








India Noncommunicable Disease Landscaping



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Abbreviations

CHC	Community Health Centre
CHW	community health worker
COPD	chronic obstructive pulmonary disease
CRD	chronic respiratory disease
CSO	civil society organization
CSR	corporate social responsibility
CVD	cardiovascular disease
DP	development partner
HWC	Health and Wellness Centre
NCD	noncommunicable disease
NFHS	National Family Health Survey
NGO	nongovernmental organization
NHPS	National Health Protection Scheme
NMHP	National Mental Health Programme
NPCDCS	National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke
OOP	out-of-pocket
PHC	Primary Health Centre
PPP	public-private partnership
RMNCH+A	reproductive, maternal, newborn, child, and adolescent health
SEAR	South-East Asia Region
UHC	universal health coverage
WHO	World Health Organization

Executive summary

India is an emerging economy with a population of more than 1.3 billion people. As economic and social reforms picked up pace in the last two decades, the country witnessed rapid development. There has been a marked shift in the country's disease pattern in the last three decades. The morbidity and mortality due to noncommunicable diseases (NCDs) and injuries have increased whereas morbidity and mortality due to communicable, maternal, and neonatal infections has declined. The five leading chronic diseases in India are mental health disorders, cardiovascular diseases (CVDs), diabetes mellitus, chronic obstructive pulmonary disease (COPD), and cancer. India contributes to more than two-thirds of the total deaths due to NCDs in the World Health Organization (WHO) South-East Asia Region (SEAR). The prevalence of NCDs is likely to increase in the coming years due to higher life expectancy as well as factors such as urbanization and industrialization.

The government of India launched the National Mental Health Programme (NMHP) and the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) in 1982 and 2010, respectively. These programs are implemented through a multitier system covering primary, secondary, and tertiary care. As a public and private health system, the private sector also plays a key role in delivering NCD care. The COVID-19 pandemic highlighted weaknesses in the health system, including how limited investments in NCDs had a direct impact on both mortality and morbidity rates.

With support from Access Accelerated, PATH undertook an NCD landscaping study to identify the key stakeholders as well as barriers and facilitators in the provision of NCD care. PATH developed priority areas of investment based on expert interviews, local prevalence data, and a review of policies and related literature exposing barriers and facilitators to access to quality NCD care. The landscaping study was conducted from September to December 2020.

The report uses the WHO health systems building blocks to understand the Indian NCD landscape. The barriers and recommendations are documented through the lens of these blocks: service delivery, health workforce, information systems, access to medicines, health financing, and leadership and governance, with an additional emphasis on how COVID-19 impacted access to care and service delivery through the attribute of resilience.

This report complements India's renewed commitment to achieving universal health coverage (UHC). In 2018, India launched Ayushman Bharat—one of the most ambitious health missions ever—to achieve UHC. It encompasses two complementary schemes, Health and Wellness Centres (HWCs) and the National Health Protection Scheme (NHPS). HWCs are envisioned as a foundation of the health system to provide comprehensive primary care and free essential medicines and diagnostic services, whereas the NHPS is envisaged to provide financial risk protection to poor and vulnerable families arising out of secondary and tertiary care hospitalization in the amount of five lakh rupees (approximately US\$6,800) per family per year.

The assessment was completed using a secondary review of national survey data, a literature review, and qualitative insights through in-depth interviews with key stakeholders. A total of 41 interviews were conducted at a national level and across four states (Maharashtra, Uttar Pradesh, Odisha, and Kerala). National policies, program documents, treatment guidelines, and protocols were reviewed to inform the report development and discussions.

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Key findings

The landscape revealed important barriers across all six WHO building blocks.

India has a mixed health system where both the government and private sector offer health services. The government offers preventive, promotive, and curative care, whereas the private sector mostly caters to curative and clinical care only. This report focuses on challenges primarily from the public-sector provisioning. Listed below are the key barriers or challenges of the government-funded, supported, and implemented work in NCD.



Service delivery

1. Lack of prioritization of NCDs in service delivery impact the quality of NCD care.
2. Operational delays in activating Health and Wellness Centre (HWC) impact NCD care at the community level.
3. Lack of unified systems across public and private sectors create challenges in patient and data capture resulting in low treatment adherence.
4. Poor awareness about NCDs among the general population leads to delayed diagnosis and poor treatment adherence.
5. Poorly defined referral systems from primary levels to specialized care impact treatment linkages.
6. Stigma around mental health is a barrier to seeking care.



Health workforce

1. Shortage of human resources to provide NCD screening and referral services at primary care level impacts quality of care.
2. Inadequate training and mentoring support for individuals providing NCD care, including frontline workers, community health workers (CHWs), and informal providers impacts quality of care.



Health information systems

1. Lack of consistent and high-quality data on the NCD disease burden impacts planning and resource allocation.
2. Absence of rigorous evaluations on NCD interventions in both public and private sector impacts program improvements.
3. Absence of a unified and countrywide data system to review routine NCD program data impacts planning and resource allocation.



Access to medicines

1. Medication shortages and short prescription cycles create barriers in treatment adherence.
2. The lack of standardized treatment protocols and prescribing habits lead to challenges in access and consistent use.



Health financing

1. Financing for NCDs in India remains low compared to maternal and child health and infectious diseases. Private sources currently provide inadequate and short-term funding.
2. The current national insurance scheme, Ayushman Bharat, covers most of the key NCD-related surgical procedures but does not cover most outpatient or primary care services.



Leadership and governance

1. Lack of intersectoral, interdepartmental collaboration makes it difficult to tackle the growing burden of NCDs in a holistic fashion.
2. Commercial interests influence policy development, leading to a lack of regulation and guidelines around risk factors for NCDs (other than tobacco).
3. No defined platform exists for the private sector to engage with state-level governments.



Health system resilience during COVID-19

The COVID-19 epidemic has exposed the fault lines of an under-resourced health system, especially in the provision of NCD care.

1. During the COVID-19 lockdown, NCD patients faced interruptions in medication procurement, access to health facilities, and maintenance of regular medical checkups due to a shortage of essential medicines, higher drug prices, and unavailability of government transportation.
2. Both the public and private sectors expanded telemedicine platforms for consultations, but these were inaccessible to patients without access to smartphones or internet.



Recommendations

The India NCD landscape assessment revealed important barriers in the country's NCD response. In response to these barriers, the following recommendations were put forward to improve access to essential NCD care in the country.



Service delivery

1. Strengthen the NCD component of UHC through the HWCs by integrating digital health systems, electronic health records, and speedy implementation of the National Health ID.
2. Design holistic interventions that involve upgrading infrastructure, deploying more efficient supply chain systems for drugs and diagnostics, designing and building an adequate referral mechanism to the appropriate level of care depending on the type of NCD, etc.
3. Pilot and scale public-private partnership models in urban areas by involving private primary care providers with a continuum-of-care approach with call centers and e-vendors for dispensing medicines.
4. Incorporate NCD awareness and screening services in school health programs and Adolescent Friendly Health Clinics under the National Health Mission.



Health workforce

1. Support public health systems to devise strategies to reduce the work burden on clinicians by delegating screening, diagnosing, and managing patient tasks.
2. Develop a comprehensive and holistic training system with offline and digital components and adequate mentoring and guidance support.
3. Train CHWs and informal providers to diagnose and refer care for NCDs, including mental health.



Health information systems

1. Assist frontline workers in the adoption and uptake of digital technologies to address the paucity and lack of quality of NCD service delivery data.
2. Collaborate with government agencies to evaluate NCD interventions and use the findings for program improvement and advocacy.
3. Utilize existing platforms to incorporate artificial intelligence and other technologies to facilitate improved health data collection, storage, and utilization with limited monetary investments.
4. Build predictive models for NCD incidence, prevalence, and risk assessment using data analytics.
5. Implement systems such as the NCD Navigator (mapping of country NCD initiatives implemented in Kenya and Ghana) to support planning, resource allocation, and alignment with national strategy.



Access to medicines

1. Strengthen the supply chain in the public sector to address the challenges arising as a result of a shortage of medicines.
2. Advocate and promote the uptake of standardized and evidence-based care for NCDs to bring in uniformity and consistency in the treatment modalities and medications being prescribed by different service providers.
3. Develop community-based models for chronic care, treatment adherence support, and rehabilitation.





Health financing

1. Advocate with public sector for additional allocations and transparency in expenditure data.
2. Work with existing private donors to develop holistic, inclusive, and comprehensive funding strategies that are patient-centered (rather than disease-centered).
3. Build mechanisms for institutionalizing health stack funding, where various social security schemes (central and state) bundled together could provide a lump sum amount for NCDs and specifically cancer care.
4. Advocate for the expansion of the national insurance scheme, Ayushman Bharat, to cover outpatient and primary care services.



Leadership and governance

1. Institutionalise health system resilience activities during and post COVID-19 pandemic
2. Support government development of a strong policy framework that ensures all NCD interventions provide holistic patient care.
3. Strengthen multi-sector collaboration of government, industry, and communities through the various committees for NCD prevention and control to improve service delivery, financing, and infrastructure.
4. Advocate for the production and sale of healthy food packages and introduction of sugar and salt tax for unhealthy food items.
5. Advocate to increase the resource allocation for building NCD infrastructure, equipment (cancer treatment centers, etc.), and other interventions in states prioritized by disease burden.



Health system resilience during and after COVID-19

1. Integrate COVID-19 and NCD screening at primary and secondary levels of care and ensure patients are referred and linked to appropriate facilities for specialized care.
2. Develop strategies for long-term follow-up of recovered COVID-19 patients with existing comorbidities by building up risk profiles for NCD patients.
3. Increase outreach and awareness programs on COVID-19 complications for NCD patients.
4. Implement community-based distribution of NCD medicines to address interruptions in access to medicines.

Recommendation for investments

PATH developed the following priority areas of investment based on expert interviews, local prevalence data, and a review of policies and related literature exposing barriers and facilitators to access to quality NCD care.

1. Strengthen the rollout of NCD packages under the Comprehensive Primary Health Care program in rural areas

NCD care at the primary level is the need of the hour, especially in many rural areas where the public health care system is the sole source of medical care. COVID-19 has underscored the importance of ensuring people with existing comorbidities receive timely and consistent care to prevent complications.

To implement this recommendation:

- Accelerate the rollout of NCD preventive, promotive, and treatment services for hypertension and diabetes and screening and referral services for cancer and mental health. This can be operationalized using the following strategies:
 - Adopt and implement innovative digital training modules for frontline workers.
 - Design referral services from HWCs to appropriate secondary and tertiary care to reduce delay in diagnosis and treatment.
 - Assist the rollout of the National Health ID and electronic health records systems.
 - Deploy easy-to-use and cost-effective point-of-care diagnostics.

2. Pilot NCD packages with private-sector primary care providers in urban areas

Primary care in the urban areas (especially the low-income localities) are dominated by general practitioners and non-allopathic physicians. They command a large loyal patient base for primary care issues due to their proximity and low consultation costs.



To implement this recommendation:

- Design financial packages for outpatient care (diagnostics and drugs) of NCD conditions that can be managed at primary care levels. These financial packages could be in the form of prepaid insurance plans/risk pooling to help lessen out-of-pocket expenditure in the long run.
- Build linkages to government systems for data sharing between the private and public sectors.
- Develop systems for referral and long-term follow-up using digital technologies.
- Train CHWs and family members to support long-term follow-up and support treatment adherence.

3. Deploy comprehensive mental health services for targeted groups using digital health tools

It is estimated that nearly 7.5 percent of the population suffers from some mental disorder. COVID-19 has exacerbated and impacted mental health across the world. There is a huge shortage of psychiatrists and psychologists in the country as compared to the number of people suffering from mental health issues.

To implement this recommendation:

- Pilot hybrid models of in-person and digital mental health care to address the growing mental health burden in the country.
- Build the capacity of primary care physicians and community health volunteers to diagnose, treat, and refer patients for common mental health conditions.
- Design health promotion campaigns to fight the stigma against mental health.

4. Build a comprehensive intervention for cervical cancer elimination and breast cancer care through public and private sectors

India contributes about 122,844 cervical cancer and 144,937 breast cancer cases every year and accounts for nearly one-third of the global cervical cancer deaths, with women facing a 1.6 percent cumulative risk of developing cervical cancer and 1.0 percent cumulative death risk from cervical cancer. Similarly, the cumulative risk of developing breast cancer is 2.7 percent, and the cumulative death risk is 1.5 percent.

To implement this recommendation:

- Collaborate with the national and state governments and the private sector to build out a comprehensive intervention to improve awareness and strengthen screening services and treatment of precancerous lesions.

5. Build a comprehensive intervention to tackle the obesity epidemic

The latest National Family Health Survey indicates that 20 of 22 major states in India are seeing an increasing prevalence of obesity in adults and children. Obesity is associated with an elevated risk of several major NCDs, including type 2 diabetes, coronary heart disease, stroke, asthma, and several cancers.

To implement this recommendation:

- Advocate with the Food Safety and Standards Authority of India to increase the visibility of obesity and related dangers.
- Design school-based programs for children, young adults, and caregivers to integrate good dietary practices and exercise in their daily routines.
- Pilot these models among schools in low-income areas where the need is most pressing.

As India renews its commitment to UHC and is receptive to aligned interventions and investments in NCDs, this report can provide guidance on where to prioritize investment and enhance stakeholder collaboration.

Introduction

01

The World Health Organization (WHO) estimates that noncommunicable diseases (NCDs) are responsible for 41 million deaths each year, equivalent to 71 percent of all deaths globally,¹ and that they now exceed all deaths due to communicable diseases.² India is an emerging economy with a population of more than 1.3 billion individuals. As economic and social reforms picked up pace in the last two decades, India has witnessed economic development and social development. This has been coupled with a major demographic and epidemiological transition. There has been a marked shift in the country's disease pattern in the last three decades. The morbidity and mortality due to NCDs and injuries have increased whereas morbidity and mortality due to communicable, maternal, and neonatal infections has declined. India contributes to more than two-thirds of the total deaths due to NCDs in the South-East Asia Region (SEAR) of WHO. The five leading chronic diseases in India are mental health disorders, cardiovascular diseases (CVDs), diabetes mellitus, chronic respiratory diseases (CRDs) (especially chronic obstructive pulmonary disease [COPD]), and cancer.

The upsurge in health care utilization due to increases in the prevalence of chronic diseases and demands among patients for services; provision and awareness among providers; access to treatments; and sharp rise in incomes is expected to continue.³ India runs the risk of losing about \$4.6 trillion in lost output due to savings lost and reallocated for treatment and due to loss of productivity and premature mortality.⁴ Other studies that have attempted to quantify NCDs' burden to the Indian economy have stated the cost of NCDs to be about 5 to 10 percent of gross domestic product.⁵ The health insurance coverage of India is also extremely low, raising the out-of-pocket (OOP) expenditure burden on the country. Urban residents have more access to public and private institutions compared to rural residents, who depend on public and informal providers.

The prevalence of NCDs is disproportionately on the rise among the poor, making them particularly vulnerable to catastrophic health expenditure in addition to lifelong morbidity and increased mortality. The share of OOP health expenditure due to NCDs rose over time, from 32 percent in 1995–1996 to 69 percent in 2004–2005 to 64 percent in 2013–2014.⁶ The proportion of households with OOP payments equaling or surpassing 10 percent of their consumption expenditure has increased more than two times during the same time period. The share of expenses dedicated to NCDs differed, with wealthier households allocating a larger portion of their spending to NCD care than poorer households. This is probably because of the wealthier households seeking more health care and preventive care.

The government of India launched the National Mental Health Programme (NMHP) and the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) in 1982 and 2010, respectively. The mental health program is predominantly medical oriented with an increasing awareness on community participation. The NPCDCS has a focus on awareness generation for behavior and lifestyle changes, screening, and early diagnosis of persons with a high level of risk factors and their referral to appropriate treatment facilities.

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1.1 NCD epidemiology in India

NCDs are a significant burden in India, as evidenced by WHO Country Profile data and other research reports. A summary national prevalence rates of selected NCDs is presented in Table 1.

Table 1. Prevalence rates of noncommunicable diseases.*

Disease	Prevalence/ Incidence	Trend compared to 1990	% contribution of total DALYs in India (2016-17)	% contribution of total deaths in India (2016-17)
Mental Disorders	197.3 million (P)	↑	4.70%	N.A
Cancers	1,069,000	↑	5.00%	8.30%
CVDs	54.5 million (P)	↑	14.10%	28.10%
Diabetes	65.0 million (P)	↑	2.20%	3.10%
COPD	55.3 million (P)	↑	6.40%	10.90%

Abbreviations: DALYs, disability-adjusted life years; COPD, chronic obstructive pulmonary disease; CVDs, cardiovascular diseases.

* Information gathered from meta-analysis of data from various sources.¹¹ For cancer incidence, rates are mentioned instead of prevalence.

Mental illness

In 2017, there were 197.3 million people with mental disorders in India, comprising 14.3 percent of the total population of the country.⁷ One among every seven people in India had a mental disorder, ranging from mild to severe. Among the mental disorders that manifest predominantly during adulthood, the highest disease burden in India was caused by depressive and anxiety disorders, followed by schizophrenia and bipolar disorder. Sex differentials are observed in the distribution of mental disorders in India. There is a higher prevalence of depressive and anxiety disorders in females than in males. This could be related to gender discrimination, violence, sexual abuse, antenatal and postnatal stress, and adverse sociocultural norms. There is a positive and modest relationship between depressive disorders and suicide death rates at the state level, with suicide death rates also being higher in the southern states than in the northern ones. The country is grappling with a shortage of mental health care workforce. In India, per 100,000 population, there are 0.3 psychiatrists, 0.12 nurses, 0.07 psychologists, and 0.07 social workers, while the desirable number is anything above three psychiatrists and psychologists per 100,000 population.

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Table 2. Lifetime and current prevalence of mental health disorders in India.

