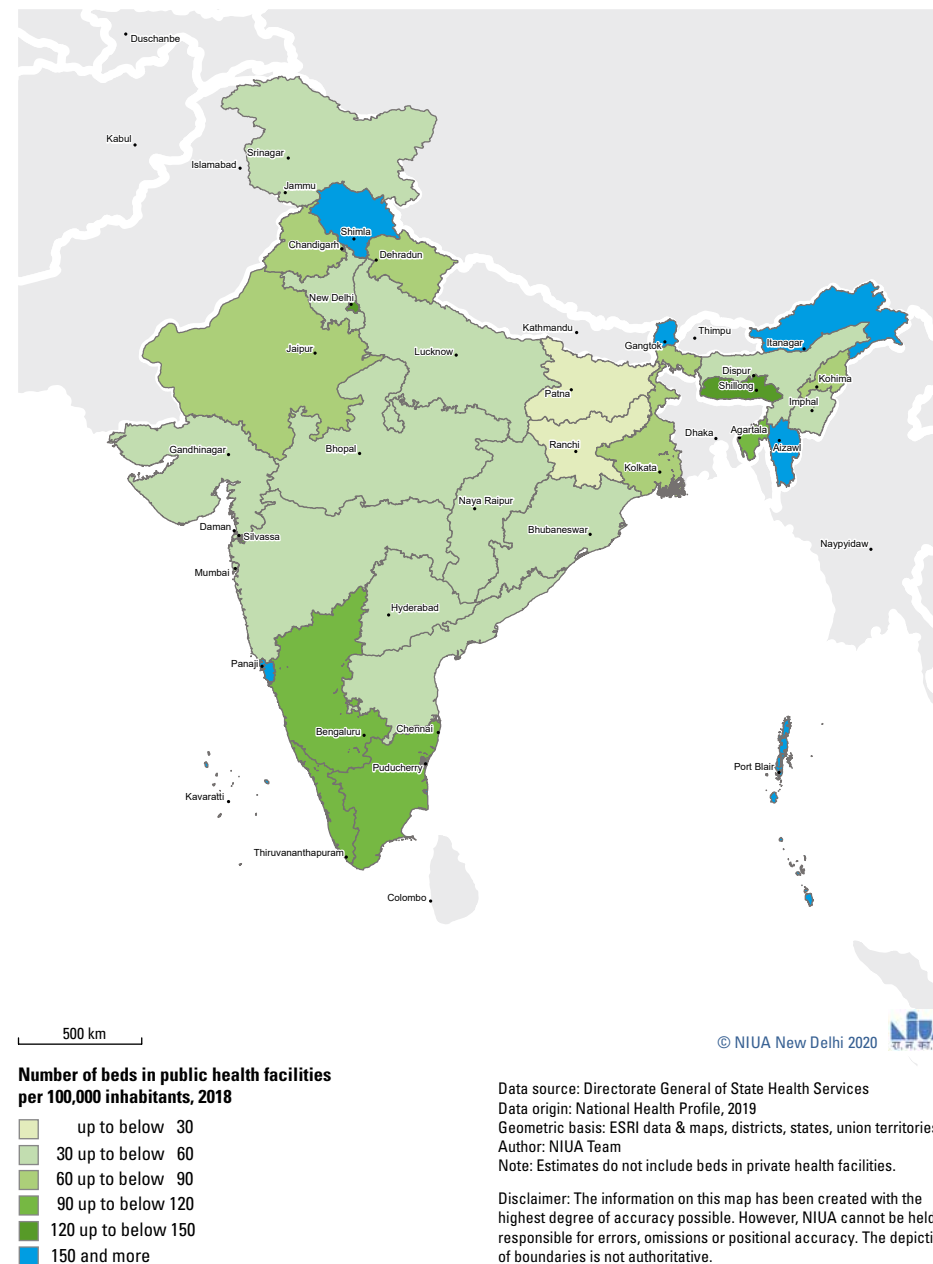Author: R. Binot

*CY: 2016

India has observed a dramatic shift in its health care services since independence, leading to a replacement of the public sector by the private sector as principle provider of health care. 55 % of outpatient and 75 % of inpatient care are provided by the country's private sector. However, a gradual shift to the public health care system, particularly in the secondary and tertiary health sectors can recently be observed. One reason is the large amount of pocket expenditure in the private sector (Ravi et al. 2016).

In the three-tier public health care system in India, beds are not distributed uniformly across states. This disproportionate distribution affects also the hierarchical health delivery system. As reported in the recent National Health Profile (NHP 2019), there are 713,986 beds in 25,778 government hospitals in India out of which 265,275 beds belong to the 21,403 public health care facilities in rural areas and 448,711 beds to the 4,375 facilities in urban areas – indicating a significant gap in distribution. Conspicuously, urban health care centres outweighed with 102.6 beds per facility rural health care centres with 12.4 beds. The reason might be that the secondary and tertiary public health care sector are mostly located in urban areas attracting an increasing number of patients from urban but also rural areas for specialised medical treatment. For this reason and due to this pressure, public health care facilities offer a higher amount