	Lifetime prevalence (%)	Current prevalence (%)
Any mental health disorders	13.7	10.6
Urban metro	19.3	14.7
Urban non-metro	12.8	9.7
Rural	12.2	9.6
Depression	5.2	2.7
Neurotic/stress-related disorders	3.7	3.5
Generalized anxiety disorders	0.6	0.6

Cancer

The estimated number of cancer cases in India increased from 548,000 in 1990 to 1,069,000 in 2016. The leading types of cancer were stomach cancer (9.0 percent), breast cancer (8.2 percent), lung cancer (7.5 percent), lip and oral cavity cancer (7.2 percent), pharynx cancer other than nasopharynx (6.8 percent), colon and rectum cancer (5.8 percent), leukemia (5.2 percent), and cervical cancer (5.2 percent). Among females, the most prevalent cancers were breast, cervical, and stomach cancer, and among males, lung cancer, followed by lip and oral cavity cancer, other pharynx cancer, and stomach cancer.^{8,12}

There was significant geographical variation in the incidence of cancers in India. Cancer incidence and deaths due to cancer in the four states and age standardized incidence rate of oral, breast, and cervical cancers per 100,000 are depicted in Figure 1 and Figure 2. Kerala is leading among the selected states with respect to both incidence and deaths due to cancer. Deaths due to cervical cancer and breast cancer were increasing in Kerala and were higher when compared to Odisha, Maharashtra, and Uttar Pradesh. Cancers of oral cavity and lip was seen to have increased in Kerala as compared to Maharashtra, Odisha, and Uttar Pradesh.



Figure 1. Overall incidence of cancer diseases and death per 100,000 (2016).

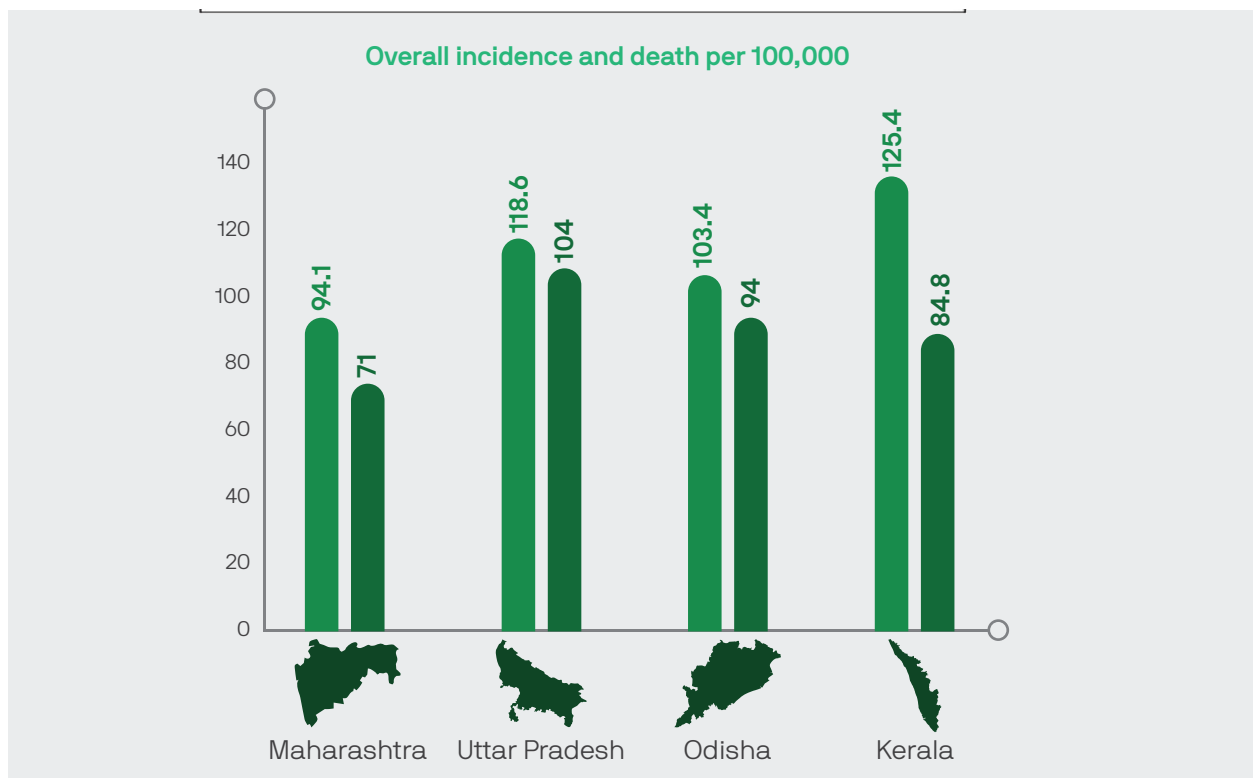
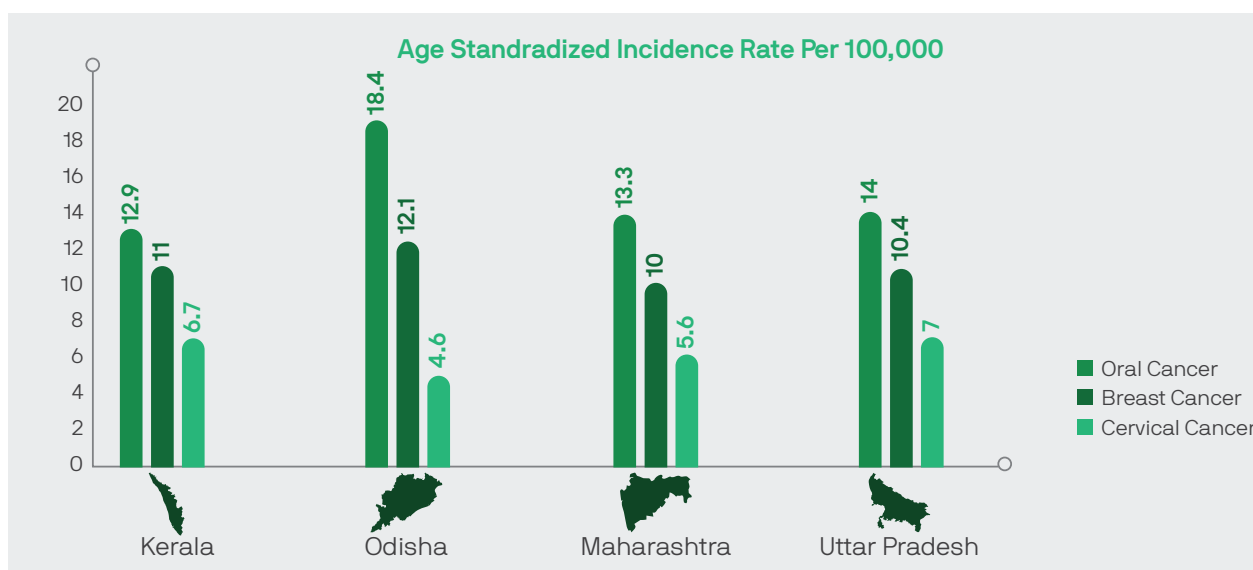


Figure 2. Age standardized incidence rate of oral, breast, and cervical cancers per 100,000.



Cardiovascular diseases

In 2016, the estimated prevalence of CVDs in India was estimated to be 54.5 million. One in four deaths in India are because of CVDs. Ischemic heart disease and stroke are responsible for >80 percent of this burden.⁹ The prevalence of CVDs in 2016 was highest in Kerala, Punjab, and Tamil Nadu. Among the risk factors that contributed to disability-adjusted life years due to CVDs in India, the leading ones were dietary risks (56.4 percent), high systolic blood pressure (54.6 percent), air pollution (31.1 percent), high total cholesterol (29.4 percent), tobacco use (18.9 percent), high fasting plasma glucose (16.7 percent), high body mass index (14.7 percent), and tobacco due to smoking (83.4 percent).

Based on the National Family Health Survey-4 (NFHS-4), the report summarizes the prevalence of hypertension in the four selected states. Higher prevalence was noted among men than women in the interest states and higher prevalence in urban than rural areas in interest states, except Kerala, where the prevalence was higher in rural areas.

Table 3. Prevalence of hypertension (%) based on NFHS-4.

	National	Kerala	Uttar Pradesh	Maharashtra	Odisha
Urban	9.4	5.2	8.2	10.0	10.4
Rural	8.2	7.7	6.7	8.9	7.8
Male	10.6	7.5	8.8	11.7	9.7
Female	6.9	6.0	6.1	7.1	6.9

The crude prevalence of stroke in Kerala, Maharashtra, Uttar Pradesh, and Odisha were 730/100,000, 547/100,000, 325/100,000, and 647/100,000 respectively.

Diabetes

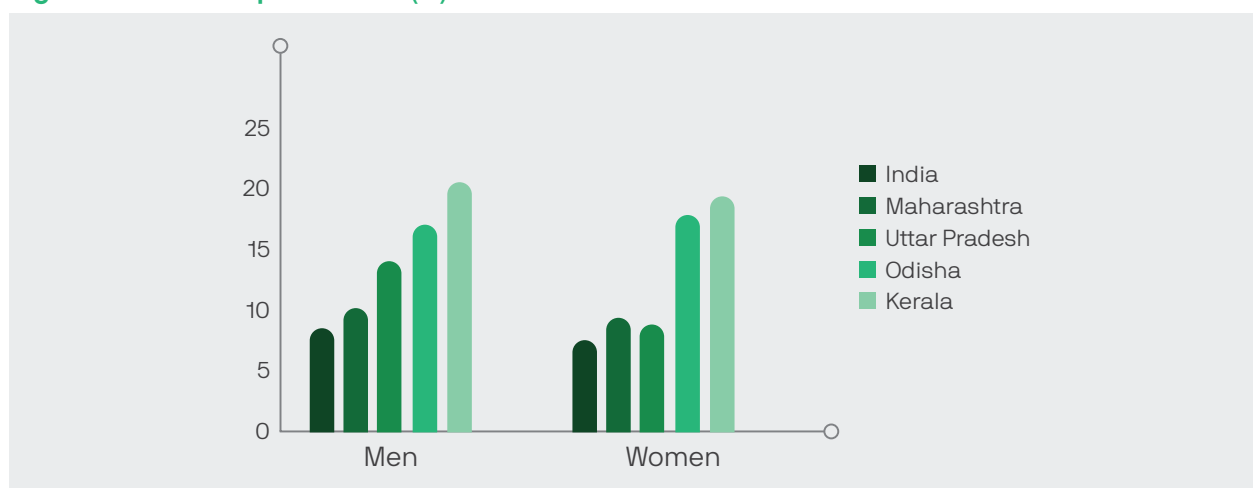
There are an estimated 72.96 million cases of diabetes in the adult population of India. The prevalence in urban areas ranges between 10.9–14.2 percent; prevalence in rural India was 3.0–7.8 percent. The prevalence of diabetes is 11.8 percent in people aged above 50, and the highest prevalence was observed in the 70–79 years age group at 13.2 percent.¹³

Prevalence of diabetes according to NFHS-4 conducted in the year 2015–2016 among people between 15 and 49 years is given in Table 4 and sex-wise prevalence in Figure 3.

Table 4. Prevalence of diabetes in India and four selected states

	Kerala	Uttar Pradesh	Maharashtra	Odisha
Urban	11.05	6.7	6.1	9.3
Rural	10.8	5.7	4.9	8.9

Figure 3. Sex-wise prevalence (%) of diabetes in India and four states.

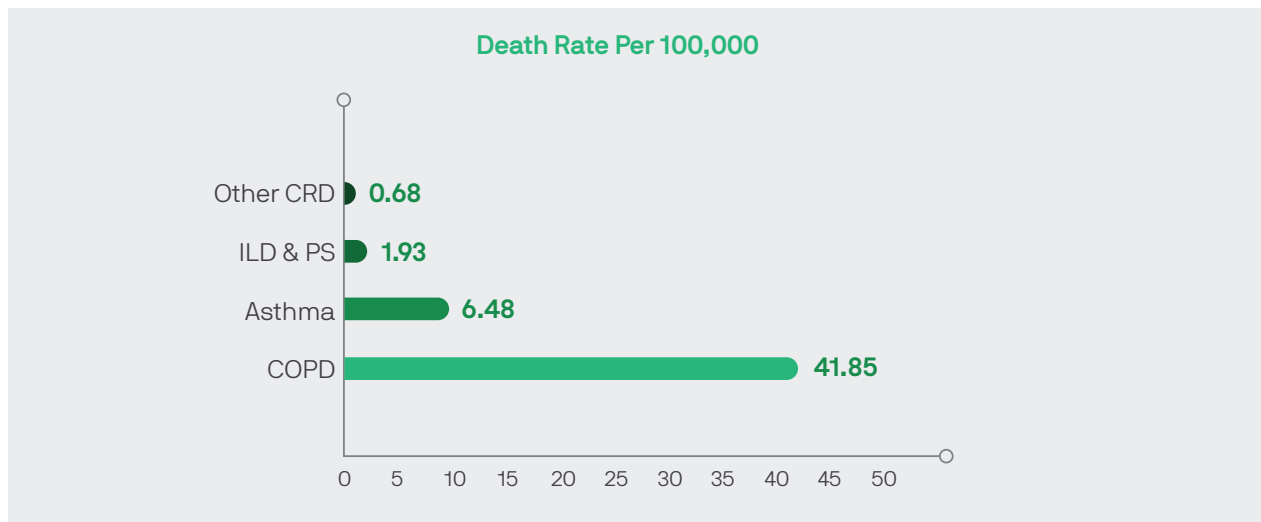


Chronic respiratory diseases

In 2016, the prevalence of COPD in India was 4.2 percent and the prevalence of asthma 2.9 percent. India has a prevalence of COPD that is higher than the global average. The overall increases in prevalence are mainly due to ageing of the population in India.¹⁰ Findings from studies in India have identified associations between CRDs and non-smoking-related factors, such as outdoor air pollution from particulate matter, indoor air pollution from biomass fuels, occupational exposure to crop dust, dust from mines, chemicals, poor socioeconomic status, poor nutrition, overcrowding, and residence in urban slums.⁹

Of all CRDs, COPD had the highest death rate (per 100,000).

Figure 4. Percentage of deaths due to chronic respiratory diseases.



Abbreviations: COPD, chronic obstructive pulmonary disease; CRD, chronic respiratory disease; ILD, interstitial lung disease; PS, pulmonary sarcoidosis.

There were no systematic studies to capture the prevalence of COPD. However, the NFHS-4 gives details on the asthma prevalence.

Figure 5. Prevalence of asthma in men and women in 2015–2016.

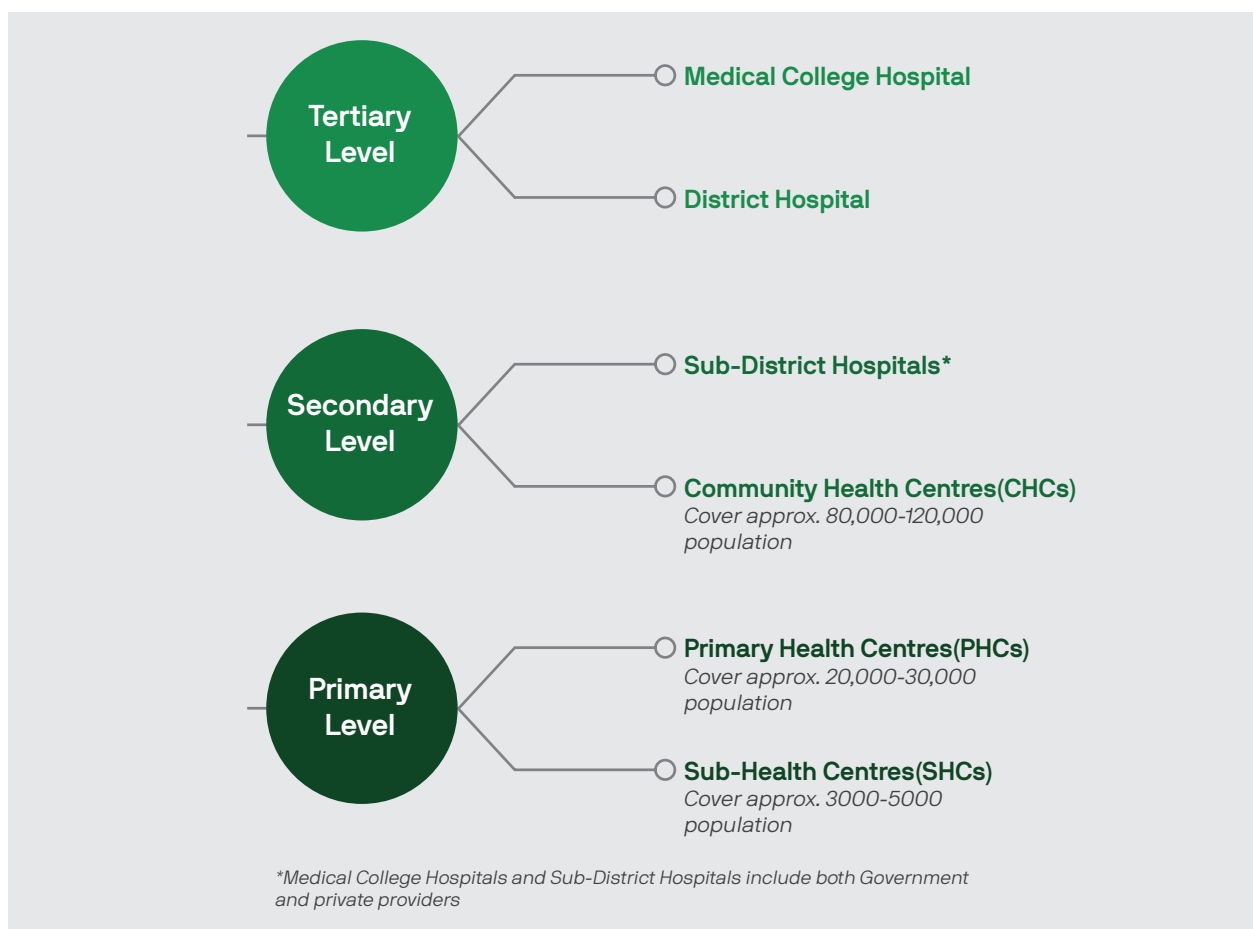


1.2 Health system structure and NCD strategy, policies, and activities

Within the federal structure of India, responsibilities are divided between the national government and state governments. The Union Ministry of Health and Family Welfare (MoHFW) is instrumental and responsible for policy direction of various programs on a national scale in the areas of health and family welfare in preventing and controlling the spread of disease outbreaks and epidemics through technical assistance. The states are responsible for the implementation, and budget allocations of various health programs and districts are the units of implementation. The public health system administers its care through a structured machinery of the National Health Mission both in rural and urban areas.

At the district level, the Indian health care system is divided into primary, secondary, and tertiary levels.

Figure 6. Structure of National Health Mission.



The Union Ministry of Health and Family Welfare (MoHFW) is instrumental and responsible for policy direction of various programs on a national scale



Since 2010, the government has been implementing the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) through the National Health Mission. NCD cells have been established at national, state, and district levels for monitoring and evaluation of the program. They have been involved in development, monitoring, and coordination of programs at respective levels. A comprehensive list of NCD programs are attached in Appendix 1.

In 1982, the government of India launched the National Mental Health Programme (NMHP) and in 1996, the District Mental Health Programme. The latter envisages provision of basic mental health care services at the community level with the following objectives:

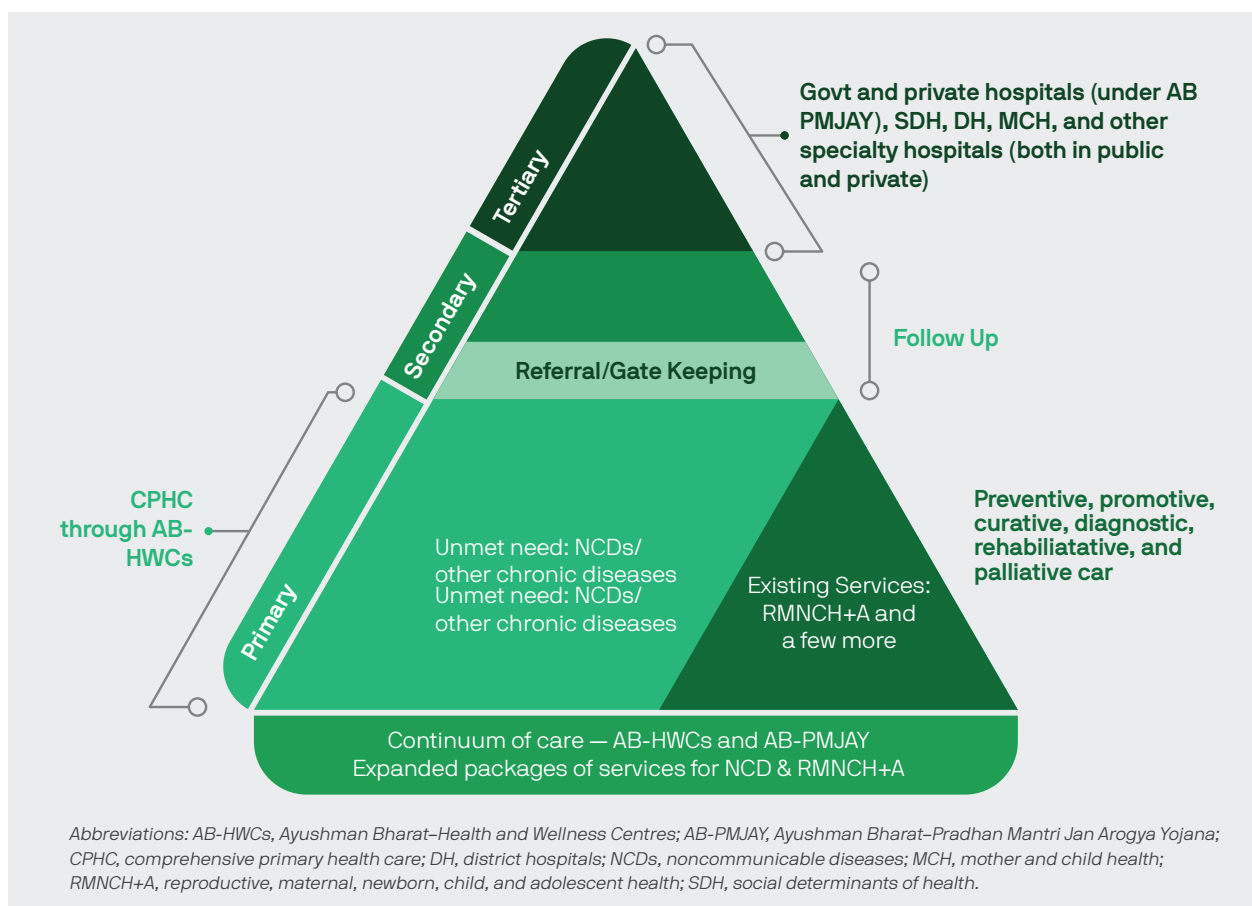
- To provide sustainable basic mental health services to the community and to integrate these services with other health services.
- To deliver early detection and treatment of patients within the community itself.
- To reduce the stigma of mental illness through public awareness.
- To treat and rehabilitate mental health patients within the community.

In 2018, the Ayushman Bharat program (Healthy India) was launched to move from a sectoral and segmented approach of health service delivery to a comprehensive need-based health care service at all tiers of care. The program has two components:

Health and Wellness Centres at the community level, providing comprehensive primary health care including free essential drugs and diagnostics.

Pradhan Mantri Jan Arogya Yojana (PMJAY) aiming at universal health coverage, providing health protection cover to poor and vulnerable people against financial risk arising out of catastrophic health episodes.

Figure 7. Schemata of Ayushman Bharat program.



1.3 Major stakeholders and their roles

Apart from the public sector, there are different organizations and stakeholders involved in NCD-related activities at the national, regional, and district levels. These have been categorized as shown Figure 8.

Figure 8. Indicative list of a key stakeholders in India's NCD landscape.

Academic Institutions	Public Health Foundation of India (PHFI), Institute of Public Health (IPH)
Bilateral and Multilateral Agencies	Bilateral: US Agency for International Development (USAID) Multilateral: World Health Organization (WHO), World Bank (WB), Asian Development Bank (ADB)
Corporate Social Responsibilities	Ambuja Cements, Reliance Industries , Roche-The Blue Tree Program, Sanofi NCD Patient Support Program,Lilly NCD Partnership
Foundations	Bill and Melinda Gates Foundation (BMGF), Tata Trust, Piramal Swasthya Foundation , Maverick Collectives ,Mariwala Health initiatives, Healix Sekhsaria Institute of Public Health ,
Inclusive Business Models	SWASTH India , Nano healthcare, Navya Care , Novartis Social Business
NGOs and Civil Society Organizations	PATH, William J Clinton Foundation, Jhpiego,The UNION, Vital Strategies, Chest Research Foundation, People to People Foundation, Sangath, Basic Needs India, ECHO India, NCD Alliance, World NCD Federation, Global Health Advocacy Incubator

Key roles of stakeholders

Based on the responses from the stakeholder interviews, this report categorizes the main role that each of the stakeholders plays in the NCD ecosystem.

Investor/donor (bilateral/multilateral/foundation/CSR)

- Investments in NCD are viewed as long term, without immediate or tangible return on investments and limited by inadequate understanding of impact measurement, hence the preference for investments ranging for two to three years in communicable disease and reproductive, maternal, newborn, child, and adolescent health (RMNCH+A).
- Investment patterns show that most donors prefer to invest in one disease or a few risk factors and not across the NCD spectrum. Most investments are geared toward hypertension, diabetes, and cancer. Among risk factors, tobacco commands maximum interest and funding. COVID-19 has been instrumental in highlighting the necessity of investment in mental health and well-being.
- Bilaterals, multilaterals, and foundations prefer to invest in system-strengthening activities nonspecific to NCDs, while corporate social responsibility program (CSRs) prefer to invest in activities such as awareness building, screening camps, and referral services.
- CSRs prefer to invest in projects in states and districts where they have extensive market presence or have interests to expand their presence. On the other hand, traditional donors have preferred states that rank low in the Human Development Index.
- The WHO India Country Office plays a technical and policy advisory role, monitoring progress toward larger international targets under the Sustainable Development Goals and convening multistakeholder and inter-ministerial meetings.
- The World Bank India Country Office provides financial investment and technical advisory to the PMJAY program—India's largest health insurance program for secondary and tertiary care for those below the poverty line.

NGOs and CSOs

- This category comprises nongovernmental organization (NGO) international and national entities as well as civil society organizations (CSOs) that implement projects, pilot process innovations, and assist the government while they scale successful proof-of-concept initiatives. Most project designs had a public-private partnership (PPP) component.
- Implementers are constrained by the nature of funding that dictates how funding should be allocated and hence discrete activities are implemented instead of a holistic continuum-of-care approach.
- Despite best efforts, this stakeholder group has not been able to have significant impact on either mobilization of resources or raising visibility of the need for additional investment for NCDs. Concerted efforts for translation of intersectoral policies into solutions were absent.

Academic institutions

- Academic institutions focus on policy, operations, systems research evaluations, capacity-building, and design and analysis of large-scale surveys and compete with NGOs for grants in specific areas.

1.4 Improving NCD programming through health systems strengthening

The government of India, in its policy articulation and investments, is showing an increasing interest in NCDs and seems to be recognizing the importance of investing in NCD care. After the endorsement of the World Health Assembly resolution and Global Action Plan for Prevention and Control of NCDs, India became the first country globally to define its National NCD Monitoring Framework with country-specific targets and indicators and committed to ten targets and 21 indicators to be achieved by 2025. The COVID-19 epidemic has underscored the importance of why NCDs cannot be neglected any further. Though there are well-established NCD programs at the national and state levels, service delivery is impacted by inadequate financing, infrastructure, and human resources. The Ministry of Health and Family Welfare has developed extensive policies and guidelines for the NPCDCS, NMHP, and HWCs.



India became the first country globally to define its National NCD Monitoring Framework with country-specific targets and indicators and committed to ten targets and 21 indicators to be achieved by 2025

Introduction to NCD landscaping exercise

2.1 Goal and objectives

PATH, with funding from Access Accelerated, conducted a landscape analysis of NCDs to map existing and emerging efforts and gaps in policy and practice in India. The goal of this study was to understand India's NCD ecosystem to ensure that future activities and investments are aligned with the national strategy.

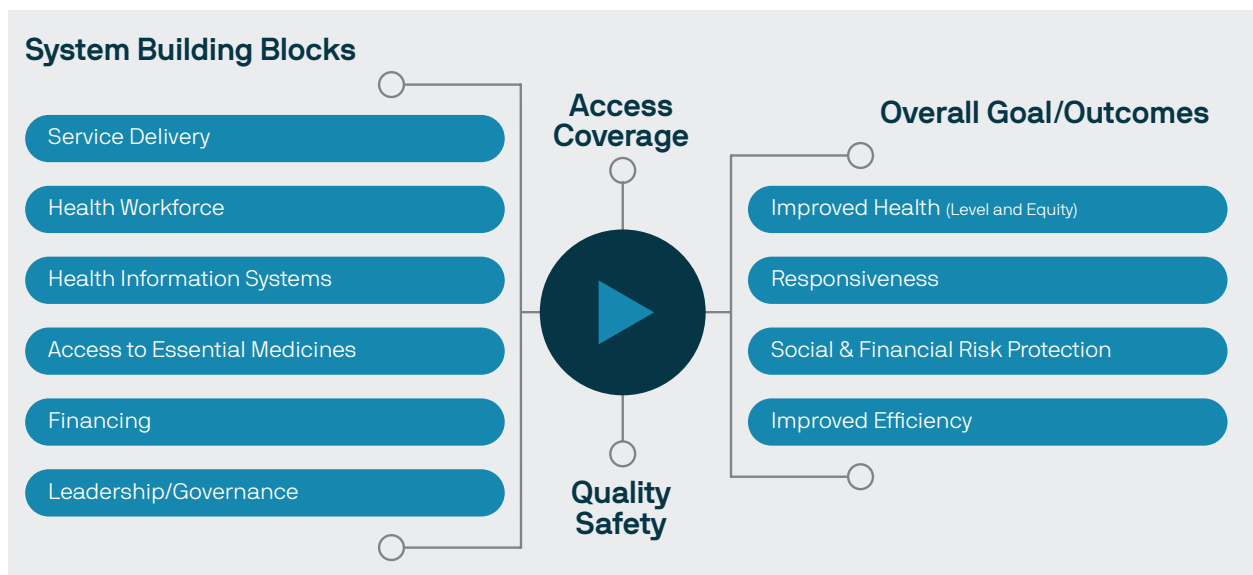
The objectives of the analysis were as follows:



This landscape assessment was analyzed through the lens of the six WHO building blocks, as defined here:

- Good service deliveries are those that deliver effective, safe, quality personal and nonpersonal health interventions to those who need them, when and where needed, with minimum waste of resources.
- A well-performing health workforce is one that works in responsive ways and is fair and efficient to achieve the best health outcomes possible, given available resources and circumstances.
- A well-functioning health information system is one that ensures the production, analysis, dissemination, and use of reliable and timely information on health determinants, health system performance, and health status.
- A well-functioning health system ensures equitable access to essential medical products, vaccines, and technologies of assured quality, safety, efficacy, and cost-effectiveness, with scientifically sound and cost-effective use.
- A good health system financing raises adequate funds for health, in ways that ensure people can use needed services and are protected from financial catastrophe or impoverishment associated with having to pay for them.
- Leadership and governance involve ensuring the existence of policy frameworks combined with effective oversight, coalition building, regulation, attention to system design, and accountability.

Figure 9. World Health Organization health systems framework.



2.2 Landscape research approach

The approach included three steps:

Step 1: Gathering information

- Secondary research:** An in-depth literature review was conducted to understand the NCD policies, programs, implementation models, and best practices (in selected states and any well-known national models of care). The secondary research was carried out through systemic reviews of documents/information available on public domain. The information was synthesized and used to develop a comprehensive understanding around the models' reach, coverage, and efficacy of implementation.
- Stakeholder analysis:** An in-depth stakeholder analysis was undertaken to get an understanding of the various actors and coordinating mechanisms within the NCD space. The stakeholder analysis helped to identify the NGOs, donors funding NCD-related interventions, efforts made by multilateral organizations, etc.
- Key informant interviews:** Key informant interviews were conducted with select relevant stakeholders identified in the stakeholder analysis. These included key government officials in charge of the NCD programs in the states, multilateral agencies, donors, NGOs, and other entities such as CSRs. The themes covered during these interviews were details of their models, outcomes achieved, program effectiveness, reach and quality, barriers to access, roles of different players, policy sufficiency to support interventions, etc. A list of stakeholders is attached as Appendix 2.



Step 2: Conducting critical analysis using WHO Framework of Analysis

A desk review was undertaken to identify a set of frameworks for analysis and their applicability to study objectives for the critical analysis of the data gathered through secondary research and key informant interviews.

Step 3: Compilation of findings

The secondary data and primary research were collated and compiled to understand and interpret the information. This was then converted into the landscaping report, which includes key insights and recommendations for investments.

Data collection tools

A list of national policies, treatment guidelines, and protocols were reviewed. Interview guides were developed for discussions with key stakeholders in the government and private sector (list of key respondents in Appendix 2 and interview guides in Appendix 3).

Study sites

For the purposes of the study, the research team proposed a deep-dive understanding at the national level and in 4 states (out of 30 states/federal entities) where the prevalence of NCDs were among the highest. The criteria for selection of the states were as follows.

- Step 1:** A compilation of prevalence rates for cancer, diabetes, hypertension, and obesity from various national surveys was prepared. States were ranked based on how they fared in relation to the national prevalence average of these conditions. Those that fared poorly in comparison to the national average were longlisted.
- Step 2:** The team layered additional selection criteria like epidemiological transition level, the national health index that ranks the overall status of health, and PATH's existing presence and governmental relationships in a state. Based on this two-step process, a score sheet was prepared to shortlist the states.
- Step 3:** States were divided region-wise, and one state was selected for each zone.
 - North—Uttar Pradesh
 - South—Kerala
 - West—Maharashtra
 - East—Odisha

2.3 Limitations

- **Short study duration:** The landscaping exercise relied primarily on desk research and discussions with key stakeholders. Any additional validation at field level and triangulation of data would have required a longer study period into specific areas.
- **COVID-19:** Due to the prevailing pandemic and pressing priorities, key persons in the government and other heads of organizations were not always receptive to long interviews.
- **Unavailability of data:** While key surveys indicated general prevalence rates of NCDs and their risk factors, there was limited information of how state governments were performing in their NCD portfolios, evaluations of their innovative interventions, and budgetary allocations.
- **In a mixed health system like India,** private health care providers and the for-profit ecosystem (for service delivery, technologies, etc.) play a major role. The study chose to focus only on the responses by governments and by the not-for-profit sector.

Challenges and recommendations

03

The following section highlights the challenges or barriers in the ability of health systems to deliver NCD care through the lens of the WHO health systems building blocks.