of inpatient beds. Given the prevailing demographic pressure, most facilities are inadequately equipped. Based on data received from CBHI (2019) and a RGI projection (2019), the estimated share of beds in government health care facilities in India runs as 54 per 100,000 people. The number of beds in public health care facilities varies between 240 in Daman & Diu and 78,566 in West Bengal. Apart from West Bengal, states like Tamil Nadu, Uttar Pradesh and Karnataka also show a higher number of beds in government hospitals. In relation to the total population, Lakshadweep (450), Chandigarh (320), Andaman & Nicobar Island (270), Puducherry (240), Delhi (120), Kerala (110) and Karnataka (110) present a high hospital bed density compared to the national average (54). However, states like Bihar (10), Jharkhand (30), Gujarat (30), Chhattisgarh (30) and Uttar Pradesh (30) are states performing not that well. A notable inequality in the number of beds at state level results from the lack of sufficient infrastructure in rural areas and high demands for hospital beds in urban areas. The bed capacity is in any hospital a crucial factor with an impact on the curative care of inpatient. A high demand for beds thus leads to a higher burden on the respective infrastructure of the public health facilities, particularly in the secondary and tertiary health care sector. Hence, bed availability requires a more balanced organisational approach in all three sectors in terms of functionality and financial resources.

Hospital beds in India

500 km

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Number of beds in public health facilities per 100,000 inhabitants, 2018

- up to below 30
- 30 up to below 60
- 60 up to below 90
- 90 up to below 120
- 120 up to below 150
- 150 and more

Data source: Directorate General of State Health Services
Data origin: National Health Profile, 2019
Geometric basis: ESRI data & maps, districts, states, union territories
Author: NIUA Team
Note: Estimates do not include beds in private health facilities.

Disclaimer: The information on this map has been created with the highest degree of accuracy possible. However, NIUA cannot be held responsible for errors, omissions or positional accuracy. The depiction of boundaries is not authoritative.
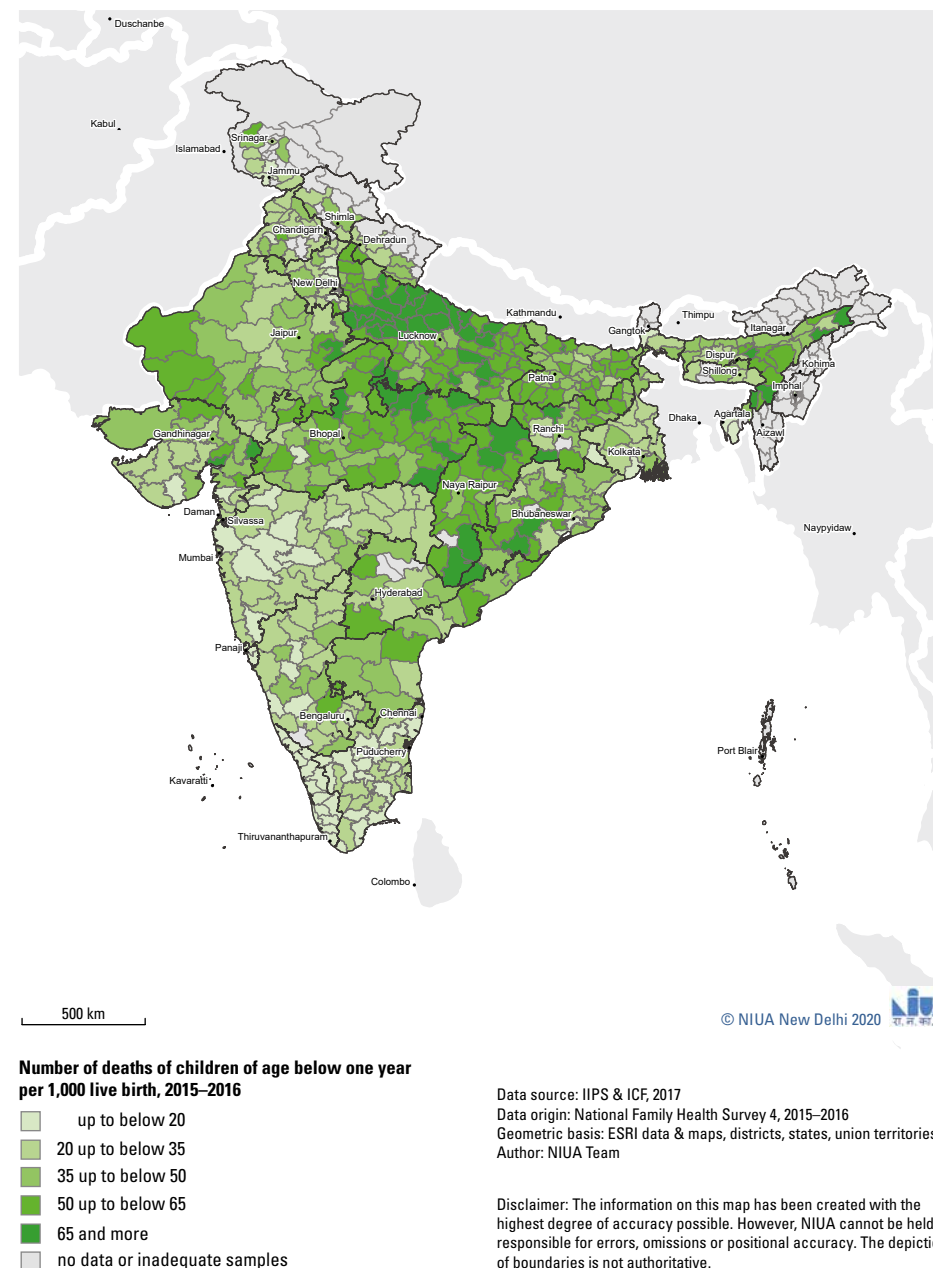
Infant mortality