3.1 Service delivery

Challenges

- **Lack of prioritization of NCDs in service delivery impacts the quality of NCD care.** Despite renewed interest and increasing importance of NCDs, the program is largely geared to providing other services. Health facilities at the primary and secondary levels do not have the sufficient infrastructure, diagnostic, and management capacity to handle the additional NCD portfolio activities. NCDs are also divided into multiple vertical programs for hypertension, tobacco control, diabetes, cancer, etc., with separate reporting components, hence making a comprehensive overhaul more complex.
- **Operational delays in activating Health and Wellness Centres impact NCD care at the community level.** At the program launch in 2018, it was envisioned that India would have 150,000 HWCs. Only 56,513 (37 percent), however, are operationalized across the country. The unavailability of universal NCD care at the community level has hampered availability and access of services. Hence, crucial NCD screening services are not as prevalent as initially conceptualized.
- **Lack of unified systems across public and private sectors create challenges in patient data capture, resulting in low treatment adherence.** NCD care is ongoing and involves lifestyle changes. Medication and long-term medical care mean that diagnosed patients need to be consistent with their treatment demands. Apart from complexities around individual and community behavioral and adoption barriers, NCD care also poses a strain on the existing health system. Long-term follow-up on compliance to medication and tracking and updating individual records is an additional responsibility for the system already struggling with other priorities. Patient movement between public and private sectors as per choice and convenience compounds the above issue further. A near absence of systems to capture care, especially outpatient/primary care, means a patient could be lost to follow-up. In the worst-case scenario, NCD patients are not receiving care in any sector.
- **Poorly defined referral system from primary levels for specialized care impact treatment linkages.** Poorly defined referral networks within the government tiered facilities means that both frontline workers and patients themselves have limited clarity where to seek care when they present with serious NCDs or complications. More often than not, patients directly reach tertiary care facilities for conditions that could be managed at lower levels or end up reaching the tertiary care very late due to incomplete understanding of how and where to seek care. In the public-funded insurance program, cardiovascular surgeries and oncology packages were the top services availed and are among the most expensive as well. Patients usually present at late stages due to inadequate screening and inefficient referral services, thus necessitating more expensive surgeries and procedures.
- **Poor awareness about NCDs among the general population leads to delayed diagnosis and poor treatment adherence.** There is fear associated with NCDs because of myths, misconceptions, and lack of knowledge on what needs to be done. In donor-supported

programs implemented by NGOs, the focus seemed more on awareness generation with specific target groups like school children, factory workers, or white-collar employees; conducting screening camps for diabetes and hypertension through mobile medical units; and referral services to the nearest public health center. No funder or organization worked across all the risk factors and all the NCDs and hence a comprehensive approach was missing.

- **Stigma around mental health is a barrier to seeking care.** The stigma around mental health is still very prevalent in the country and is a barrier to seeking timely care. Furthermore, mental health care is dominated by medical treatment with limited focus on psychological and social rehabilitation.

Recommendations

- Strengthen the NCD component of universal health coverage through the Health and Wellness Centres by integrating digital health systems, electronic health records, and speedy implementation of the National Health ID.
- Design holistic interventions that involve upgrading infrastructure, deploying more efficient supply chain systems for drugs and diagnostics, designing and building an adequate referral mechanism to the appropriate level of care depending on the type of NCD, etc.
- Pilot and scale public-private partnership models in urban areas by involving private primary care providers with a continuum-of-care approach with call centers and e-vendors for dispensing medicines.
- Incorporate NCD awareness and screening services in school health programs and Adolescent Friendly Health Clinics under the National Health Mission.





3.2 Health workforce

Challenges

- **Shortage of human resources to provide NCD screening and referral services at primary care level impacts quality of care.** Most of the frontline workers, nurses, and doctors at these levels are catering to public health provisioning for other disease verticals, and staff shortages increase the work burden on existing staff. This challenge is ubiquitous in urban and rural areas but more pronounced in the latter. The gaps in capacity-building and limited understanding of NCD risk factors and long-term implications restrict their ability to provide holistic care.
- **Inadequate training and mentoring support for individuals providing NCD care, including frontline workers, CHWs, and informal providers impacts quality of care.** Due to the heavy patient load across health facilities, health care workers are simultaneously dealing with preventive, promotive, curative, and clinical work streams with limited bandwidth and hence present with inefficiencies during service delivery. The current training and capacity-building methods are classroom based and in lecture format, with very little scope to gauge actual learning. Post the training sessions, there is no system available for on-the-job guidance and training. There are limited models for digital training of frontline workers.

Recommendations

- Support public health systems to devise strategies to reduce the work burden on clinicians by delegating screening, diagnosing, and managing patient tasks.
- Develop a comprehensive and holistic training system with offline and digital components and adequate mentoring and guidance support.
- Train CHWs and informal providers to diagnose and refer care for NCDs including mental health.



3.3 Health information systems

Challenges

- **Lack of consistent and high-quality data on the NCD disease burden impacts planning and resource allocation.** There is no regular surveillance mechanism in place and there is a lack of quality data on the NCD disease burden, diagnosis, and service delivery. Limited efforts have been made around risk factor/behavior surveillance, other than tobacco and piecemeal efforts toward drug abuse/alcoholism. There is no way to measure the progress that has been made. The major sources for NCD data are from National Family Health Survey, cancer registries, India state-level disease burden reports, etc. Routine program data for data-driven decision-making is not a prevalent practice. Currently, a digital app/portal deployed by the Tata Trusts and Dell Foundation aims to collect data across multiple NCDs and at various points of care. The uptake has been inconsistent and varied across states due to general system-related gaps in data surveillance.

Studies that have analyzed the performance of health information systems of the NCD program have cited the nonavailability of data as one of the major challenges of the program. NCDs being a multisectoral disease will require collection of information beyond the health sector, and the existing systems for data collection and analysis are not aligned to other national health programs. Another study done in Odisha revealed lack of monitoring and supervision in the collection of NCD-related morbidity and mortality data. The study also found that surveillance for chronic diseases does

not seem to be integrated successfully into state and national health information systems. Moreover, the tendency has been to focus on gathering data for the coverage of specific services and surveillance for NCDs often for the purpose of ensuring accountability.

- **Absence of rigorous evaluations on NCD interventions in both public and private sectors impacts program improvements.** Research on NCDs is very individually driven and by private-sector institutions. While the state governments pilot and implement many ideas, most initiatives are not subjected to rigorous external evaluations. Hence, it is difficult to measure both short- and long-term impact of these pilots. Given the limitation of short-term projects for chronic care patients, the donor and NGO projects have a tendency to focus on inputs and process indicators as opposed to long-term wellness indicators.
- **Absence of a unified and countrywide data system to review routine NCD program data impacts planning and resource allocation.** The current system effective monitoring of NCD programs in India in the public sector is characterized by fragmentation and lack of coordination across various levels. The NPCDCS program has its own health information management system that collects monthly disaggregated data for each level of health facility on each individual disease. These formats are designed to capture data on new patients screened at the facility, the number of patients treated at the facility, and the number of patients referred to higher centers. A district NCD nodal officer is required to collate the data monthly and submit it to the NCD unit at the state.



Recommendations

- Assist frontline workers in the adoption and uptake of digital technologies to address the paucity and lack of quality of NCD service delivery data.
- Collaborate with government agencies to evaluate NCD interventions and use the findings for program improvement and advocacy.
- Utilize existing platforms to incorporate artificial intelligence and other technologies to facilitate improved health data collection, storage, and utilization with limited monetary investments.
- Build predictive models for NCD incidence, prevalence, and risk assessment using data analytics.
- Implement systems such as the NCD Navigator (mapping of country NCD initiatives implemented in Kenya and Ghana) to support planning, resource allocation, and alignment with the national strategy.

The current system effective monitoring of NCD programs in India in the public sector is characterized by fragmentation and lack of coordination across various levels.



3.4 Access to essential medicines

Challenges

- **Medication shortages and short prescription cycles create barriers in treatment adherence.** In the public health system, medicine shortage is a common challenge wherein patients are given medicines for durations of 7 or 15 days. Patients are then asked to return for subsequent refills. As NCDs tend to have long-term drug intake, patients find it cumbersome to come back at such short frequencies for subsequent prescriptions. Patients then prefer to buy drugs from chemists closer to their residence, which increases their out-of-pocket expenditure.
- **The lack of standardized treatment protocols and prescribing habits lead to challenges in access and consistent use.** Though NCD medicines are on the national medicines list, the lack of standardized treatment protocols and prescribing habits lead to challenges in access and consistent use. Clinicians do not consistently follow standardized treatment protocols due to the challenges of staying up to date with guidelines and the lack of consistent training.

Recommendations

- Strengthen the supply chain in the public sector to address the challenges arising as a result of shortage of medicines.
- Advocate and promote the uptake of standardized and evidence-based care for NCDs to bring in uniformity and consistency in the treatment modalities and medications being prescribed by different service providers.
- Develop community-based models for chronic care, treatment adherence support, and rehabilitation.



3.5 Health system financing

Challenges

- **Financing of NCDs in India remains low.** Financing for NCDs in low- and middle-income countries (LMICs) like India pose a big challenge to health systems due to the critical gaps in financial protection. India, like most of the LMICs, has relatively low levels of public expenditure on health and incomplete health insurance and health service coverage. The shortfall in public expenditure on health care is typically made by OOP and other private expenditures on health. The allocation of funding for NCD programming also remains low. Short-term vision, for the scope and duration of programs as well as funding, is the limiting factor for strong advocacy and call to action around NCDs.
- **The current national insurance scheme, Ayushman Bharat, covers most of the key NCD-related surgical procedures and in-patient treatment but does not cover most outpatient or primary care services.**

Recommendations

- Advocate with the public sector for additional allocations and transparency in expenditure data.
- Work with existing private donors to develop holistic, inclusive, and comprehensive funding strategies that are patient-centered (rather than disease-centered).
- Build mechanisms for institutionalizing health stack funding, where various social security schemes (central and state) are bundled together, to provide a lump sum amount for NCDs and specifically cancer care.



3.6 Leadership and governance

Challenges

- **Lack of intersectoral, interdepartmental collaboration makes it difficult to tackle the growing burden of NCDs in a holistic fashion.** There is a need for a strong policy framework that ensures all interventions directed toward NCDs are in sync and provide holistic care of the patient.
- **Commercial interests influence policy development leading to a lack of regulation and guidelines around risk factors for NCDs (other than tobacco).** Policy inertia, triggered by commercially driven interests (with the exception of tobacco, where strong advocacy efforts have led to strong regulations), has led to no regulations/guidelines around industries that heighten risk factors for NCDs.
- **No defined platform exists for the private sector to engage with state-level governments.** While the government has defined forums and platforms for engaging with the private sector/development partners/NGOs at a national level, no such mechanisms exist at the state level, which is the nerve center for a state's priorities.

Recommendations

- Support government development of a strong policy framework that ensures all NCD interventions provide holistic patient care.
- Strengthen multisector collaboration of government, industry, and communities through the various committees for NCD prevention and control to improve service delivery, financing, and infrastructure.
- Advocate for the production and sale of healthy food packages and introduction of sugar and salt tax for unhealthy food items.
- Advocate to increase the resource allocation for building NCD infrastructure, equipment (cancer treatment centers, etc.), and other interventions in states prioritized by disease burden.



3.7 Resilience during and after COVID-19 pandemic

Challenges

- **During the COVID-19 lockdown, NCD patients faced interruptions in medication procurement, access to health facilities, and maintenance of regular medical checkups due to a shortage of essential medicines, higher drug prices, and unavailability of government transportation.** From March 2020 to September 2020, the public- and private-sector health care systems were geared and focused on prioritizing COVID-19 care. Patients with existing ailments postponed hospital visits and consultations due to fear of infections in health care facilities. During the lockdown, the NCD patients had faced many challenges, including interruption of day-to-day activities, such as routine exercise, limitations in venturing out to buy medicines, and the inability to reach testing centers and health centers, etc. In addition, shortages of essential medicines, higher prices of drugs, and unavailability of government transportation also affected the patients.
- **Both the public and private sectors expanded telemedicine platforms for consultations, but these were inaccessible to patients without access to smartphones or internet.** The public- and private-sector health care systems expanded services through telemedicine platforms for consultations. The public-sector platform was called the e-sanjeevani, and private-sector providers used commonly available platforms such as Zoom and WhatsApp video calls, but those without access to smartphones or personal devices were unable to access any form of care.

Recommendations

- Integrate COVID-19 and NCD screening at primary and secondary levels of care and ensure patients are referred and linked to appropriate facilities for specialized care.
- Develop strategies for long-term follow-up of recovered COVID-19 patients with existing comorbidities by building up risk profiles for NCD patients.
- Increase outreach and awareness programs on COVID-19 complications for NCD patients.
- Implement community-based distribution of NCD medicines to address interruptions in access to medicines.

Recommendations for investments

04

Analyzed through the lens of WHO building blocks and based on the study findings and our on-ground knowledge of the local health systems, we propose and recommend interventions to address some of the key barriers.



1. Strengthen the roll out of NCD packages under the Comprehensive Primary Health Care Program in rural areas

Rationale: NCD care at the primary level is the need of the hour, especially in many rural areas where the public health care system is the sole source of medical care. COVID-19 has underscored the importance of ensuring people with existing co-morbidities receive timely and consistent care to prevent complications.

Accelerate the roll out of NCD preventive, promotive, and treatment services for hypertension, diabetes, screening, and referral services for cancer and mental health. This can be operationalized using the following strategies:

- Adopt and implement innovative digital training modules for frontline workers.
- Design referral services from health and wellness centres to appropriate secondary and tertiary care to reduce delay in diagnosis and treatment. Assist the roll out of the National Health ID and Electronic Health Records Systems.
- Deploy easy-to-use and cost-effective point-of-care diagnostics.



2. Pilot NCD packages with private sector primary care providers in urban area

Rationale: Primary care in the urban areas (especially the low-income localities) are dominated by general practitioners and non-allopathic physicians. They command a large loyal patient base for primary care issues due to their proximity to slums and low consultation costs.

- Design financial packages for out-patient care (diagnostics and drugs) of NCD conditions that can be managed at primary care levels. These financial packages could be in the form of pre-paid insurance plans /risk pooling to help lessen out-of-pocket expenditure in the long run.
- Build linkages to government systems for data sharing between the private and public sector. Develop systems for referral and long-term follow-up using digital technologies.
- Train CHWs and family members to support long-term follow-up and support treatment adherence.



3. Deploy comprehensive mental health services using digital health tools

Rationale: It is estimated that nearly 7.5% of the population suffers from some mental disorder. COVID-19 has exacerbated and impacted mental health across the world. There is a huge shortage of psychiatrists and psychologists in the country as compared to the number of people suffering from mental health issues.

- Pilot hybrid models of in-person and digital mental health care to address the growing mental health burden in the country.

- Build the capacity of primary care physicians and community health volunteers to diagnose, treat, and refer patients for common mental health conditions.
- Design health promotion campaigns to fight the stigma against mental health



4. Build a comprehensive intervention for cervical cancer elimination and breast cancer care through public and private sectors

Rationale: India contributes about 122,844 cervical cancer and 144,937 breast cancer cases every year and accounts for nearly one-third of the global cervical cancer deaths, with women facing a 1.6% cumulative risk of developing cervical cancer and 1.0% cumulative death risk from cervical cancer. Similarly, the cumulative risk of developing breast cancer is 2.7%, and cumulative death risk is 1.5%.

- Collaborate with the national and state governments and the private sector to build out a comprehensive intervention to improve awareness, strengthen screening services, and treatment of pre-cancerous lesions.



5. Build a comprehensive intervention to tackle the obesity epidemic

Rationale: The latest National Family Health Survey indicates that 20 of 22 major states in India are seeing an increasing prevalence of obesity in adults and children. Obesity is associated with an elevated risk of several major NCDs, including type 2 diabetes, coronary heart disease, stroke, asthma, and several cancers. Hence, it is recommended to:

- Advocate with the Indian Food Safety Authorities to increase the visibility of obesity and related dangers.
- Design school-based programs for children, young adults, and caregivers to integrate good dietary practices and exercise in their daily routine. Pilot these models among school in low-income areas where the need is most pressing.



Conclusion

05

The India NCD landscape assessment highlights important gaps in NCD care in all of WHO key health system building blocks and also identifies interventions to address these gaps. At a critical juncture, as India is looking to strengthen its UHC program, it is paramount to ensure that NCD services are provided at all levels and with the best possible standards of care. The COVID-19 epidemic exposed the fault lines of under-resourced primary health care settings and how primary health care and empowered health care workers and communities are key for health systems strengthening

The image features a solid blue background. In the center, there is a dark blue circle containing the word "Appendices" in white. To the left and right of this central circle are two dark blue vertical rectangles, one on each side, creating a symmetrical design.

Appendices

Appendix 1. Comprehensive list of NCD programs

Name of the program	Year launched	Objectives	Main strategies
National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS)	2010	<ul style="list-style-type: none"> ● Health promotion through behavior change with involvement of community, civil society, community-based organizations, media, etc. ● Screening at all levels in the health care delivery system from subcenter and above for early detection of diseases covered under the program, including management and follow-up. ● To build capacity at various levels of health care for prevention, early diagnosis, treatment, rehabilitation, IEC/BCC, operational research, and rehabilitation. ● To provide logistic support for diagnosis and cost-effective treatment at primary, secondary, and tertiary levels of health care. ● To support development of NCD database through surveillance system and to monitor NCD morbidity and mortality and risk factors. 	<ul style="list-style-type: none"> ● Health promotion awareness generation and promotion of healthy lifestyle. ● Screening and early detection. ● Timely affordable and accurate diagnosis. ● Access to affordable treatment. ● Rehabilitation.
National Mental Health Programme (NMHP)	1982	<ul style="list-style-type: none"> ● To ensure the availability and accessibility of minimum mental health care for all in the foreseeable future, particularly the most vulnerable and underprivileged sections of the population. ● To encourage the application of mental health knowledge in general health care and in social development. ● To promote community participation in the mental health service development and to stimulate efforts towards self-help in the community. 	<ul style="list-style-type: none"> ● Early detection and treatment. ● Training: Imparting short-term training to general physicians for diagnosis and treatment of common mental illnesses with limited number of drugs under guidance of specialist. The health workers are being trained in identifying mentally ill persons. ● Information, Education and Communication: Public awareness generation. ● Monitoring: The purpose is for simple record keeping.
National Tobacco Control Programme	2007	<ul style="list-style-type: none"> ● Public awareness/mass media campaigns for awareness building and behavior change. ● Establishment of tobacco product testing laboratories to build regulatory capacity, as required under Cigarettes and Other Tobacco Products Act, 2003. 	

Name of the program	Year launched	Objectives	Main strategies
		<ul style="list-style-type: none"> ● Mainstreaming the program component as a part of the health delivery mechanism under the National Rural Health Mission framework. ● Mainstreaming research and training on alternate crops and livelihood in collaboration with other nodal ministries. ● Monitoring and evaluation, including surveillance, e.g., Global Adult Tobacco Survey India. 	<ul style="list-style-type: none"> ● Planning, monitoring, and evaluation of the different activities envisaged under the program. ● National-level public awareness campaigns. ● Implementation of the Food Safety and Standards Authority of India regulation in the state.
National Programme for Palliative Care (NPPC)	2012	<ul style="list-style-type: none"> ● Improve the capacity to provide palliative care service delivery within government health programs such as the National Program for Prevention and Control of Cancer, Cardiovascular Disease, Diabetes, and Stroke; National Program for Health Care of the Elderly; the National AIDS Control Program; and the National Rural Health Mission. ● Refine the legal and regulatory systems and support implementation to ensure access and availability of opioids for medical and scientific use while maintaining measure for preventing diversion and misuse. ● Encourage attitudinal shifts among health care professionals by strengthening and incorporating principles of long-term care and palliative care into the educational curricula (of medical, nursing, pharmacy, and social work courses). ● Promote behavior change in the community through increasing public awareness and improved skills and knowledge regarding pain relief and palliative care, leading to community-owned initiatives supporting health care system. ● Develop national standards for palliative care services and continuously evolve the design and implementation of the national program to ensure progress toward the vision of the program. 	<ul style="list-style-type: none"> ● Provide essential funding to build capacity within the key health programs for NCDs, including cancer, HIV/AIDS, and efforts targeting elderly populations. ● Working across ministries of health and finance, the program will also ensure that the national law and regulations allow for access to medical and scientific use of opioids.

Appendix 2. Key stakeholders interviewed

NCD program managers in four study sites (16 persons).

List of private-sector stakeholders interviewed.

Donors (philanthropies/ foundations/ corporate social responsibility programs)	Piramal Swasthya Tata Trusts Maverick Collective Roche Medtronic Foundation
Nongovernmental organizations	The Union Jhpiego Vital Strategies Global Health Advocacy Incubator Sangath People-to-People Health Foundation Chest Research Foundation Indian Cancer Society Nada India Foundation ECHO India
Advocacy initiatives	NCD Alliance World NCD Federation
Academic research institutions	Public Health Foundation of India

Appendix 3. Interview Guides

1. How are screening, diagnosis, treatment, and referral for diabetes and hypertension and other NCDs happening at various levels of care? How are these coordinated?
2. How is service delivery for NCDs incorporated under the universal health coverage in your state? Can you also share some insights on the reforms in primary care for providing NCD services? (*Probe for primary care reforms, status of HWCs and NCD program, and provision of comprehensive package of NCD services.*)
3. What is the role of the private sector in delivering NCD care in your state? Do you have programs where the public sector is collaborating with the private sector for delivering NCD services? (*Probe for role of NGOs and community organizations and public-private partnership models in delivery of NCD services.*)
4. How are health workers coping with the NCD workload? Are they sufficiently placed and trained? Approximately how many positions are vacant at each level?
5. What is the surveillance and monitoring and evaluation in the state for NCD programs through HMIS/HIS platform? (*Probe integration of NCD surveillance with the Integrated Disease Surveillance Programme, m-health, or e-health initiatives of the state.*)
6. How do you plan budget allocations for your NCD programs?
7. How do you plan the procurement and distribution of NCD medicines and supplies?
8. Are there any government-funded insurance schemes or other health financing programs in the state covering NCDs? Please give details.
9. Are there any special programs/innovative measures in the state to deal with any of these diseases? Are there any best practices that became popular or appreciated by others?
10. What are the key challenges you face in expanding affordable and accessible service delivery of NCD services in your state?
11. How has the COVID-19 pandemic affected NCD services in your state?

A. Sector experts

1. Who are the key NGOs/ private entities working in these five NCDs?
2. Who are the key donors both from nonprofit as well as for-profit (like CSR of corporations/ pharma industry, etc.).
3. Can you refer us to any of the above-mentioned donors/implementers?
4. Can you share details on some of these interventions run by the NGOs/private entities, such as:
 - Problems these interventions are trying to solve, across the continuum of care?
 - Geographical scale?
 - Reach (beneficiaries)?
 - Cost of the interventions?
 - Any other relevant details?
5. Are any of these models addressing:
 - Health human resource issues, such as capacity-building and PPP?
 - Health information, such as new systems/ technologies and interventions using data for decision-making?
 - Access to medicines, such as improving the supply chain and provision of subsidized medicine?
6. Which of these are scalable models?
7. Which of these models are most cost-effective models—offer the most for the least investment?
8. How can one estimate the total funding coming in from the private sector for NCD prevention, care, and management?
9. Can you explain how private insurance companies are covering NCDs?
10. How is the government ensuring covering of NCDs in the private sector through PMJAY?
11. What are the mechanisms/forums through which government engages with the development partners/NGOs/private sector/etc. for coordinated efforts in NCD management?
12. Are you aware of any advocacy efforts by development partners (DPs)/NGOs/ CSOs around NCD policy formulation and implementation?

13. What, according to you, is a challenge in implementing NCD-related intervention?
14. What are the gaps in knowledge about the NCD burden, prevention, and controls strategies? What are the research and policy gaps and needs?
15. With the giving patterns changing largely due to COVID-19, what do you see as potential opportunity areas for philanthropic investment around NCDs? Intervention-centric or health system strengthening?
16. Are you aware of any global models or interventions which India can learn from?

B. NGOs

1. We would like to understand from you the efforts/interventions of your organization toward any of these five NCDs.
2. What are the key areas within the NCDs that you provide funding for and why?
3. What kind of organizations do you fund? Who are your key implementing partners?
4. Can you share some details about your funding strategy?
5. What are the core components of the program/interventions that you fund—goals and objectives, intervention design/model?
6. Under the interventions funded by your organization, the delivery of services to the beneficiaries is targeted at which stage of the continuum of care:
 - Prevention?
 - Diagnosis/screening?
 - Treatment?
 - Patient care and management?
7. Can you share some details on some of these interventions run by your organization:
 - Geographical scale?
 - Reach (beneficiaries)?
 - Cost of the interventions?
 - Funding source?
 - Any other relevant details?
8. Are any of these interventions/models addressing:
 - Health human resource issues, such as capacity-building and PPP?

- Health information, such as new systems/technologies and interventions using data for decision-making?
 - Access to medicines, such as improving the supply chain and provision of subsidized medicine?
9. What are the measurement, learning, and evaluation efforts around your interventions?
 10. Which of these are scalable models?
 11. Which of these models are most cost-effective models—offer the most for the least investment?
 12. Are you collaborating with government on any of the NCDs? Can you share details of the engagement? Who are the key donors both from nonprofit as well as for-profit (like CSR of corporations/pharma industry, etc.)?
 13. Can you refer us to any of the above-mentioned donors/your implementing partners?
 14. Can you explain how private insurance companies are covering NCDs?
 15. How is the government ensuring covering of NCDs in private sector through PMJAY?
 16. What are the mechanisms/forums through which government engages with the development partners/NGOs/private sector/etc. for coordinated efforts in NCD management?
 17. Are you aware of any advocacy efforts by DPs/NGOs/CSOs around NCD policy formulation and implementation?
 18. What, according to you, is a challenge in implementing NCD-related intervention?
 19. What are the gaps in knowledge about the NCD burden, prevention, and controls strategies? What are the research and policy gaps and needs?
 20. With the giving patterns changing largely due to COVID-19, what do you see as potential opportunity areas for philanthropic investment around NCDs? Intervention-centric or health system strengthening?
 21. Are you aware of any global models or interventions which India can learn from?

C. Donors

1. We would like to understand from you the efforts/interventions of your organization toward any of these five NCDs.
2. What are the key areas within the NCDs that you provide funding for and why?
3. What kind of organizations do you fund? Who are your key implementing partners?
4. Can you share some details about your funding strategy?
5. What are the core components of the program/ interventions that you fund—goals and objectives and intervention design/model?
6. Under the interventions funded by your organization, the delivery of services to the beneficiaries is targeted at which stage of the continuum of care:
 - Prevention?
 - Diagnosis/screening?
 - Treatment?
 - Patient care and management?
7. Can you share some details on some of these interventions run by your organization, such as:
 - Geographical scale?
 - Reach (beneficiaries)?
 - Cost of the interventions?
 - Funding source?
 - Any other relevant details?
8. Are any of these interventions/models addressing:
 - Health human resource issues, such as capacity-building and PPP?
 - Health information, such as new systems/ technologies and interventions using data for decision-making?
 - Access to medicines, such as improving the supply chain and provision of subsidized medicine?
9. What are the measurement, learning, and evaluation efforts around your interventions?
10. Which of these are scalable models?
11. Which of these models are most cost-effective— offer the most for the least investment?
12. Are you collaborating with government on any of the NCDs? Can you share details of the engagement?
13. Who are the key donors both from nonprofit as well as for-profit (like CSR of corporations/ pharma industry, etc.)?
14. Can you refer us to any of the above-mentioned donors/your implementing partners?
15. Can you explain on how private insurance companies are covering NCDs?
16. How is the government ensuring covering of NCDs in the private sector through PMJAY?
17. What are the mechanisms/forums through which government engages with the development partners/NGOs/private sector/etc. for coordinated efforts in NCD management?
18. Are you aware of any advocacy efforts by DPs/ NGOs/CSOs around NCD policy formulation and implementation?
19. What, according to you, is a challenge in implementing NCD-related intervention?
20. What are the gaps in knowledge about the NCD burden, prevention, and controls strategies? What are the research and policy gaps and needs?
21. With the giving patterns changing largely due to COVID-19, what do you see as potential opportunity areas for philanthropic investment around NCDs? Intervention-centric or health system strengthening?
22. Are you aware of any global models or interventions which India can learn from?

Appendix 4. Examples of innovative private-sector initiatives for stack funding for cancer

Name of the scheme/organization/funders	Details of coverage
Health Mutual Fund policy Developed by Inter Aide and ATIA Health Mutual Fund India Supported by Sanofi Espoir Foundation Implemented with support from six local NGO partners (Antyodaya, NSVK, Parvati, Prem Seva, SAI, and Uplift)	<p>Provides mutual health insurance services to micro-entrepreneurs who are generally excluded from any health coverage system. The model allows families to join to a mutual health insurance scheme for a fee of US\$1.50, creating social protection for the poorest families in certain districts of Pune and Mumbai.</p> <p>This scheme entitles members to claim i) a refund for hospitalization worth up to US\$210, ii) access to contracted health care providers where rates are negotiated on average 30% below standard market prices, iii) a system of referrals and telephone support (a health care hotline available 24/7), and iv) further preventive health activities (free medical consultations, health care briefings).</p> <p>This coverage includes cancer screening and treatment. As of December 2013, mutual health funds covered 14,058 families, or 54,230 individuals.</p>
Arogya Finance zero-interest loan Health Care Global Enterprises, which runs a cancer treatment hospital network in India, has partnered with Arogya Finance to offer first-year interest-free loans to cancer patients.	<p>Social health care venture that offers loans for medical treatment to the traditionally unbanked, using risk assessment tools. Arogya provides direct financial loans of US\$300 to US\$7,000 for a period of 12 months and pays the medical bills on behalf of the patient directly to the hospital or service provider. The loan tenure is from 6 months to 48 months with 0% interest rate for 1 year, 6% for 2 years, 8% for 3 years, and 9% for 4 years. A processing charge of 2% on loan amount is applicable. In addition to direct financial loans, patients can register for a cashless insurance card with an embedded preapproved loan based on their ability to pay.</p> <p>Implemented in Bengaluru, Gulbarga, and Mysuru.</p>
Arogya Finance provider loan	<p>A provider-initiated cancer treatment loan targeting the traditionally unbanked, with no interest for the first year.</p>
Fullerton Health equated monthly instalment (EMI) Supported by Michael & Susan Dell Foundation.	<p>Subsidized loan interest rates for patients who choose monthly instalment scheme with Fullerton India below its usual rates.</p>
New India Assurance Cancer Guard insurance scheme	<p>The health care policy covers inpatient hospitalization expenses incurred for cancer.</p>
Indian Cancer Society Cancer Cure Fund	<p>A nonprofit organization providing financial aid for treatment to needy cancer patients partnering with an asset management firm.</p>
Sparsh by Dr. Reddy's	<p>A patient assistance program by Dr. Reddy's to help economically challenged patients complete chemotherapy treatment.</p>
The Blue Tree Program (Roche)	<p>A comprehensive and integrated patient support program by Roche, also providing financial assistance to economically poor patients.</p>
Detect Early Save Her, Him (DESH) by Piramal	<p>A community-based cancer program for early screening and detection of oral, breast, and cervical cancer.</p>
Novartis Oncology Access program	<p>Designed to address the lack of access and reimbursement for cancer treatment in low- and middle-income countries.</p>

Appendix 5. Package of services made available under the NPCDCS

Health facility	Packages of services
Subcenter	1. Health promotion for behavior change and counseling
	2. Population-based/opportunistic screening of common NCDs, including cancer
	3. Referral of suspected cases to PHC/CHC and follow-up of patient
	4. Awareness generation of early warning signals of cancers
PHC	1. Health promotion for behavior change and counseling
	2. Population-based/opportunistic screening of diabetes, hypertension, and three common cancers
	3. Clinical diagnosis and treatment of common CVDs, including hypertension and diabetes; referral of complicated cases of DM/HTN
	4. Identification of early warning signals of common cancer
	5. Referral of suspected cases to CHC/DH and follow-up of patients put on treatment
CHC/FRUs	1. Prevention and health promotion, including counseling
	2. Early diagnosis through clinical and laboratory investigations (common lab investigations: blood sugar, lipid profile, ECG, ultrasound, x-ray, etc.)
	3. Management of common CVDs, diabetes, and stroke cases (outpatient and inpatient)
	4. Home-based care for bedridden chronic cases
	5. Referral of difficult cases to district hospital/higher-level health care facility
District hospital	1. Early diagnosis of diabetes, CVDs, stroke, and cancer, including emergency services particularly for MI and stroke
	2. Investigations: blood sugar, lipid profile, kidney function test, liver function test, ECG, ultrasound, x-ray, colposcopy, mammography, etc. (if not available, to be outsourced)
	3. Medical management of cases (outpatient, inpatient, and intensive care)
	4. Follow-up and care of bedridden cases
	5. Day care facility; follow-up chemotherapy in cancer cases
	6. Referral of difficult cases to higher-level health care facility
	7. Health promotion for behavior change and counseling; opportunistic screening for NCDs
Tertiary care centre	1. Comprehensive cancer care, including prevention, early detection, diagnosis, treatment, minimal access surgery after care, palliative care, and rehabilitation
	2. Mentoring of district hospitals and outreach activities

Abbreviations: CHC, Community Health Centre; CVDs, cardiovascular diseases; DM, diabetes mellitus; ECG, electrocardiogram; FRUs, first referral units; HTN, hypertension; NCDs, noncommunicable diseases; NPCDCS, National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke; PHC, Primary Health Centre.

Appendix 6. Bibliography

Sources for further information.

1. Non communicable diseases, <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases> (accessed 5 October 2020).
2. Mendis S, World Health Organization. *Global status report on noncommunicable diseases 2014*. 2014.
3. Omran AR. The epidemiologic transition: A theory of the epidemiology of population change. *Milbank Quarterly* 1971; 39: 509–538.
4. Popkin BM. The nutrition transition and obesity in the developing world. *J Nutr* 2001; 131: 871S–873S.
5. The chemistry of fullerenes | Nature, <https://www.nature.com/articles/363685a0> (accessed 1 December 2020).
6. WHO EMRO | Unhealthy diet | Causes | NCDs, <http://www.emro.who.int/noncommunicable-diseases/causes/unhealthy-diets.html> (accessed 1 December 2020).
7. Chakma JK, Gupta S. Lifestyle and Non-Communicable Diseases: A double edged sword for future India. *Indian Journal of Community Health* 2014; 26: 325–332.
8. Kassa M, Grace J. The Global Burden and Perspectives on Non-Communicable Diseases (NCDs) and the Prevention, Data Availability and Systems Approach of NCDs in Low-resource Countries. 2019, pp. 1–10.
9. Arokiasamy P. India's escalating burden of non-communicable diseases. *The Lancet Global Health* 2018; 6: e1262–e1263.
10. Gupta R, Gaur K, S. Ram CV. Emerging trends in hypertension epidemiology in India. *Journal of Human Hypertension* 2019; 33: 575–587.
11. Poddar AK, Khan TA, Sweta K, et al. Prevalence and causes of avoidable blindness and visual impairment, including the prevalence of diabetic retinopathy in Siwan district of Bihar, India: A population-based survey. *Indian J Ophthalmol* 2020; 68: 375–380.
12. Gupta R, Rao RS, Misra A, et al. Recent trends in epidemiology of dyslipidemias in India. *Indian Heart Journal* 2017; 69: 382–392.
13. Salvi S, Kumar GA, Dhaliwal RS, et al. The burden of chronic respiratory diseases and their heterogeneity across the states of India: the Global Burden of Disease Study 1990–2016. *The Lancet Global Health* 2018; 6: e1363–e1374.
14. Bagcchi S. Hypothyroidism in India: more to be done. *The Lancet Diabetes & Endocrinology* 2014; 2: 778.
15. Behera P, Patro BK. Population Based Cancer Registry of India – the Challenges and Opportunities. *Asian Pac J Cancer Prev* 2018; 19: 2885–2889.
16. Kastor A, Mohanty SK. Disease-specific out-of-pocket and catastrophic health expenditure on hospitalization in India: Do Indian households face distress health financing? *PLoS One* 2018; 13: e0196106.
17. Atre S. The burden of diabetes in India. *The Lancet Global Health* 2019; 7: e418.
18. 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* 2017; 390: 2437–2460.
19. Pati MK, Swaroop N, Kar A, et al. A narrative review of gaps in the provision of integrated care for noncommunicable diseases in India. *Public Health Rev*; 41. Epub ahead of print 13 May 2020. DOI: 10.1186/s40985-020-00128-3.
20. Engलगau MM, Karan A, Mahal A. The Economic impact of Non-communicable Diseases on households in India. *Globalization and Health* 2012; 8: 9.
21. Kataria I, Siddiqui M, Gillespie T, et al. A research agenda for non-communicable disease prevention and control in India. *Health Res Policy Syst*; 18. Epub ahead of print 30 October 2020. DOI: 10.1186/s12961-020-00639-0.
22. Thakur J, Prinja S, Garg CC, et al. Social and Economic Implications of Noncommunicable diseases in India. *Indian J Community Med* 2011; 36: S13–S22.
23. Pandey A, Kumar GA, Dandona R, et al. Variations in catastrophic health expenditure across the states of India: 2004 to 2014. *PLOS ONE* 2018; 13: e0205510.
24. Pandey A, Ploubidis GB, Clarke L, et al. Trends in catastrophic health expenditure in India: 1993 to 2014. *Bulletin of the World Health Organization* 2018; 96: 18.
25. Aryal KK, Mehata S, Neupane S, et al. The Burden and Determinants of Non Communicable Diseases Risk Factors in Nepal: Findings from a Nationwide STEPS Survey. *PLoS One*; 10. Epub ahead of print 5 August 2015. DOI: 10.1371/journal.pone.0134834.
26. What is CVD? - World Heart Day, <https://www.world-heart-federation.org/world-heart-day/world-heart-day-2019/cvds/> (accessed 29 October 2020).
27. Jain DV. Does Sedentary Lifestyle lead to Diabetes - Risks & Effects. *Medlife Blog: Health and Wellness Tips*, <https://www.medlife.com/blog/does-sedentary-lifestyle-lead-to-diabetes/> (2017, accessed 8 November 2020).
28. Singh M, Prasad CP, Singh TD, et al. Cancer research in India: Challenges & opportunities. *Indian J Med Res* 2018; 148: 362–365.
29. Chronic respiratory diseases, <https://www.who.int/westernpacific/health-topics/chronic-respiratory-diseases> (accessed 9 October 2020).