India is undergoing a rapid but unconventional demographic transition phase. At present, this phase is moving from the mid-transitional stage to the late transitional stage. A decline of the infant mortality rate might also be perceived as transitive. However, the decline in the infant mortality rate has been disproportionate due to non-uniform paths of demographic transition at the level of the states. The infant mortality rate decreased from a high level of 78 infant deaths per 1,000 live births between 1992 and 1993 to 41 infant deaths between 2015 and 2016. In the same period, the infant mortality declined in rural areas from a high level of 85 to 46, whereas the infant mortality slowed down in urban areas from 56 to 29 infant deaths per 1,000 live births. The spatial variations of the infant mortality rate shows a considerable heterogeneity at state and district level. Conspicuously, the infant mortality rate was high in Uttar Pradesh, Chhattisgarh and Madhya Pradesh in the central part of the country followed by Bihar and Jharkhand in the eastern part and Assam in the northeastern part. Almost all southern states of India, except Andhra Pradesh, attained before 2019 the goal of NHP (2017) of less than 28 infant deaths per 1,000 live births.

The infant mortality varies at district level between 1.39 in the District of Idukki in Kerala to 100.4 in the District of Rayagada in Odisha. A total of 121 districts, constituting 19 % of all districts in India, reached between 2015 and 2016 the goal of NHP (2017). These districts may be found not only in socio-economically advanced states but also spread across some less developed states, such as Madhya Pradesh, Uttar Pradesh, West Bengal and Jharkhand. 264 districts show an infant mortality rate above national average. Moreover, 92 districts among them report a higher infant mortality rate of 60 infant deaths per 1,000 live births. These districts are part of Uttar Pradesh, Bihar, Madhya Pradesh and Gujarat. The comparative assessment of the infant mortality rate at district level thus demonstrates that the majority of high-risk districts lie in EAG states, including Assam and Gujarat.

Attaining the targets listed in NHP (2017) requires the collation of micro-level data on births and deaths as births and deaths and their registration are inappropriately reported. Ensuring evidence-based interventions by programmes demands the regular assessment of the causes of death and the quality of reported data (Kumar, Singhal 2020). The 73rd and 74th constitutional amendments devolve on local bodies as obligation the registration of births and deaths, resulting in local governments requiring access to adequate funding and expertise.

Infant mortality in India

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500 km

Number of deaths of children of age below one year per 1,000 live birth, 2015–2016

- up to below 20
- 20 up to below 35
- 35 up to below 50
- 50 up to below 65
- 65 and more
- no data or inadequate samples

Data source: IIPS & ICF, 2017
Data origin: National Family Health Survey 4, 2015–2016
Geometric basis: ESRI data & maps, districts, states, union territories
Author: NIUA Team

Disclaimer: The information on this map has been created with the highest degree of accuracy possible. However, NIUA cannot be held responsible for errors, omissions or positional accuracy. The depiction of boundaries is not authoritative.
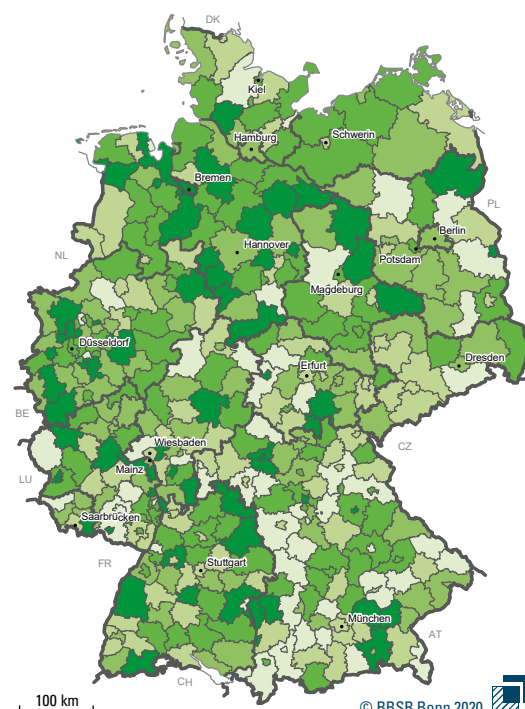
Taking the European average, 4 out of 1,000 newborns died in 2017 during their first year of life. Romania reports the highest infant mortality rate with 7 out of 1,000 newborns; the lowest share with 1 out of 1,000 newborns is visible in Cyprus. Germany counts 3 out of 1,000 newborns according to this definition. Regional differences within a country are small, infant mortality is slightly higher in urban areas in UK or France, in more rural regions in Spain, Italy, Hungary and Poland. Regional values range from 0 out of 1,000 newborns in Åland to 9 out of 1,000 newborns in the southeastern part of Bulgaria and 11 out of 1,000 newborns in Martinique.
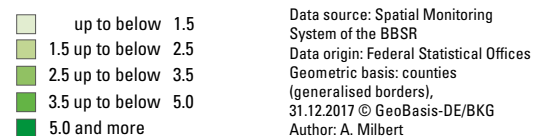
Particularly in the 19th century and until World War II, infant mortality decreased in Germany significantly from 240 deaths per 1,000 newborns to 40. Improvement in nutrition, living conditions and medical care made the number of infant mortality slow down to only 3 as of today. Regional disparities also reflect annual fluctuations in these regionally infrequent occurrences – especially in districts of low population size. Affirmatively, there are no systematic differences between urban and rural districts. 2 out of 1,000 newborns die in the first months. The main