30. Overview of Mental Illness - Mental Health Disorders. *MSD Manual Consumer Version*, <https://www.msmanuals.com/home/mental-health-disorders/overview-of-mental-health-care/overview-of-mental-illness> (accessed 13 October 2020).
31. Depression, <https://www.who.int/news-room/fact-sheets/detail/depression> (accessed 13 October 2020).
32. Prabhakaran D, Jeemon P, Sharma M, et al. The changing patterns of cardiovascular diseases and their risk factors in the states of India: the Global Burden of Disease Study 1990–2016. *The Lancet Global Health* 2018; 6: e1339–e1351.
33. Bhise MD, Patra S. Prevalence and correlates of hypertension in Maharashtra, India: A multilevel analysis. *PLoS One*; 13. Epub ahead of print 5 February 2018. DOI: 10.1371/journal.pone.0191948.
34. NHIS - Adult Tobacco Use - Glossary, https://www.cdc.gov/nchs/nhis/tobacco/tobacco_glossary.htm (2019, accessed 15 November 2020).
35. Kaur P, Ramachandra Rao S, Venkatachalam R, et al. Risk factors for cardiovascular disease in rural South India: cohort study. *BMJ Open*; 9. Epub ahead of print 28 October 2019. DOI: 10.1136/bmjopen-2019-029759.
36. GATS2 (Global Adult Tobacco Survey) Fact Sheet, India, 2016–17. 4.
37. Kerala-GATS2-Factsheet.pdf, https://tiss.edu/uploads/files/30_KL.pdf (accessed 15 November 2020).
38. Maharashtra-GATS2-Factsheet.pdf, <https://tmc.gov.in/images/act/Maharashtra-GATS2-Factsheet-Countryspecific-latest-v13.pdf> (accessed 15 November 2020).
39. Uttar Pradesh GATS-2 Factsheet.pdf, <https://tmc.gov.in/images/act/Uttar%20Pradesh%20GATS-2%20Factsheet%20.pdf> (accessed 15 November 2020).
40. Odisha GATS-2 Factsheet.pdf, <https://tmc.gov.in/images/act/Odisha%20GATS-2%20Factsheet.pdf> (accessed 15 November 2020).
41. Sarma PS, Sadanandan R, Thulaseedharan JV, et al. Prevalence of risk factors of non-communicable diseases in Kerala, India: results of a cross-sectional study. *BMJ Open* 2019; 9: e027880.
42. MadavanakaduDevassy S, Webber M, Scaria L, et al. Social and behavioural risk factors in the prevention and management of cardiovascular disease in Kerala, India: a catchment area population survey. *BMC Cardiovascular Disorders* 2020; 20: 327.
43. Srivastav S, Mahajan H, Goel S, et al. Prevalence of risk factors of noncommunicable diseases in a rural population of district Gautam-Budh Nagar, Uttar Pradesh using the World Health Organization STEPS approach. *J Family Med Prim Care* 2017; 6: 491–497.
44. Kumar M, Arya R, Shukla MK. Community based cross sectional study on prevalence of risk factors of type 2 Diabetes Mellitus in adult population residing in urban area of Shahjahanpur, Uttar Pradesh. 5.
45. Patro S, Kande S, Deo DS, et al. Cardio vascular risk profile among diabetic patients attending a tertiary care hospital in Odisha, India. *International Journal of Advances in Medicine* 2019; 6: 475–480.
46. ICMR-NCDIR. *Report of National Cancer Registry Programme*. Bengaluru, India: Indian Council of Medical Research- National Centre for Disease Informatics and Research, 2020.
47. Krishnatreya M. Cancer trends and burden in India. *The Lancet Oncology* 2018; 19: e660.
48. Dinesh TA, Nair P, Abhijath V, et al. Economics of cancer care: A community-based cross-sectional study in Kerala, India. *South Asian Journal of Cancer* 2020; 9: 7.
49. Borse V, Konwar AN, Buragohain P. Oral cancer diagnosis and perspectives in India. *Sensors International* 2020; 1: 100046.
50. Mohanty DP, Nayak DB. Office Bearers of IMA Odisha State Branch 2016–17. 58.
51. Chronic obstructive pulmonary disease (COPD), [https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-\(copd\)](https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd)) (accessed 20 October 2020).
52. Labaki WW, Han MK. Chronic respiratory diseases: a global view. *The Lancet Respiratory Medicine* 2020; 8: 531–533.
53. Agrawal S, Pearce N, Ebrahim S. Prevalence and risk factors for self-reported asthma in an adult Indian population: a cross-sectional survey. *The International Journal of Tuberculosis and Lung Disease* 2013; 17: 275–282.
54. Poongadan MN, Gupta N, Kumar R. Lifestyle factors and asthma in India — a case-control study. *Advances in Respiratory Medicine* 2016; 84: 104–108.
55. Karnam A, Ramaiah I. A study of chronic obstructive lung disease among women. *APIK Journal of Internal Medicine* 2019; 7: 117.
56. Salvi S, Barnes PJ. Is Exposure to Biomass Smoke the Biggest Risk Factor for COPD Globally? *CHEST* 2010; 138: 3–6.
57. Gakidou E, Afshin A, Abajobir AA, et al. 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. *The Lancet* 2017; 390: 1345–1422.
58. The burden of chronic respiratory diseases and their heterogeneity across the states of India: the Global Burden of Disease Study 1990–2016 - The Lancet Global Health, [https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(18\)30409-1/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(18)30409-1/fulltext) (accessed 11 October 2020).

59. Jat KR, Kabra SK. Awareness about childhood asthma. *Indian J Med Res* 2017; 145: 581–583.
60. Sharma V, Gupta R, Jamwal D, et al. Prevalence of chronic respiratory disorders in a rural area of North West India: A population-based study. *Journal of Family Medicine and Primary Care* 2016; 5: 416.
61. Kalkana T, Moitra S, Jindal SK, et al. Increasing burden of COPD in rural India: an example why India warrants primary healthcare reforms. *ERJ Open Research*; 2. Epub ahead of print 1 April 2016. DOI: 10.1183/23120541.00032-2016.
62. Mahmood T, Singh RK, Kant S, et al. Prevalence and etiological profile of chronic obstructive pulmonary disease in nonsmokers. *Lung India* 2017; 34: 122–126.
63. Willcox PA, Ferguson AD. Chronic obstructive airways disease following treated pulmonary tuberculosis. *Respir Med* 1989; 83: 195–198.
64. Bajpai J, Kant S, Bajaj DK, et al. Clinical, demographic and radiological profile of smoker COPD versus nonsmoker COPD patients at a tertiary care center in North India. *J Family Med Prim Care* 2019; 8: 2364–2368.
65. Soni NA. Risk Factors for Chronic Obstructive Airway Disease: A Hospital Based Prospective Study in Rural Central India. *Annals of Medical and Health Sciences Research* 2019; 9: 6.
66. An assessment of health-related quality of life among patients with chronic obstructive pulmonary diseases attending a tertiary care hospital in Bhubaneswar City, India, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6259520/> (accessed 20 October 2020).
67. Kashyap GC, Gupta J, Singh SK, et al. Addressing the disease burden of asthma and chronic bronchitis due to tobacco consumption: a study of Kanpur, India. *J Public Health (Berl)* 2020; 28: 313–322.
68. Schneiderman N, Ironson G, Siegel SD. Stress and health: psychological, behavioral, and biological determinants. *Annu Rev Clin Psychol* 2005; 1: 607–628.
69. How does stress impact our mental health?, <https://www.mqmentalhealth.org/posts/stress-and-mental-health> (accessed 13 October 2020).
70. GATS_India.pdf, http://www.indiaenvironmentportal.org.in/files/file/GATS_.pdf (accessed 17 November 2020).
71. Evaluation of prevalence, kap and prescribing pattern of drugs to type 2 diabetic patients and assessment of risk factors among the non-diabetic patients in a tertiary care hospital in southern kerala | international journal of pharmaceutical sciences and research, <https://ijpsr.com/bft-article/evaluation-of-prevalence-kap-and-prescribing-pattern-of-drugs-to-type-2-diabetic-patients-and-assessment-of-risk-factors-among-the-non-diabetic-patients-in-a-tertiary-care-hospital-in-southern-kerala/?view=fulltext> (accessed 30 October 2020).
72. Deepa M, Bhansali A, Anjana R, et al. Knowledge and awareness of diabetes in urban and rural India: The Indian Council of Medical Research India Diabetes Study (Phase I): Indian Council of Medical Research India Diabetes 4. *Indian journal of endocrinology and metabolism* 2014; 18: 379–85.
73. Goyal J, Raghav S, Kumar N, et al. Knowledge attitude and practice (KAP) of diabetes in Mathura Uttar Pradesh - An observational study. *International Journal of Medical Research and Review* 2019; 7: 482–489.
74. Chowdhury RK, Dora J, Priyadarshini K. Awareness and knowledge of Diabetic retinopathy among Diabetic patients in a tertiary care hospital of western Odisha, India. *Indian Journal of Clinical and Experimental Ophthalmology*; 5. Epub ahead of print 8 November 2019. DOI: <http://doi.org/10.18231/ijceo.2019.070>.
75. Jayaprakash M, Eralil G, Jose R, et al. Study on knowledge and practice of screening for cervical cancer among women from rural communities in central Kerala, India. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology* 2018; 7: 4165.
76. Prusty RK, Begum S, Patil A, et al. Knowledge of symptoms and risk factors of breast cancer among women: a community based study in a low socio-economic area of Mumbai, India. *BMC Women's Health* 2020; 20: 106.
77. Singh. Awareness of oral cancer, oral premalignant disorders and their risk factors among adult population in Bareilly city, <http://www.ijds.in/article.asp?issn=0976-4003;year=2020;volume=12;issue=3;spage=126;epage=131;aulast=Singh> (accessed 18 November 2020).
78. Khanna N, Ramaseshan A, Arnold S, et al. Community Awareness of HPV Screening and Vaccination in Odisha. *Obstetrics and Gynecology International* 2015; 2015: e694560.
79. Vanjare N, Chhowala S, Madas S, et al. Use of spirometry among chest physicians and primary care physicians in India. *npj Primary Care Respiratory Medicine* 2016; 26: 1–5.
80. Jadhav S, Littlewood R, Ryder AG, et al. Stigmatization of severe mental illness in India: Against the simple industrialization hypothesis. *Indian J Psychiatry* 2007; 49: 189–194.
81. Venkatesh BT, Andrews T, Mayya SS, et al. Perception of stigma toward mental illness in South India. *J Family Med Prim Care* 2015; 4: 449–453.
82. Venkataraman S, Patil R, Balasundaram S. Why mental health literacy still matters: a review. *International Journal Of Community Medicine And Public Health* 2019; 6: 2723–2729.

83. Maulik PK, Devarapalli S, Kallakuri S, et al. Evaluation of an anti-stigma campaign related to common mental disorders in rural India: a mixed methods approach. *Psychol Med* 2017; 47: 565–575.
84. Anjana RM, Pradeepa R, Deepa M, et al. Prevalence of diabetes and prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural India: Phase I results of the Indian Council of Medical Research–INDiaDIABetes (ICMR–INDIAB) study. *Diabetologia* 2011; 54: 3022–3027.
85. UttarPradesh-NMHS-Report.pdf, <http://indianmhs.nimhans.ac.in/Docs/statereports/UttarPradesh-NMHS-Report.pdf> (accessed 11 October 2020).
86. Mental health services spread wings in Odisha - OrissaPOST. *Odisha News, Odisha Latest news, Odisha Daily - OrissaPOST*, <https://www.orissapost.com/mental-health-services-spread-wings-in-odisha/> (2020, accessed 4 November 2020).
87. Panda R, Mahapatra S, Persai D. Health system preparedness in noncommunicable diseases: Findings from two states Odisha and Kerala in India. *Journal of Family Medicine and Primary Care* 2018; 7: 565.
88. Agarwal A, Davies D, Goenka S, et al. Facilitators and barriers of heart failure care in Kerala, India: A qualitative analysis of health-care providers and administrators. *Indian Heart Journal* 2019; 71: 235–241.
89. UP Health System Strengthening Project (UPHSSP), <http://uphssp.org.in/> (accessed 10 October 2020).
90. Progress Report of NCD.docx-2.pdf, <http://www.nrhmorissa.gov.in/writereaddata/Upload/Documents/Progress%20Report%20of%20NCD.docx-2.pdf> (accessed 26 October 2020).
91. Mishra US, Rajan SI, Joe W, et al. Surveillance of Chronic Diseases: Challenges and Strategies for India. 44.
92. Koul PA. Chronic obstructive pulmonary disease: Indian guidelines and the road ahead. *Lung India* 2013; 30: 175–177.
93. Bhattacharyya P, Paul R, Nag S, et al. Treatment of asthma: Identification of the practice behavior and the deviation from the guideline recommendations. *Lung India* 2010; 27: 141–144.
94. Onyedum C, Ukwaja K, Desalu O, et al. Challenges in the Management of Bronchial Asthma Among Adults in Nigeria: A Systematic Review. *Ann Med Health Sci Res* 2013; 3: 324–329.
95. Physicians' Knowledge and Practice of Inhalation Therapy – An Indian Perspective. *CiplaMed*, <https://www.ciplamed.com/content/physicians-knowledge-and-practice-of-inhalation-therapy-an-indian-perspective> (accessed 19 October 2020).
96. Asthma self-management: a study in an emergency room of a chest hospital in delhi, India - PubMed, <https://pubmed.ncbi.nlm.nih.gov/23532570/> (accessed 19 October 2020).
97. Kotwani A, Chhabra SK, Tayal V, et al. Quality of asthma management in an urban community in Delhi, India. *Indian J Med Res* 2012; 135: 184–192.
98. Krishna MT, Mahesh PA, Vedanthan P, et al. An appraisal of allergic disorders in India and an urgent call for action. *World Allergy Organ J*; 13. Epub ahead of print 1 August 2020. DOI: 10.1016/j.waojou.2020.100446.
99. NMHS India report, <http://indianmhs.nimhans.ac.in/Docs/Report2.pdf> (accessed 13 October 2020).
100. Kerala-NMHS-Report.pdf, <http://indianmhs.nimhans.ac.in/Docs/statereports/Kerala-NMHS-Report.pdf> (accessed 11 October 2020).
101. Gupta S, Sagar R. National Mental Health Programme-Optimism and Caution: A Narrative Review. *Indian J Psychol Med* 2018; 40: 509–516.
102. India's 82% of the Population Suffers from High-Stress Levels, reveals the Cigna 360 Well-Being Survey 2019. *Punekar News*, <https://www.punekarnews.in/indias-82-of-the-population-suffers-from-high-stress-levels-reveals-the-cigna-360-well-being-survey-2019/> (2019, accessed 5 November 2020).
103. Singh O. District Mental Health Program - Need to look into strategies in the era of Mental Health Care Act, 2017 and moving beyond Bellary Model. *Indian Journal of Psychiatry* 2018; 60: 163.
104. Ke C, Gupta R, Xavier D, et al. Divergent trends in ischaemic heart disease and stroke mortality in India from 2000 to 2015: a nationally representative mortality study. *Lancet Glob Health* 2018; 6: e914–e923.
105. Tabish SA. Is Diabetes Becoming the Biggest Epidemic of the Twenty-first Century? *Int J Health Sci (Qassim)* 2007; 1: V–VIII.
106. Subramani SK, Yadav D, Mishra M, et al. Prevalence of Type 2 Diabetes and Prediabetes in the Gwalior-Chambal Region of Central India. *Int J Environ Res Public Health*; 16. Epub ahead of print December 2019. DOI: 10.3390/ijerph16234708.
107. Gupta A, Gupta R, Sharma KK, et al. Prevalence of diabetes and cardiovascular risk factors in middle-class urban participants in India. *BMJ Open Diabetes Research and Care* 2014; 2: e000048.
108. GLOBOCAN - World Health Organization (WHO). Estimated number of new cases in 2018, worldwide, both sexes, all ages. *International Agency for Research on Cancer* 2018; 852: 1.
109. Smith RD, Mallath MK. History of the growing burden of cancer in India: From antiquity to the 21st century. *Journal of Global Oncology* 2019; 2019: 1–15.
110. Sankaranarayanan R. Cancer prevention and care in India: An unfinished agenda. *The Lancet Oncology* 2014; 15: 554–555.
111. India.pdf, <http://rchiips.org/nfhs/NFHS-4Reports/India.pdf> (accessed 11 October 2020).

112. Sagar R, Dandona R, Gururaj G, et al. The burden of mental disorders across the states of India: the Global Burden of Disease Study 1990–2017. *The Lancet Psychiatry* 2020; 7: 148–161.
113. WHO | Mental disorders affect one in four people. WHO, https://www.who.int/whr/2001/media_centre/press_release/en/ (accessed 13 October 2020).
114. Accidental deaths & suicides in India 2018, National Crime Records Bureau, Ministry of Home Affairs. Available from: <https://ncrb.gov.in/sites/default/files/ADSI-2018-FULL-REPORT-2018.pdf> (accessed 13 October 2020).
115. Bhise MD, Patra S. Prevalence and correlates of hypertension in Maharashtra, India: A multilevel analysis. *PLoS One*; 13. Epub ahead of print 5 February 2018. DOI: 10.1371/journal.pone.0191948.
116. Prenissl J, Manne-Goehler J, Jaacks LM, et al. Hypertension screening, awareness, treatment, and control in India: A nationally representative cross-sectional study among individuals aged 15 to 49 years. *PLOS Medicine* 2019; 16: e1002801.
117. Meshram II, Rao MVV, Rao VS, et al. Regional variation in the prevalence of overweight/obesity, hypertension and diabetes and their correlates among the adult rural population in India. *British Journal of Nutrition* 2016; 115: 1265–1272.
118. Somasundaran A, Potty SN. Epidemiological Profile of Stroke in Central Kerala. 2020; 8: 5.
119. Vakade K, Thorat V, Khanwelkar C, et al. A study of prescribing pattern of drugs in patients of cardiovascular emergencies at a tertiary care hospital of Western Maharashtra. *International Journal of Research in Medical Sciences* 2016; 556–561.
120. National Family Health Survey, http://rchiips.org/nfhs/factsheet_nfhs-4.shtml (accessed 7 November 2020).
121. Kapoor N, Lotfaliany M, Sathish T, et al. Prevalence of normal weight obesity and its associated cardio-metabolic risk factors – Results from the baseline data of the Kerala Diabetes Prevention Program (KDPP). *PLOS ONE* 2020; 15: e0237974.
122. Agrawal V, Kshirsagar A, Patil V. Risk factors of type 2 diabetes mellitus in rural population of Karad, Maharashtra, India: an observational study. *International Journal of Advances in Medicine* 2019; 6: 1584–1588.
123. Palo SK, Swain S, Priyadarshini S, et al. Epidemiology of obesity and its related morbidities among rural population attending a primary health centre of Odisha, India. *J Family Med Prim Care* 2019; 8: 203–208.
124. Sahoo1 A, Patnaik2 A. An Epidemiological Study of Diabetes Mellitus among Adult Population in an Urban Area of Odisha. *IJPHRD* 2019; 10: 707–710.
125. India diabetes report 2010 — 2045, <https://diabetesatlas.org/data/> (accessed 6 November 2020).
126. C S, B. K A. GESTATIONAL DIABETES MELLITUS- PREVALENCE AND OBSTETRIC OUTCOME. *Journal of Evidence Based Medicine and Healthcare* 2019; 6: 2299–2305.
127. Agrawal S, Das V, Agarwal A, et al. Prevalence of Gestational Glucose Intolerance and Gestational Diabetes in a Tertiary Care Centre in Northern India. *JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH*. Epub ahead of print 2018. DOI: 10.7860/JCDR/2018/36575.11915.
128. Hussain T, Das S, Parveen F, et al. Prevalence, risk factors and morbidities of gestational diabetes among pregnant women attending a hospital in an urban area of Bhubaneswar, Odisha. *Journal of Family Medicine and Primary Care* 2020; 9: 5327.
129. Jose J, Thomas N. How should one tackle prediabetes in India? *Indian J Med Res* 2018; 148: 675–676.
130. Prevalence of Chronic Kidney Disease (CKD) in Type 2 Diabetes Mellitus Patients: START-India Study | Abstract, <https://www.longdom.org/abstract/prevalence-of-chronic-kidney-disease-ckd-in-type-2-diabetes-mellitus-patients-startindia-study-30786.html> (accessed 16 October 2020).
131. Pande T, Huddart S, Xavier W, et al. Prevalence of diabetes mellitus amongst hospitalized tuberculosis patients at an Indian tertiary care center: A descriptive analysis. *PLoS One*; 13. Epub ahead of print 18 July 2018. DOI: 10.1371/journal.pone.0200838.
132. Singh M, Prasad CP, Singh TD, et al. Cancer research in India: Challenges & opportunities Quick. *Indian Journal Of Medical Research* 2018; 148: 362–365.
133. India State-Level Disease Burden Initiative Cancer Collaborators. Supplementary Appendix. *Lancet Oncology* 2018; 19: 0–55.
134. ICMR, PFHI, IHME. *India: Health of the Nation's States*. New Delhi, India, 2017.
135. The India State-Level Disease Burden Initiative | Public Health Foundation of India, <https://phfi.org/the-work/research/the-india-state-level-disease-burden-initiative/> (accessed 9 November 2020).
136. Sharmila C, Paul H L, SurendraNath S, et al. Cancer Patterns in Odisha - An Important Mining State in India. *International Journal of Cancer and Clinical Research*; 6. Epub ahead of print 2019. DOI: 10.23937/2378-3419/1410126.
137. Odisha.pdf, <http://rchiips.org/nfhs/NFHS-4Reports/Odisha.pdf> (accessed 11 October 2020).
138. Viswanathan K, Rakesh PS, Balakrishnan S, et al. Prevalence of chronic respiratory diseases from a rural area in Kerala, southern India. *Indian J Tuberc* 2018; 65: 48–51.

139. Londhe J, Kodgule R, Juvekar S, et al. Prevalence of chronic obstructive pulmonary disease (COPD) amongst farmers in rural India. *European Respiratory Journal*; 46. Epub ahead of print 1 September 2015. DOI: 10.1183/13993003.congress-2015.PA342.
140. Research (IJSR) IJ of S and. Search Results. *International Journal of Science and Research (IJSR)*, https://www.ijsr.net/search_index_results_paperid.php?id=SR20709130158 (accessed 11 October 2020).
141. Kar S, Mohapatra I, Konar A. Epidemiologic Correlates of Chronic Respiratory Infections in Adults an Urban Slum of Bhubaneswar, Odisha, India. *Global Journal of Health Science* 2016; 9: 64.
142. Lalu JS, Rakesh PS, Leelamoni K. Prevalence of bronchial asthma and factors associated with it among higher secondary school children in Ernakulam district, Kerala, Southern India. *J Family Med Prim Care* 2017; 6: 311–315.
143. Singh S, Sharma BB, Sharma SK, et al. Prevalence and severity of asthma among Indian school children aged between 6 and 14 years: associations with parental smoking and traffic pollution. *Journal of Asthma* 2016; 53: 238–244.
144. Kumar N, Kumar N, Sharma P. Prevalence of Bronchial Asthma among School Children in Urban and Rural Areas and Associated Risk Factors: A Cross Sectional Study from Western Uttar Pradesh, India. *International Journal Of Medical Science And Clinical Invention*. Epub ahead of print 31 January 2017. DOI: 10.18535/ijmsci/v4i2.02.
145. Operational Guidelines on Prevention, Screening and Control of Common NCDs_1.pdf, https://main.mohfw.gov.in/sites/default/files/Operational%20Guidelines%20on%20Prevention%2C%20Screening%20and%20Control%20of%20Common%20NCDs_1.pdf (accessed 23 October 2020).
146. Operational Guidelines of NPCDCS (Revised - 2013-17)_1.pdf, https://main.mohfw.gov.in/sites/default/files/Operational%20Guidelines%20of%20NPCDCS%20%28Revised%20-%202013-17%29_1.pdf (accessed 23 October 2020).
147. Chronic obstructive pulmonary disease (COPD) - Professional | National Health Portal Of India, [https://www.nhp.gov.in/chronic-obstructive-pulmonary-disease-\(copd\)-professional_pg](https://www.nhp.gov.in/chronic-obstructive-pulmonary-disease-(copd)-professional_pg) (accessed 16 October 2020).
148. Guidelines for Prevention and Managment of Stroke. pdf, <https://main.mohfw.gov.in/sites/default/files/Guidelines%20for%20Prevention%20and%20Managment%20of%20Stroke.pdf> (accessed 23 October 2020).
149. Kaur P. Indian Hypertenstion Control(Management) Initiative, [https://nhm.gov.in/New_Updates_2018/Good_practices_innovations/2018/5TH_NATIONAL_SUMMIT/Day_2/Session_III_\(Non_Communicable_Diseases\)/India_Hypertension_Control_\(Management\)_Initiative_ICMR.pptx](https://nhm.gov.in/New_Updates_2018/Good_practices_innovations/2018/5TH_NATIONAL_SUMMIT/Day_2/Session_III_(Non_Communicable_Diseases)/India_Hypertension_Control_(Management)_Initiative_ICMR.pptx).
150. Durgad K. Strentheninghypertention services and performance measures using Simple App in India, https://www.who.int/docs/default-source/searo/mhs/ihci-simple-app---or.pptx?sfvrsn=4a5245ee_2.
151. NCD- Non Communicable Diseases Control Programme – National Health Mission, /2020/03/23/ncd-non-communicable-diseases-control-programme/ (accessed 26 October 2020).
152. Tripathy JP, Sagili KD, Kathirvel S, et al. Diabetes care in public health facilities in India: a situational analysis using a mixed methods approach. *Diabetes MetabSyndrObes* 2019; 12: 1189–1199.
153. State Innovations in Family Planing Services Project Agency, <http://sifpsa.org/sampoorna.php> (accessed 6 October 2020).
154. Sweet Govt move on diabetes: Free medicines supply. *The New Indian Express*, <https://www.newindianexpress.com/states/odisha/2016/nov/13/sweet-govt-move-on-diabetes-free-medicines-supply-1538030.html> (accessed 5 October 2020).
155. Panda R, Mahapatra S, Persai D. Health system preparedness in noncommunicable diseases: Findings from two states Odisha and Kerala in India. *J Family Med Prim Care* 2018; 7: 565–570.
156. National Cancer Control Programme https://main.mohfw.gov.in/sites/default/files/1493693747note_0.pdf (accessed 19 October 2020).
157. National Centre for Disease Informatics and Research (NCDIR) annual report for 2016 - 2017, https://ncdirindia.org/Downloads/AR_2016_2017.pdf (accessed 19 October 2020).
158. National Cancer Control Programme Guidelines https://main.mohfw.gov.in/sites/default/files/4249985666nccp_0.pdf (accessed 19 October 2020).
159. Directorate General Of Health Services, https://dghs.gov.in/content/1363_3_NationalProgrammePreventionControl.aspx (accessed 19 October 2020).
160. (Beta version)National Institute of Health & Family Welfare, <http://www.nihfw.org/NationalHealthProgramme/NATIONALCANCERCONTROLPROGRAMME.html> (accessed 19 October 2020).
161. Chaudhry K, Luthra UK. CANCER REGISTRATION IN INDIA. 13.
162. Community Oncology, Regional Cancer Centre, Thiruvananthapuram, Kerala, <https://www.rcctvm.gov.in/community-oncology.php> (accessed 21 October 2020).
163. Patient Welfare Services, RCC, Thiruvananthapuram, Kerala, India, <https://www.rcctvm.gov.in/patient-welfare.php> (accessed 21 October 2020).

164. Telemedicine facilities, Regional Cancer Centre, RCC, Thiruvananthapuram, Kerala, India, <https://www.rcctvm.gov.in/telemedicine.php> (accessed 21 October 2020).
165. Nair MK. CANCER CONTROL IN KERALA, INDIA. 15.
166. Department of Epidemiology & Biostatistics, Regional Cancer Centre, RCC, Thiruvananthapuram, Kerala, India, <https://www.rcctvm.gov.in/division-of-epidemiology-and-biostatistics.php> (accessed 21 October 2020).
167. Rajagopal M, Karim S, Booth C. Oral Morphine Use in South India: A Population-Based Study. *Journal of Global Oncology* 2017; 3: JGO.2016.007872.
168. National Cancer Control Programme - Maharashtra State Health Status - Health Education to Villages, <https://hetv.org/india/mh/healthstatus/cancer-control.htm> (accessed 21 October 2020).
169. Fadnavis D. Cancer can be defeated if we work together. *mint*, <https://www.livemint.com/Opinion/qIK5cZvAXU82XjmDMw4iJK/Cancer-can-be-defeated-if-we-work-together.html> (2018, accessed 22 October 2020).
170. UP Health System Strengthening Project (UPHSSP), <http://uphssp.org.in/> (accessed 21 October 2020).
171. Chatterjee S, Chattopadhyay A, Senapati SN, et al. Cancer Registration in India - Current Scenario and Future Perspectives. *Asian Pac J Cancer Prev* 2016; 17: 3687–3696.
172. Super Specialty Cancer Institute (SSCI) to be inaugurated in Lucknow today. *Knocksense*, <https://www.knocksense.com/lucknow/super-specialty-cancer-institute-ssci-to-be-inaugurated-in-lucknow-today> (2020, accessed 21 October 2020).
173. S C, S C. Cancer Patterns in Odisha - An Important Mining State in India. DOI: 10.23937/2378-3419/1410126.
174. Reporter S. Odisha extends free cancer treatment to all districts. *The Hindu*, 30 May 2017, <https://www.thehindu.com/news/national/other-states/odisha-extends-free-cancer-treatment-to-all-districts/article18661253.ece> (30 May 2017, accessed 22 October 2020).
175. Cleary J, Simha N, Panieri A, et al. Formulary availability and regulatory barriers to accessibility of opioids for cancer pain in India: a report from the Global Opioid Policy Initiative (GOPI). *Annals of Oncology* 2013; 24: xi33–xi40.
176. National Tobacco Control Programme, http://ntcp.nhp.gov.in/acts_rules_regulations (accessed 9 November 2020).
177. Quit Tobacco | National Health Portal Of India, <https://www.nhp.gov.in/quit-tobacco> (accessed 16 October 2020).
178. Directorate General Of Health Services, https://dghs.gov.in/content/1350_3_ NationalMentalHealthProgramme.aspx (accessed 11 October 2020).
179. Presentation Revised Operational Guidelines on National Mental Health Program Available from: https://main.mohfw.gov.in/sites/default/files/ComprehensiveReport%20Part%202-83145794_1.pdf (accessed 11 October 2020)
180. Khurana S, Sharma S. National mental health program of India: a review of the history and the current scenario. *International Journal of Community Medicine and Public Health* 2016; 3: 1–9.
181. SampoornaManasikarogyam [https://nhm.gov.in/images/pdf/in-focus/MP/Day-2/2-SAMPOORNA-MANASIKAROGYAM.pptx#:~:text='SAMPOORNA%20MANASIKAROGYAM'%20\(Mental%20Health%20for%20all\)&text=Needed%20an%20implementation%20model%20to,to%20close%20the%20treatment%20gap](https://nhm.gov.in/images/pdf/in-focus/MP/Day-2/2-SAMPOORNA-MANASIKAROGYAM.pptx#:~:text='SAMPOORNA%20MANASIKAROGYAM'%20(Mental%20Health%20for%20all)&text=Needed%20an%20implementation%20model%20to,to%20close%20the%20treatment%20gap).
182. Annual Activity Report 2011-12, District Mental Health Programme (DMHP) Thiruvananthapuram Available from: https://dhs.kerala.gov.in/wp-content/uploads/2020/06/ar040912_compressed.pdf (accessed 11 October 2020).
183. Aarogya.com. National Mental Health Programme. www.aarogya.com, <https://www.aarogya.com/health-resources/health-programs/national-mental-health-programme.html> (accessed 11 October 2020).
184. National Mental Health Programme : Directorate of Medical & Health Services, Uttar Pradesh, <http://dgmhup.gov.in/EN/MentalHealth> (accessed 11 October 2020).
185. Dist hospital's Mann Kaksh to tackle mental illness to start from next week | Bareilly News - Times of India, <https://timesofindia.indiatimes.com/city/bareilly/dist-hospitals-mann-kaksh-to-tackle-mental-illness-to-start-from-next-week/articleshow/64263168.cms> (accessed 11 October 2020).
186. 'Dua se dawatak' scheme in Uttar Pradesh's 40 districts to treat mentally-ill patients | Bareilly News - Times of India, <https://timesofindia.indiatimes.com/city/bareilly/dua-se-dawa-tak-scheme-in-ups-40-districts-to-treat-mentally-ill-patients/articleshow/67493859.cms> (accessed 11 October 2020).
187. Annual Activity Report 2016-2017 Odisha https://health.odisha.gov.in/PDF/Health_Dept_AR_2016-17A.pdf.
188. National AYUSH Mission Framework for Implementation, <https://main.ayush.gov.in/sites/default/files/National%20AYUSH%20Mission%20.pdf> (accessed 2 December 2020).
189. Pati MK, Swaroop N, Kar A, et al. A narrative review of gaps in the provision of integrated care for noncommunicable diseases in India. *Public Health Reviews* 2020; 41: 8.