causes are premature birth and congenital malformations such as defects of the heart or the nervous system (Destatis 2020). Some of these causes may be prevented by better nutrition, folic acid additives respectively, or avoiding nicotine, alcohol or other drugs during pregnancy.
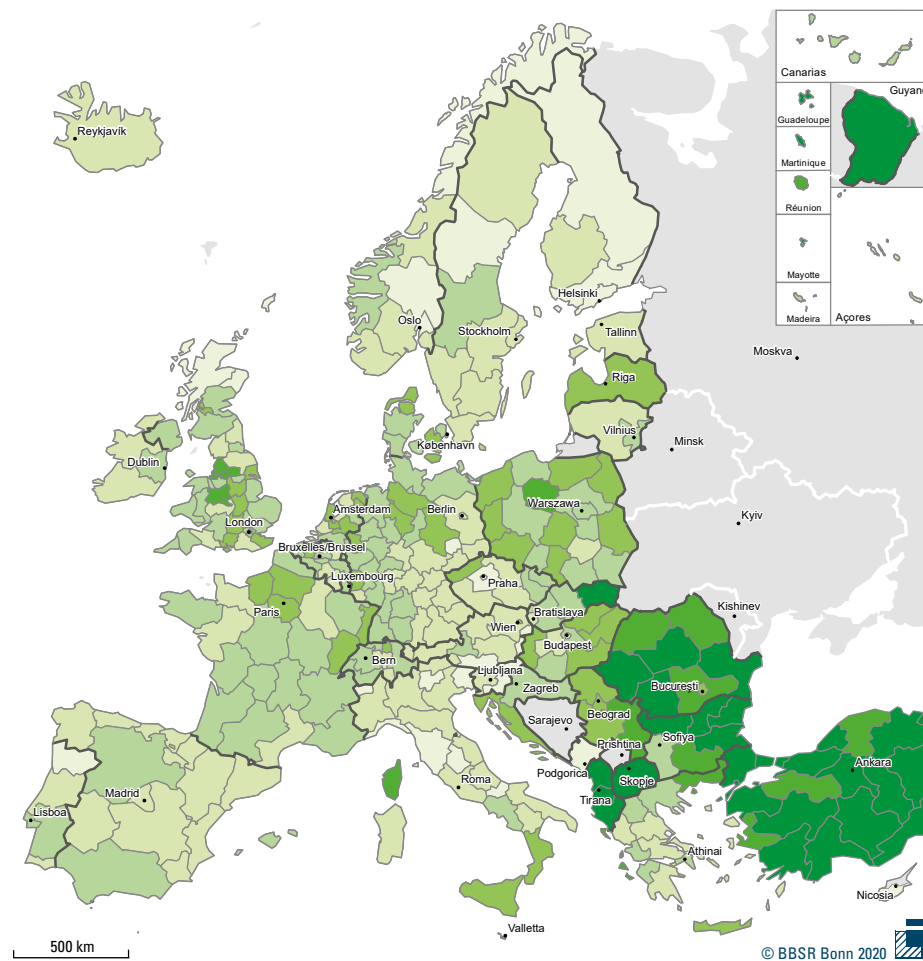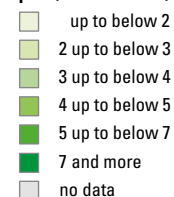
Infant mortality in Germany

Number of deaths of children of age below one year per 1,000 live births, 2017

- up to below 1.5
- 1.5 up to below 2.5
- 2.5 up to below 3.5
- 3.5 up to below 5.0
- 5.0 and more

Data source: Spatial Monitoring System of the BBSR
Data origin: Federal Statistical Offices
Geometric basis: counties (generalised borders),
31.12.2017 © GeoBasis-DE/BKG
Author: A. Milbert

Infant mortality in Europe

Number of deaths of children of age below one year per 1,000 live births, 2017

- up to below 2
- 2 up to below 3
- 3 up to below 4
- 4 up to below 5
- 5 up to below 7
- 7 and more
- no data

Data source: Spatial Monitoring for Europe
Data origin: Eurostat
Geometric basis: GfK GeoMarketing, NUTS 2 regions
Author: R. Binot

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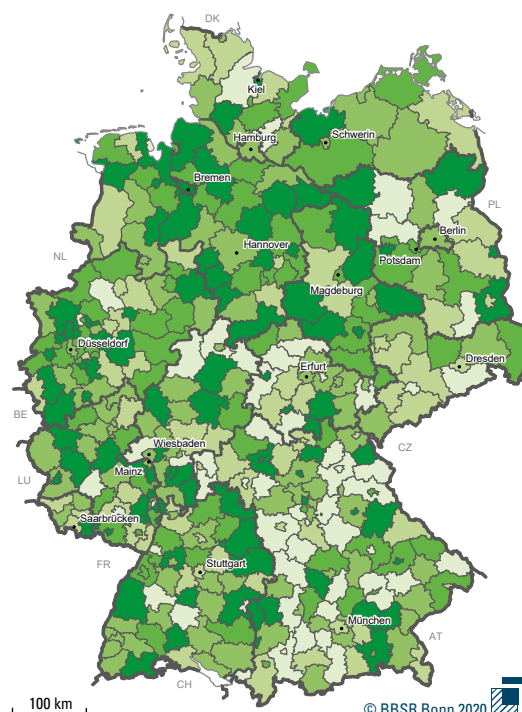
Toddler mortality

The mortality of children below 5 years is in Europe comparable to the situation of infant mortality. Main causes for toddler mortality are illness and accidents. Around 4 out of 1,000 toddlers die in Europe (EU27-2020) before reaching the age of 5 years, in Romania these are 8 out of 1,000 and in Cyprus 2 out of 1,000.

The regional mosaic is quite similar to the one of infant mortality yet more distinct: rural regions show slightly higher toddler mortality rates compared to urban regions.
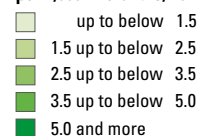
Toddler mortality is strongly related to infant mortality, yet preventing the deaths of children below the age of 5 years has been more successful than that of infants. In 1991, the number of toddlers dying was at a rate of 1.2 per 1,000 newborns higher than that of infants. By 2016, the difference was only 0.6 children per 1,000. Regional disparities in toddler mortality are similar

to the ones of infant mortality. The main causes of the deaths of children at the age of 1 year up to below 5 years are diseases, particularly cancer, and accidents (Destatis 2020).

Toddler mortality in Germany

Number of deaths of children of age below five years per 1,000 live births, 2017

- up to below 1.5
- 1.5 up to below 2.5
- 2.5 up to below 3.5
- 3.5 up to below 5.0
- 5.0 and more

Data source: Spatial Monitoring System of the BBSR
Data origin: Federal Statistical Offices
Geometric basis: counties (generalised borders), 31.12.2017 © GeoBasis-DE/BKG
Author: A. Milbert

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Toddler mortality in Europe

Number of deaths of children of age below five years per 1,000 live births, 2017

- up to below 2.5
- 2.5 up to below 3.5
- 3.5 up to below 4.5
- 4.5 up to below 5.5
- 5.5 up to below 10.0
- 10.0 and more
- no data
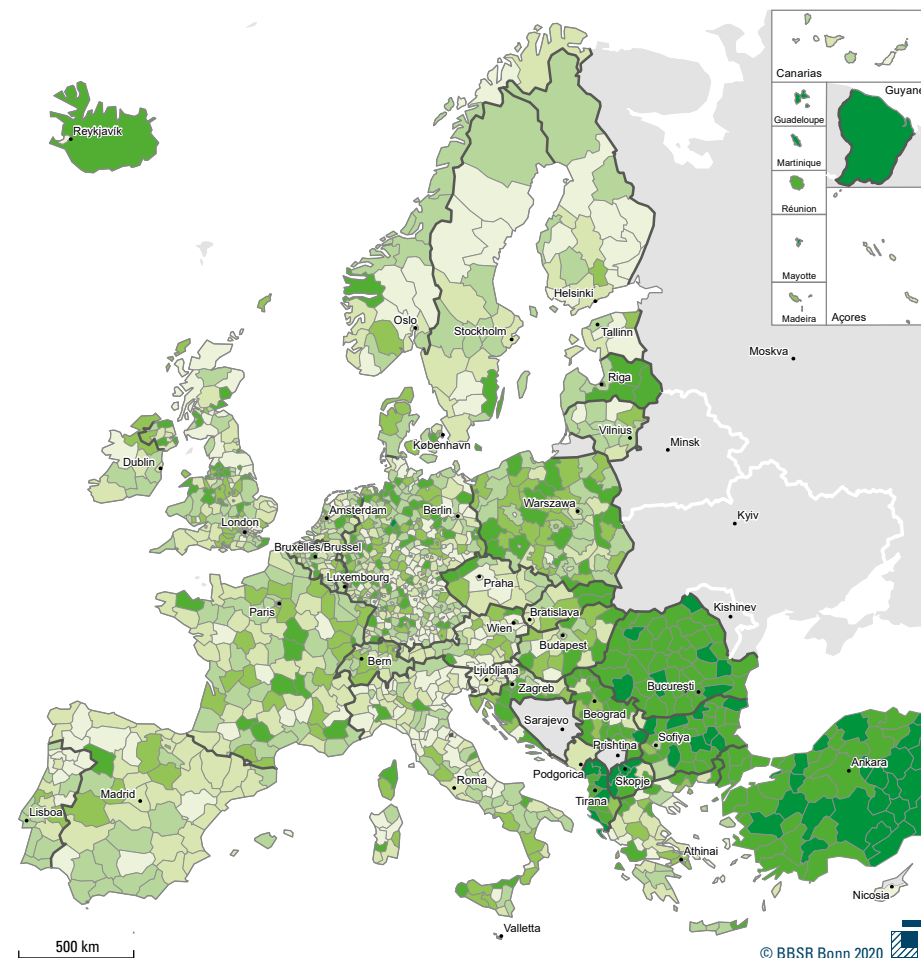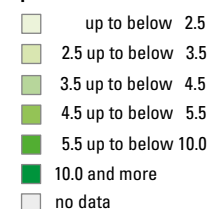
Data source: Spatial Monitoring Europe
Data origin: Eurostat
Geometric basis: GfK GeoMarketing, NUTS 3 regions
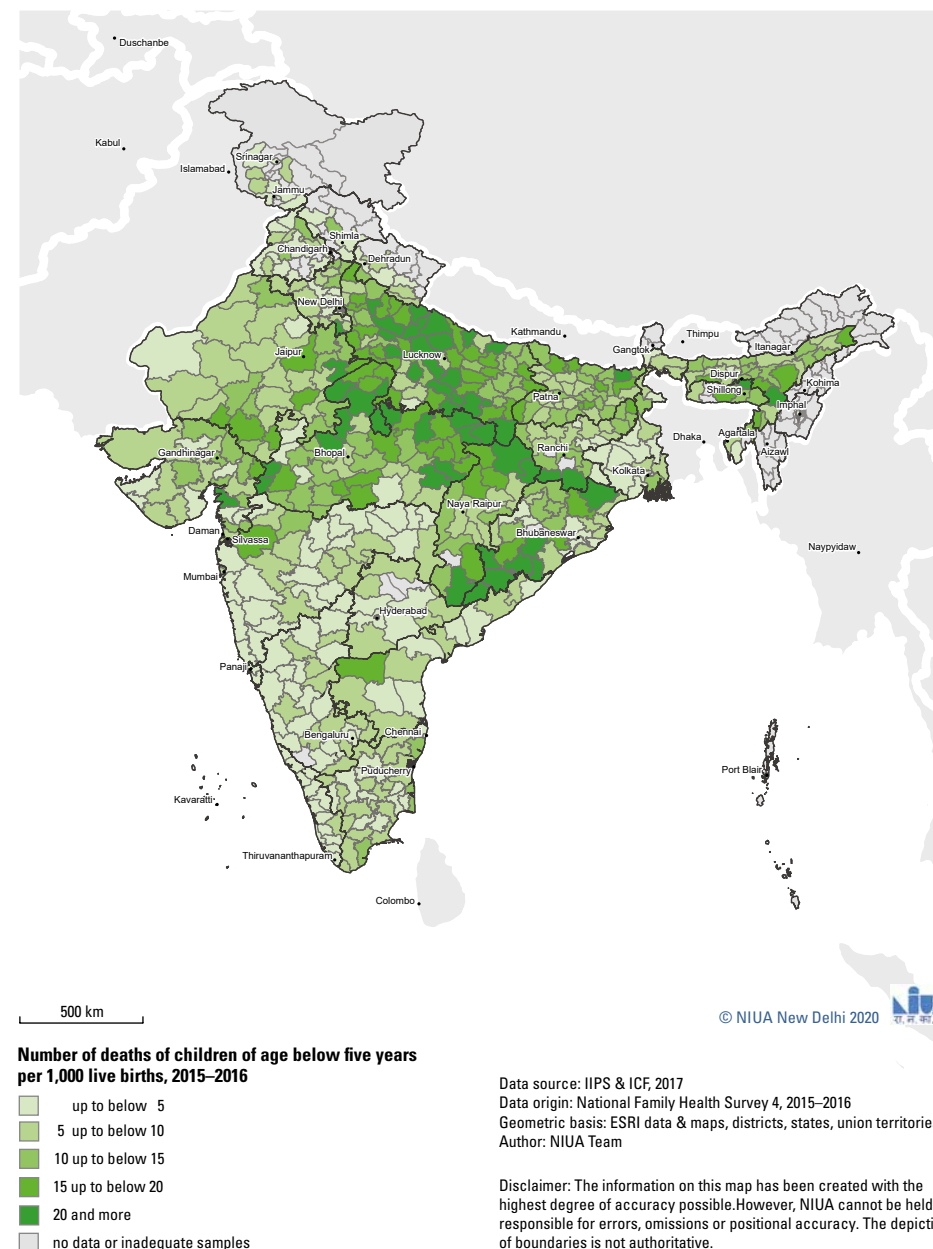Author: R. Binot