190. Directorate General Of Health Services, https://dghs.gov.in/content/1363_3_NationalProgrammePreventionControl.aspx (accessed 23 November 2020).
191. Free Drugs & Diagnostics Service Initiative :: National Health Mission, <https://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=1218&lid=192> (accessed 25 November 2020).
192. Gupta I, Ranjan A. Public expenditure on Non-Communicable Diseases & Injuries in India: A budget-based analysis. *PLoS One*; 14. Epub ahead of print 12 September 2019. DOI: 10.1371/journal.pone.0222086.
193. Pati S, Agrawal S, Swain S, et al. Non communicable disease multimorbidity and associated health care utilization and expenditures in India: cross-sectional study. *BMC Health Serv Res*; 14. Epub ahead of print 2 October 2014. DOI: 10.1186/1472-6963-14-451.
194. Tripathy JP, Prasad BM, Shewade HD, et al. Cost of hospitalisation for non-communicable diseases in India: are we pro-poor? *Tropical Medicine & International Health* 2016; 21: 1019–1028.
195. Kastor A, Mohanty SK. Disease-specific out-of-pocket and catastrophic health expenditure on hospitalization in India: Do Indian households face distress health financing? *PLoS One*; 13. Epub ahead of print 10 May 2018. DOI: 10.1371/journal.pone.0196106.
196. Engलगau MM, Karan A, Mahal A. The Economic impact of Non-communicable Diseases on households in India. *Global Health* 2012; 8: 9.
197. Chauhan AS, Prinja S, Ghoshal S, et al. Economic Burden of Head and Neck Cancer Treatment in North India. *Asian Pac J Cancer Prev* 2019; 20: 403–409.
198. Krishnan A, Gupta V, Ritvik, et al. How to Effectively Monitor and Evaluate NCD Programmes in India. *Indian J Community Med* 2011; 36: S57–S62.
199. WHO | Availability of data for monitoring noncommunicable disease risk factors in India. WHO, <https://www.who.int/bulletin/volumes/90/11/091041/en/> (accessed 25 November 2020).
200. Modified Write-up of National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS). pdf, [https://dghs.gov.in/WriteReadData/userfiles/file/Publication/Modified%20Write-up%20of%20National%20Programme%20for%20Prevention%20and%20Control%20of%20Cancer,%20Diabetes,%20Cardiovascular%20Diseases%20and%20Stroke%20\(NPCDCS\).pdf](https://dghs.gov.in/WriteReadData/userfiles/file/Publication/Modified%20Write-up%20of%20National%20Programme%20for%20Prevention%20and%20Control%20of%20Cancer,%20Diabetes,%20Cardiovascular%20Diseases%20and%20Stroke%20(NPCDCS).pdf) (accessed 21 November 2020).
201. Directorate General Of Health Services, https://dghs.gov.in/content/1352_3_NationalOralHealthProgramme.aspx (accessed 21 November 2020).
202. National Programme for Palliative care (NPPC) :: National Health Mission, <https://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=1047&lid=609> (accessed 21 November 2020).
203. Coronavirus in India: Latest Map and Case Count, <https://www.covid19india.org> (accessed 26 November 2020).
204. Cristelo C, Azevedo C, Marques JM, et al. SARS-CoV-2 and diabetes: New challenges for the disease. *Diabetes Res Clin Pract* 2020; 164: 108228.
205. COVID-19 in people with diabetes: understanding the reasons for worse outcomes - The Lancet Diabetes & Endocrinology, [https://www.thelancet.com/journals/landia/article/PIIS2213-8587\(20\)30238-2/fulltext](https://www.thelancet.com/journals/landia/article/PIIS2213-8587(20)30238-2/fulltext) (accessed 28 November 2020).
206. Risk of COVID-19-related death among patients with chronic obstructive pulmonary disease or asthma prescribed inhaled corticosteroids: an observational cohort study using the OpenSAFELY platform - The Lancet Respiratory Medicine, [https://www.thelancet.com/journals/lanres/article/PIIS2213-2600\(20\)30415-X/fulltext](https://www.thelancet.com/journals/lanres/article/PIIS2213-2600(20)30415-X/fulltext) (accessed 28 November 2020).
207. The risk and prognosis of COVID-19 infection in cancer patients: A systematic review and meta-analysis - ScienceDirect, <https://www.sciencedirect.com/science/article/pii/S1658387620301229> (accessed 28 November 2020).
208. Prevalence and impact of cardiovascular metabolic diseases on COVID-19 in China - PubMed, <https://pubmed.ncbi.nlm.nih.gov/32161990/> (accessed 27 October 2020).
209. Pal R, Bhadada SK. COVID-19 and non-communicable diseases. *Postgraduate Medical Journal* 2020; 96: 429–430.
210. Abrams EM, Szeffler SJ. Managing Asthma during Coronavirus Disease-2019: An Example for Other Chronic Conditions in Children and Adolescents. *J Pediatr* 2020; 222: 221–226.
211. CDC. Coronavirus Disease 2019 (COVID-19). *Centers for Disease Control and Prevention*, <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/asthma.html> (2020, accessed 11 October 2020).
212. Report-COVID-Clinical-Managment.pdf, <https://dhs.kerala.gov.in/wp-content/uploads/2020/07/Report-COVID-Clinical-Managment.pdf> (accessed 26 November 2020).
213. The psychological impact of quarantine and how to reduce it: Rapid review of the evidence | National Collaborating Centre for Determinants of Health, <https://nccdh.ca/resources/entry/the-psychological-impact-of-quarantine-and-how-to-reduce-it-rapid-review-of> (accessed 28 November 2020).

214. Galea S, Merchant RM, Lurie N. The Mental Health Consequences of COVID-19 and Physical Distancing: The Need for Prevention and Early Intervention. *JAMA Intern Med* 2020; 180: 817–818.
215. Daivadanam M, Absetz P, Sathish T, et al. Lifestyle change in Kerala, India: needs assessment and planning for a community-based diabetes prevention trial. *BMC Public Health* 2013; 13: 95.
216. Group TTMCC-19 W. The COVID-19 pandemic and the Tata Memorial Centre response. *Indian Journal of Cancer* 2020; 57: 123.
217. Ln S, M G. COVID-19: A 'Violent' pandemic for health care workers in India. *Current Opinion in Virus and Infectious Diseases - COVID* 2020; 1: 32–40.
218. www.ETHealthworld.com. The risk of a fatal outcome from COVID-19 is up to 50% higher in people with diabetes :Dr. V Mohan - ET HealthWorld. *ETHealthworld.com*, <https://health.economictimes.indiatimes.com/news/industry/the-risk-of-a-fatal-outcome-from-covid-19-is-up-to-50-higher-in-people-with-diabetes-dr-v-mohan/76009347> (accessed 20 November 2020).
219. Sharma S, Padma MV, Bhardwaj A, et al. Telestroke in resource-poor developing country model. *Neurol India* 2016; 64: 934–940.
220. Govt launches KIRAN, a 24x7 helpline for people to seek mental health counselling, <https://theprint.in/health/govt-launches-kiran-a-24x7-helpline-for-people-to-seek-mental-health-counselling/497542/> (accessed 11 October 2020).
221. Varghese BT. Covid19 pandemic; A practicing head and neck surgeon's perspective of an institutional model. *Oral Oncol* 2020; 106: 104765.
222. Arogya's mass awareness campaign with the National Health Mission, Uttar Pradesh - Events. *Voluntary Health Association of India*, <https://vhai.org/events/project-arogya-mass-awareness-campaign-with-the-national-health-mission-uttar-pradesh/> (2020, accessed 16 November 2020).
223. Thakur DK. Dr RoliMathur, Scientist F & Head, ICMR Bioethics Unit, NCDIR, Bengaluru. 17.
224. Community based diabetes prevention in Maharashtra, India, WDF15-1288. *World diabetes foundation*, <https://www.worlddiabetesfoundation.org/projects/india-wdf15-1288> (2017, accessed 5 October 2020).
225. Srivastava PV, Sudhan P, Khurana D, et al. Telestroke a viable option to improve stroke care in India. *Int J Stroke* 2014; 9 Suppl A100: 133–134.
226. National Programme for Prevention and Control:Bhopal Memorial Hospital & Research Centre,Goverment, http://bmhrc.ac.in/content/1363_3_NationalProgrammePreventionControl.aspx (accessed 24 October 2020).
227. Panicker V. EFFECT OF YOGA AS AN ADJUNCTIVE THERAPY ON THE RESPIRATORY FUNCTION OF COPD PATIENTS WITH MILD TO SEVERE GRADES OF SEVERITY IN A TERTIARY CARE CENTRE IN KERALA. *Chest* 2019; 156: A959.
228. VikramDevraj M, Pulmonology, EknathBahekar S, et al. Qualitative assessment of impact of interventions on rotahalor using technique in the patients of bronchial asthma and chronic obstructive pulmonary disease at a tertiary care hospital of rural Maharashtra. *IJIRM* 2019; 4: 218–220.
229. Agnihotri S, Kant S, Kumar S, et al. Impact of yoga on biochemical profile of asthmatics: A randomized controlled study. *Int J Yoga* 2014; 7: 17–21.
230. DHS Maharashtra and PHFI announce partnership for prevention of NCDs | Business Standard News, https://www.business-standard.com/article/news-ani/dhs-maharashtra-and-phfi-announce-partnership-for-prevention-of-ncds-119110801305_1.html (accessed 26 October 2020).
231. Emergency training for Doctors. *MediCircle*, <https://www.medicircle.in/emergency-training-for-doctors> (accessed 25 October 2020).
232. KEM Hospital gets advanced stroke centre. *The Hindu*, 11 October 2018, <https://www.thehindu.com/news/cities/mumbai/kem-hospital-gets-advanced-stroke-centre/article25184734.ece> (11 October 2018, accessed 25 October 2020).
233. Narasimhan L, Gopikumar V, Jayakumar V, et al. Responsive mental health systems to address the poverty, homelessness and mental illness nexus: The Banyan experience from India. *International Journal of Mental Health Systems*; 13. Epub ahead of print 1 December 2019. DOI: 10.1186/s13033-019-0313-8.
234. MHI :Mariwala Health Initiative, <https://mhi.org.in/partner/details/basic-needs-india/> (accessed 4 November 2020).
235. Shidhaye R, Gangale S, Patel V. Prevalence and treatment coverage for depression: a population-based survey in Vidarbha, India. *Soc Psychiatry PsychiatrEpidemiol* 2016; 51: 993–1003.
236. Shields-Zeeman L, Pathare S, Walters BH, et al. Promoting wellbeing and improving access to mental health care through community champions in rural India: theAtmiyata intervention approach. *Int J Ment Health Syst* 2017; 11: 6–6.
237. Agarwal A, Rai S, Upreti M, et al. Day care as an innovative approach in psychiatry: Analysis of Lucknow experience. *Indian journal of psychiatry* 2015; 57: 162–4.
238. Tian M, Ajay VS, Dunzhu D, et al. A Cluster-Randomized, Controlled Trial of a Simplified Multifaceted Management Program for Individuals at High Cardiovascular Risk (SimCard Trial) in Rural Tibet, China, and Haryana, India. *Circulation* 2015; 132: 815–824.
239. Three innovative approaches to combat cardiovascular disease. *Med-Tech Innovation |*

- Latest news for the medical device industry*, <https://www.med-technews.com/api/content/980deff8-e10e-11e9-8e4f-12f1225286c6/> (2019, accessed 14 November 2020).
240. Basu P, Mahajan M, Patira N, et al. A pilot study to evaluate home-based screening for the common non-communicable diseases by a dedicated cadre of community health workers in a rural setting in India. *BMC Public Health* 2019; 19: 1–12.
 241. QualityRights Gujarat. *Mental Health Innovation Network*, <https://www.mhinnovation.net/innovations/qualityrights-gujarat/> (2015, accessed 17 November 2020).
 242. Quality Rights Gujarat - Centre for Mental Health Law and Policy, <https://cmhlp.org/stories-of-changes/quality-rights-gujarat/> (accessed 17 November 2020).
 243. mh2: Mobile Health for Mental Health. *Mental Health Innovation Network*, <https://www.mhinnovation.net/innovations/mh2-mobile-health-mental-health/> (2014, accessed 19 November 2020).
 244. Maulik PK, Devarapalli S, Kallakuri S, et al. Systematic Medical Appraisal, Referral and Treatment (SMART) Mental Health Programme for providing innovative mental health care in rural communities in India. *Glob Ment Health (Camb)*; 2. Epub ahead of print 29 July 2015. DOI: 10.1017/gmh.2015.11.
 245. 5 Innovations Taking On Mental Health, <https://hundred.org/en/articles/5-innovations-taking-on-mental-health/> (2017, accessed 18 November 2020).
 246. Six mental health care projects in developing countries demonstrate effective, affordable options. *EurekaAlert!*, http://www.eurekaalert.org/pub_releases/2016-01/tca-pia012116.php (accessed 19 November 2020).
 247. It's time to consider pollution in NCD prevention – Authors' reply – The Lancet, [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)32179-2/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32179-2/fulltext) (accessed 1 December 2020).
 248. WHO | India: first to adapt the Global Monitoring Framework on noncommunicable diseases (NCDs). *WHO*, <https://www.who.int/features/2015/ncd-india/en/> (2015, accessed 7 November 2020).
 249. Daphtary M, Agrawal S, Vikram B. Human Resources for Cancer Control in Uttar Pradesh, India: A Case Study for Low and Middle Income Countries. *Front Oncol*; 4. Epub ahead of print 4 September 2014. DOI: 10.3389/fonc.2014.00237.
 250. Steurer-Stey C, Dalla Lana K, Braun J, et al. Effects of the 'Living well with COPD' intervention in primary care: a comparative study. *Eur Respir J*; 51. Epub ahead of print 2018. DOI: 10.1183/13993003.01375-2017.
 251. NCD- Non Communicable Diseases Control Programme – National Health Mission, /2020/03/23/ncd-non-communicable-diseases-control-programme/ (accessed 28 November 2020).
 252. Pandya A, Shah K, Chauhan A, et al. Innovative mental health initiatives in India: A scope for strengthening primary healthcare services. *J Family Med Prim Care* 2020; 9: 502–507.
 253. Murray LK, Dorsey S, Haroz E, et al. A Common Elements Treatment Approach for Adult Mental Health Problems in Low- and Middle-Income Countries. *CognBehavPract* 2014; 21: 111–123.
 254. Gupta A, Shridhar K, Dhillon PK. A review of breast cancer awareness among women in India: Cancer literate or awareness deficit? *European Journal of Cancer* 2015; 51: 2058–2066.
 255. WHO | Healthy Settings. *WHO*, <http://www.who.int/healthpromotion/healthy-settings/en/> (accessed 17 November 2020).



References

1. Centers for Disease Control and Prevention website. Global Health Protection and Security Noncommunicable Diseases page. <https://www.cdc.gov/globalhealth/healthprotection/ncd/global-ncd-overview.html>. Accessed September 24, 2020.
2. World Health Organization website. Noncommunicable diseases page. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>. Accessed September 24, 2020.
3. Engलगau MM, Karan A, Mahal A. The economic impact of non-communicable diseases on households in India. *Globalization and Health*. 2012;8:8–9. <https://doi.org/10.1186/1744-8603-8-9>.
4. Kataria I, Morris AMJ. Addressing chronic noncommunicable diseases is essential to strengthen urban resilience to communicable pandemic diseases. *Cities & Health*. Published online Aug 21, 2020. <https://doi.org/10.1080/23748834.2020.1805280>.
5. Thakur J, Prinja S, Garg CC, Mendis S, Menabde N. Social and economic implications of noncommunicable diseases in India. *Indian Journal of Community Medicine*. 2011;36(1):S13–22. <https://doi.org/10.4103/0970-0218.94704>.
6. Pandey A, Kumar GA, Dandona R, Dandona L. Variations in catastrophic health expenditure across the states of India: 2004 to 2014. *PLOS ONE*. 2018;13(10):e0205510. <https://doi.org/10.1371/journal.pone.0205510>.
7. India State-Level Disease Burden Initiative Mental Disorders Collaborators. The burden of mental disorders across the states of India: the Global Burden of Disease Study 1990–2017. *The Lancet Psychiatry*. 2020;7:148–161. [https://doi.org/10.1016/S2215-0366\(19\)30475-4](https://doi.org/10.1016/S2215-0366(19)30475-4).
8. India State-Level Disease Burden Initiative Cancer Collaborators. The burden of cancers and their variations across the states of India: the Global Burden of Disease Study 1990–2016. *Lancet Oncology*. 2018;19:1289–306.
9. India State-Level Disease Burden Initiative CVD Collaborators. The changing patterns of cardiovascular diseases and their risk factors in the states of India: the Global Burden of Disease Study 1990–2016. *Lancet Glob Health*. 2018;6:e1339–51.
10. India State-Level Disease Burden Initiative CRD Collaborators. The burden of chronic respiratory diseases and their heterogeneity across the states of India: the Global Burden of Disease Study 1990–2016. *Lancet Global health*. 2018;6:e1363–74.
11. Ministry of Health & Family welfare, Govt. of India. National Multi-sectoral action plan for prevention and control of common non-communicable diseases (2017–22). 2017 Oct. [cited on 2021 Jan. 25]; available from https://main.mohfw.gov.in/sites/default/files/National%20Multisectoral%20Action%20Plan%20%28NMAP%29%20for%20Prevention%20and%20Control%20of%20Common%20NCDs%20%282017-22%29_1.pdf
12. Mathur P, Sathishkumar K, Chaturvedi M et al. Cancer Statistics, 2020: Report From National Cancer Registry Programme, India. *JCO Global Oncology*. 2020;6:1063–75.
13. Ministry of Health & Family welfare, Govt. of India. National Diabetes and Diabetic Retinopathy Survey [internet]. 2019 Oct. [cited on 2021 Jan. 25]; available from <https://www.insightsonindia.com/2019/10/11/national-diabetes-and-diabetic-retinopathy-survey/>



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