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India, as all 192 other member states of the United Nations, declared to end by 2030 all preventable deaths under the age of 5 years as incorporated in SDG 3. Although India ensures commitments to achieve this goal, the deaths of children under the age of 5 years cover numerous implications cutting across health and nutrition, social and cognitive development as well as the gender bias in the country. Due to structural changes and progress made in the health of its population, India observes a significant reduction of toddler mortality. The decline of the mortality rate under the age of five years has been faster in recent years compared to the neonatal and infant mortality rate at the national level. By applying unit-level data deriving from the National Family Health Survey (NFHS) 2015–2016 (IIPS/ICF 2017) spatial variations in toddler mortality become visible. The estimation of toddler mortality is given for a period of 10 years at state and district level.

Findings from various NFHS rounds suggest that the toddler mortality had sharply declined from 33 per 1,000 live births between 1992 and 1993 to 9 per 1,000 live births between 2015 and 2016 (IIPS 1995; IIPS, ORC Macro 2000; IIPS, Macro International 2007; IIPS, ICF 2017). However, progress made in reducing toddler mortality is unevenly distributed across states, noting a disparity at state level between 2015 and 2016. Toddler mortality varied at state level from 18 in Uttar Pradesh to 1 in Kerala. Toddler
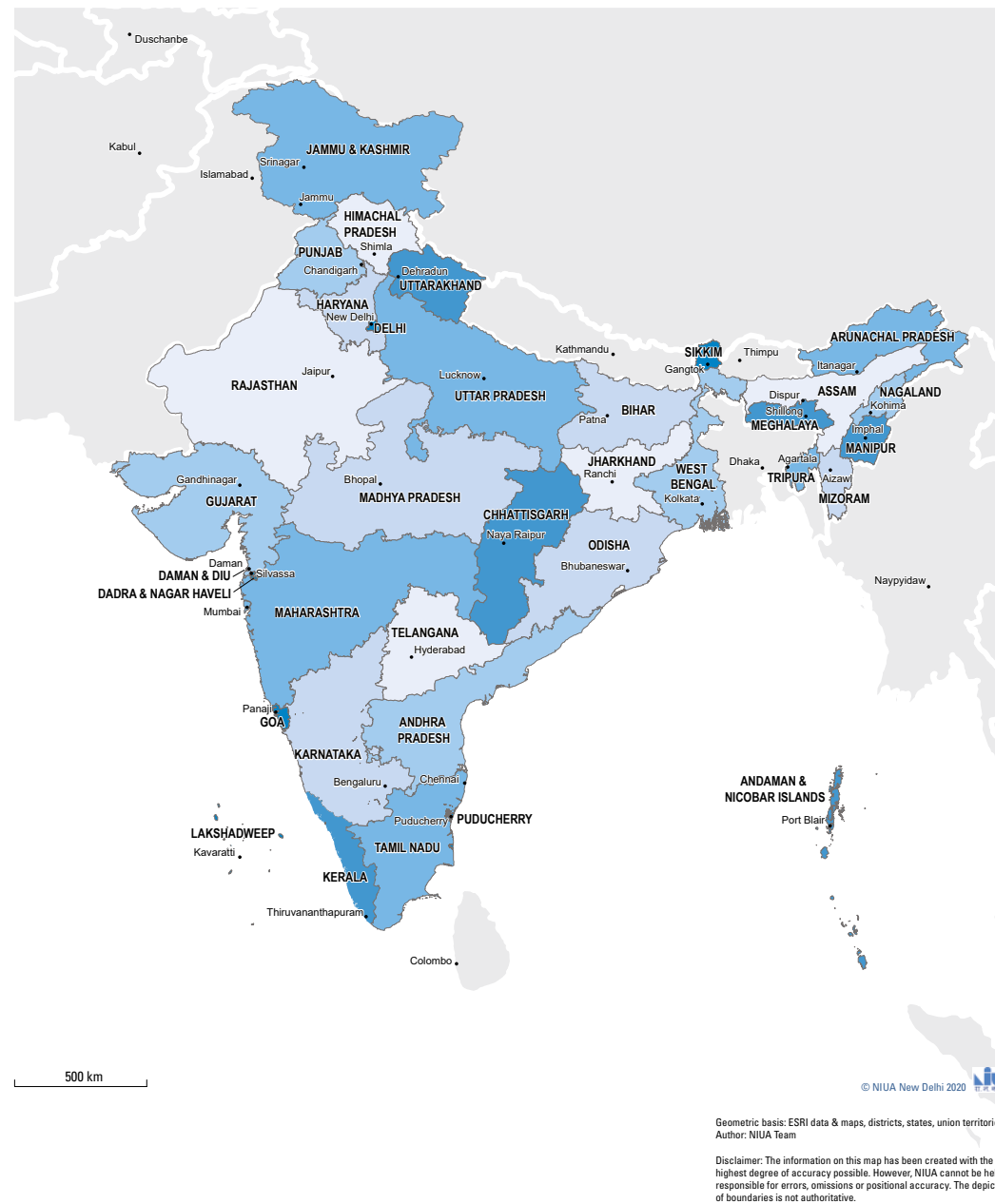
mortality in addition shows significant spatial variations at district level. Analysing the district level shows that toddler mortality varies from 0 in the Districts of Kasaragod, Kozhikode, Malappuram and Thrissur in Kerala and the District of Chikmagalur in Karnataka to 45 in the District of Panna in Madhya Pradesh and also 45 the District of West Singhbhum in Jharkhand. Altogether 124 districts reported a toddler mortality of less than 5 between 2015 and 2016. At the same time, 53 districts stated a toddler mortality higher than 20 per 1,000 live births.

The findings clearly illustrate that the majority of the districts in Kerala, Tamil Nadu, Karnataka, Maharashtra, Telangana and Punjab reported low toddler mortality rates. In fact, those districts showing a considerable socio-economic progress have been able to significantly reduce toddler mortality. However, several districts in EAG states and in Assam are affected by high toddler mortality figures. The identified disparities in toddler mortality may be attributed to a lack of health care facilities, despite socio-economic progress. Understanding the underlying causes of toddler mortality would require comprehensive real-time data approaches in high-risk districts, though differences in the approaches chosen for the respective district and sub-district levels would be needed with regard to the identified geographical heterogeneity.

Toddler mortality in India

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500 km

Number of deaths of children of age below five years per 1,000 live births, 2015–2016

	up to below 5
	5 up to below 10
	10 up to below 15
	15 up to below 20
	20 and more
	no data or inadequate samples

Data source: IIPS & ICF, 2017
Data origin: National Family Health Survey 4, 2015–2016
Geometric basis: ESRI data & maps, districts, states, union territories
Author: NIUA Team

Disclaimer: The information on this map has been created with the highest degree of accuracy possible.However, NIUA cannot be held responsible for errors, omissions or positional accuracy. The depiction of boundaries is not authoritative.

States, capitals and union territories in India

Duschanbe

Kabul

Islamabad

JAMMU & KASHMIR
Srinagar
Jammu

HIMACHAL
PRADESH
Shimla

PUNJAB
Chandigarh

Dehradun
UTTARAKHAND

HARYANA
New Delhi

DELHI

RAJASTHAN
Jaipur

Lucknow
UTTAR PRADESH

Kathmandu

SIKKIM
Gangtok

Thimpu

ARUNACHAL PRADESH
Itanagar

BIHAR
Patna

Dispur
ASSAM

NAGALAND
Kohima

Shillong
MEGHALAYA

Imphal
MANIPUR

JHARKHAND
Ranchi

WEST
BENGAL

Dhaka

Agartala
TRIPURA

Aizawl
MIZORAM

Bhopal

MADHYA PRADESH

GUJARAT
Gandhinagar

CHHATTISGARH
Naya Raipur

ODISHA
Bhubaneswar

Kolkata

Naypyidaw

Daman
DAMAN & DIU
Silvassa
DADRA & NAGAR HAVELI

Mumbai

MAHARASHTRA

TELANGANA
Hyderabad

Panaji
GOA

KARNATAKA

ANDHRA
PRADESH

Bengaluru
Chennai

ANDAMAN &
NICOBAR ISLANDS

Port Blair

LAKSHADWEEP
Kavaratti

Puducherry
PUDUCHERRY

TAMIL NADU

KERALA

Thiruvananthapuram

Colombo

500 km

© NIUA New Delhi 2020

Geometric basis: ESRI data & maps, districts, states, union territories
Author: NIUA Team

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States and capitals in Europe

BBSR-Analysen KOMPAKT 11/2020

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500 km

Canarias
Guyane
Guadeloupe
Martinique
Réunion
Mayotte
Açores

ÍSLAND
Reykjavík

NORGE
Oslo

SVERIGE
Stockholm

SUOMI
Helsinki

EESTI
Tallinn

LATVIJA
Riga

LIETUVA
Vilnius

Moskva

Minsk

Kyiv

DANMARK
København

ÉIRE
Dublin

UNITED KINGDOM
London

NEDERLAND
Amsterdam

BELGIË
Bruxelles/Brussel

Berlin

DEUTSCHLAND

POLSKA
Warszawa

LËTZEBUERG
Luxembourg

FRANCE
Paris

ČESKO
Praha

SLOVENSKO
Bratislava

ÖSTERREICH
Wien

MAGYARORSZÁG
Budapest

ROMÂNIA
Bucureşti

SCHWEIZ
Bern

SLOVENIJA
Ljubljana

HRVATSKA
Zagreb

Beograd

Sarajevo

Prishtina

Podgorica

Skopje

Tirana

Kishinev

BÂLGARIJA
Sofiya

PORTUGAL
Lisboa

ESPAÑA
Madrid

ITALIA
Roma

ELLÁDA
Athinai

Ankara

KYPROS
Nicosia

MALTA
Valletta

Conclusion

This joint publication is a significant follow-up milestone of the cooperation between BBSR and NIUA in the context of the urbanization partnership closed between the responsible ministries in India and Germany. Its underlying common understanding of analysing spatial structures as well as the collaboratively intercultural cooperation of both institutions shows that the envisaged blueprint of joint spatial research in the area of urban and spatial development might be of added value for both, methodological approaches and policy advice.

The joint analysis describes the spatial structures of some of the topics covered by SDG 3 on Good Health and Well-Being. It uses the lowest common data level available in India, Germany and Europe and develops a common visual language. Taking life expectancy at birth and teenage parenthood, medical practitioners and hospital beds as well as infant mortality and toddler mortality as a first set of topics, the joint approach also illustrates how spatial analysis might be applied to reveal the situation on the ground in regions and

cities. Not really surprising matters the size, the function and the relative wealth of a city: a larger city would show another spatial picture than a medium-sized city, a small town or a rural municipality. In the same way, it would need a different response by decision-makers than for other types of settlements.

The selected indicators on SDG 3 prove to be well comparable between India, Germany and Europe as well as between regions in these areas. The output indicators particularly allow drawing conclusions on the success in improving living conditions by enhancing health care: In all three areas described in this publication (India, Europe, Germany) health at the regional and local level is strongly influenced by socio-economic factors.

Considering the indicators related to health services, medical care and hospital beds, the situation looks different. Despite varieties in defining professions, choosing the appropriate spatial level is crucial in order to be able to draw correct conclusions. The lowest level of reporting would not always be the most appropriate:

physicians for example do not serve in all cases the population on the given spot of their practice but a geographically larger community. On a low scale, this would lead to misjudgements with regard to a city and suburban or rural communities. If the observation units are too large, i.e. far beyond the actual catchment area of a physician or hospital, the resulting spatial picture may value the level of service supply for sub-spaces too optimistically. Creating a more realistic picture of the actual situation would require smaller-scale data.

Teenage parenthood would also deserve more attention in national, supranational and international comparison. The respective indicator illustrates existing differences between developing and developed countries. It is undoubtedly important in terms of the health of mother and child. It may also be taken as an early warning indicator on the success of education policies and regional imbalances of job markets as well as their fluctuations over time.

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Source: UNO 2020

Information
This publication is accompanied by two other publications on SDG 4 (13/2020) and SDG 11 (15/2020). The chapters visualise the spatial analysis of SDG 3. Alternating maps illustrate the spatial perspective on SDG 3 in India, Germany and Europe by taking national as well as supranational views wherever feasible. The colour code used follows the choice of the United Nations, which assigned a greenish colour to SDG 3. Two general maps in bluish colour-facets complete the sequence of maps. They serve the purpose of a map-reading guidance and cover Europe and India in administrative terms showing their respective states and capitals, in the case of India also its union territories.

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